Second Year Engineering									
Third Semester									
	Theory						Practical		
Code	**Course Name**		**Hours/ week L/T**	**Credit Theory**	**University Marks**	**Internal Evaluation**	**Hours/ Week L/T**	**Credit Practical**	**Marks**
PC	Mechanics of Solid		3-1	4	100	50			
PC	Fluid Mechanics & Hydraulics Machines		3-0	3	100	50	2	1	50
PC	Survey		3-0	3	100	50	2	1	50
PC	Geotechnical Engineering		3-0	3	100	50	2	1	50
PC	Construction Technology		3-0	3	100	50			
HS	Engineering Economics/ Organizational Behavior		2-1	3	100	50			
PC	Building Drawing						2	1	50
Total			19	19	600	300	8	4	200
Total Marks: 1100									
Total Credits: 23									
Honours		Concrete Technology / Construction Planning Management	4	4	100	50			
Minor		Mechanics of Solid							

Semester : 3rd

1.	PCI3D001	Honours(O2)	Concrete Technology	4-0-0	4
2.	PCI3D002	Honours(O2)	Construction Planning Management	4-0-0	4
3.	PEK3E001	HS(O1)	Engineering Economics	3-0-0	3
4.	POB3E002	HS(O1)	Organizational Behavior	3-0-0	3
5.	PCI3G001	Minor(CP)	Mechanics of Solid	4-0-0	4
6.	PCI3I001	PC(CP)	Mechanics of Solid	4-0-0	4
7.	PCI3I002	PC(CP)	Construction Technology	3-0-0	3
8.	PCI3I101	PC(CP)	Fluid Mechanics & Hydraulics Machines	3-0-1	4
9.	PCI3I102	PC(CP)	Survey	3-0-1	4
10.	PCI3I103	PC(CP)	Geotechnical Engineering	3-0-1	4
11.	PCI3I201	PC(CP)	Building Drawing	0-0-1	1
					27

PCI3I001 MECHANICS OF SOLID

Theory L/T (Hours per week): 3/1, Credit: 4

Module-I (12 classes)

Simple Stress and Strain -Load, Stress, Principle of St.Venant, Principle of Superposition, Strain, Hooke's law, Modulus of Elasticity, Stress-Strain Diagrams, Working Stress, Factor of safety, Strain energy in tension and compression, Resilience, Impact loads, Analysis of Axially Loaded Members, Composite bars in tension and compression, temperature stresses in composite rods, Statically indeterminate problems, Shear stress, Complimentary shear stress, Shear strain, Modulus of rigidity, Poisson's ratio, Bulk Modulus, Relationship between elastic constants.

Compound Stress and strain- Stresses in thin cylinders, thin spherical shells under internal pressure, wire winding of thin cylinders.Analysis of Biaxial Stress. Plane stress, Principal stress, Principal plane, Mohr's Circle for Biaxial Stress, Two dimensional state of strain, Mohr's circle for strain, Principal strains and principal axes of strain, strain measurements, Calculation of principal stresses from principal strains.

Module-II (10 classes)

Shear Force and Bending Moment for Determinate Beams - Types of load and Types of support. Support reactions,Shear force and bending moment, Relationship between bending moment and shear force, Point of inflection, Shear Force and Bending Moment diagrams for determinate beams.

Module-III (10 classes)

Simple Bending of Beams - Theory of simple bending of initially straight beams, Bending stresses, Shear stresses in bending, Distribution of normal and shear stress, beams of two materials, Composite beams.

Deflection of Beams - Differential equation of the elastic line, Slope and deflection of beams by integration method and area - moment method.

Module-IV (8 classes)

Theory of Columns - Eccentric loading of a short strut, Long columns, Euler's column formula, Lateral buckling, Critical Load, Slenderness ratio

Torsion in solid and hollow circular shafts - Twisting moment, Strain energy in shear and torsion, strength of solid and hollow circular shafts. Stresses due to combined bending and torsion, Strength of shafts in combined bending and twisting.

TEXT BOOKS

1. *Elements of Strength of Materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press*
2. *Strength of Materials by G. H. Ryder, Macmillan Press*
3. *Strength of Materials by R.Subramaniam, Oxford University Press*
4. *Strength of Material by S. S. Ratan, McGraw Hill*

REFERENCE BOOKS

1. *Mechanics of Materials by Beer and Johnston, McGraw Hill*
2. *Mechanics of Materials by R.C.Hibbeler, Pearson Education*
1. *3.Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall of India*

PCI3I101 FLUID MECHANICS & HYDRAULICS MACHINES

Theory L/T (Hours per week): 3/0, Credit: 3

Module-I (12 classes)

Introduction - Physical property of Fluid: Density, specific gravity, specific weight, specific volume, surface tension and capillarity, viscosity, compressibility and bulk modulus, Fluid classification.

Fluid statics - Pressure, Pascal's Law, Pressure variation for incompressible fluid, atmospheric pressure, absolute pressure, gauge pressure and vacuum pressure, manometer.Hydrostatic pressure on submerged surface, force on a horizontal submerged plane surface, force on a vertical submerged plane surface.Buoyancy and floatation, Archimedes' principle, stability of immersed and floating bodies, determination of metacentric height.

Module-II (10 classes)

Fluid kinematics - Introduction, description of fluid flow, classification of fluid flow.Reynold's number, Acceleration of fluid particles, flow rate and continuity equation, differential equation of continuity,Mathematical definitions of irrotational and rotational motion. Circulation, potential function and stream function. Flow net

Module-III (8 classes)

Fluid dynamics - Introduction, Euler's equation along a streamline, energy equation, Bernoulli's equation and its application to siphon, venturimeter, orificemeter, pitot tube.Flow in pipes and ducts: Loss due to friction, Minor energy losses in pipes Hydraulic Gradient Line (HGL), Total Energy Line (TEL), Power transmission in the fluid flow in pipes, fluid flow in pipes in series and parallel. Flow through nozzles.

Module-IV (10 classes)

Hydraulic turbine: Classification, Impulse and Reaction turbine; Tangential, Radial and axial turbine.Impulse turbine, Pelton wheel, bucket dimensions, number of buckets in pelton wheel, efficiency and performance curves.Reaction Turbines: Francis turbine and Kaplan turbine, velocity triangle and efficiencies, performance curve. Function of draft tube and casing cavitationCentrifugal Pump: constructional features, vane shape, velocity triangles, Efficiencies, Multi stage centrifugal pumps, Pump Characteristic, NPSH and Cavitation.Positive displacement pumps: Reciprocating Pump, Working principle, Discharge, work done and power requirement, Slip, Indicator diagram

TEXT BOOKS

1. *Fluid Mechanics and Hydraulic Machines, P. N. Modi&S.M Seth, STANDARD BOOK HOUSE*
2. *A Text Book of Fluid Mechanics and Hydraulic Machines, R.K.Bansal, Laxmi Publications*

3. *Fluid Mechanics and Machinery, CSP Ojha and P.N. Chandramouli, Oxford University Press*
4. *Engineering Fluid Mechanics & Hydraulic Machines, K. C. Patra, Narosa Publishing House, Standard Book House*

REFERENCE BOOKS

1. *Fluid Mechanics , J. F. Douglas, J. M. Gasiorek, J. A. Swaffield, , Pearson Education,*
2. *Fluid Mechanics, F. M. White, McGraw-Hill*
3. *Fluid Mechanics Foundations and Application of Mechanics, C.S.Jog, Cambridge University Press*
4. *Fluid Mechanics and Fluid Machines, Som&Biswas, McGraw Hill*
5. *Problems in Fluid Mechanics, Subramanyam, McGraw Hill*

FLUID MECHANICS & HYDRAULICS MACHINES LAB

1. *Determination of Metacentric Height*
2. *Proof of Bernoulli's Theory*
3. *Determination of Coefficient of Discharge for V-notch*
4. *Determination of Coefficient of Discharge for Orifice meter*
5. *Determination of Coefficient of Discharge for Venturimeter*
6. *Determination of Reynold'sNumber*
7. *Friction Flow through Pipes*
8. *Determination of losses due to bends, fittings and elbows in pipes*
9. *Impact of Jets*
10. *Efficiency of Francis Turbine*
11. *Characteristics of Pelton wheel turbine*
12. *Discharge through Centrifugal Pump.*

PCI3I102 SURVEY

Theory L/T (Hours per week): 3/0, Credit: 3

Module I (10 classes)

Linear measurement and chain survey: Use of chains and tapes for measurement of correct length of lines, direct and indirect ranging, chaining along sloping ground. Obstacle in chaining, errors and their elimination.

Compass surveying: Use of prismatic compass, temporary adjustment, bearing of a line, local attractions, correction of bearing

Module II (8 classes)

Levelling: Use of dumpy level and levelling staff.Temporary and Permanent adjustment of dumpy level, Reduction of levels by height of instrument and rise and fall method. Curvature and refraction error, sensitiveness of level tube, reciprocal levelling, levelling difficulties and common errors, Automatic and Electronic or Digital levels

Module III (10 classes)

Contouring: Contour interval and horizontal equivalent, characteristics of contours, methods of contouring- different and indirect method, contour gradient

Theodolite Survey: Use of theodolite, temporary adjustment, measuring horizontal and vertical angles, theodolite traversing

Module IV (8 classes)

Modern Surveying Instruments – Electromagnetic Spectrum, Radar, Electronic Distance Measurement, EDM Equipment, Corrections to measurement, Digital Theodolite, Total Stations, Introduction to Remote Sensing and GIS

Text Books

1. *Surveying &Levelling. Vol-I by T.P.Kanethar&S.V.Kulkarni, Pune VidyarthiGrihaPrakashan*
2. *Surveying and Leveling by R. Subramanian, Oxford University Press*
3. *Surveying- Vol.I, by B.C. Punmia, Laxmi Publications*

Reference Books

1. *Surveying Vol-1 by R Agor, Khanna Publishers*
2. *A Textbook of Surveying, C. Venkatramaiah, Universities Press*
3. *Surveying AndLevelling, N.N. Basak, McGraw-Hill Education*
4.

SURVEY – I LAB

1. *Testing of chain and measurement of correct length of the line and chain traversing.*
2. *Traversing by Compass*
3. *Horizontal and vertical angle by theodolite*
4. *Traversing by theodolite*
5. *Use of dumpy level and automatic level for fly levelling.*
6. *Contouring*
7. *Measurement of distance, horizontal and vertical angle by Total Station*
8. *Contouring by Total Station*

PCI3I103 GEOTECHNICAL ENGINEERING

Theory L/T (Hours per week): 3/0, Credit: 3

Module-I (10classes)

Origin of Soil and Grain Size: Rock Cycle and the origin of soil, soil particle size, clay minerals, mechanical analysis of soil, grain size distribution curve, particle shape, weight volume relationships, specific gravity, unit weight, void ratio, moisture content, and relationships, relative density, Consistency of soil: Atterberg limits - liquid limit, plastic limit, shrinkage limit. Liquidity index and consistency index, activity, soil structure. Engineering classification of soil: IS, USCS, HRB and ASTM.

Module-II (10 classes)

Soil Hydraulics: Modes of occurrence of water in soil. Stress conditions in soil- total, effective and neutral stresses and relationships. Permeability - Bernaulli's equation, Darcy's Law, hydraulic conductivity, laboratory determination of hydraulic conductivity, equivalent hydraulic conductivity in stratified soil. Seepage- Laplace equation of continuity, flow nets, seepage calculation from a flow net, flow nets in anisotropic soils, seepage through earth dam, critical hydraulic gradient and quick sand condition.

Soil Compaction: mechanism and principles, Standard and Modified Proctor Test, factors affecting compaction, effect of compaction on soil properties, field compaction techniques.

Module-III (10 classes)

Consolidation of soils: Consolidation and compaction, primary and secondary consolidation, Terzhaghi's theory of one dimensional consolidation, consolidation test, determination of coefficient of consolidation.Stresses in Soil: Normal and shear stresses on a plane, Boussinesq's solution for a point load, line load, strip load, uniformly loaded circular and rectangular areas, Isobar and pressure bulb concept, stress distribution on horizontal and vertical planes, Newmark's chart and its application, contact pressure.

Module-IV (10 classes)

Shear Strength: Mohr-Coulomb failure criterion, shear strength parameters and determination: direct and tri-axial shear test, unconfined compression test, vane shear test. Other methods of determining the un-drained shear strength of soil, sensitivity and thixotropy of clay.Stability of Slopes: Terminology, stability of finite and infinite slopes, Swedish slip circle method and friction circle method of analysis of slopes, Taylor stability Number and stability curves, Bishops Method.

TEXT BOOKS

1. *Principles of Geotechnical Engineering by Braja M. Das, Cengage Learning*
2. *Soil Mechanics and Foundation Engineering by B. C Punmia et al., Laxmi Publications Pvt Ltd*
3. *Soil Mechanics and Foundation Engineering, by K.R. Arora, Stanard Publishers*
4. *Soil Mechanics and Foundation Engineering by B.N.D. NarasingaRao, Wiley India Pvt. Ltd*

REFERENCE BOOKS

1. *Basic and applied soil mechanics, New Age International Publishers*
2. *Geotechnical Engineering by T.N. Ramamurthy & T.G. Sitharam,S. Chand & Co.*
3. *Geotechnical Engineering, S.K.Gulati and M. Datta, McGrow Hill*

GEOTECHNICAL ENGINEERING LAB

1. *Determination of specific gravity of soil grains*
2. *Determination of grain size distribution of soil*
   (a)Sieve test (b) Hydrometer/ pipette test
3. *Determination of Atterberg limits of soil*
   Liquid limit (b) plastic limit (c) shrinkage limit
4. *Measurement of soil compaction in the field*
   Core cutter method (b) Sand replacement method
5. *Determination of Density – Water content relationship of soil.*
   Proctor compaction test (ii) Modified Proctor compaction test (c) Use of Proctor penetration needle
6. *Determination of relative density of granular soil*
7. *Determination of shear strength parameters of soil*
   (a)Shear Box test (b) Tri-axial compression test (c) Unconfined compression test (d) Vane shear test
8. *Determination of consolidation characteristics of soil using fixed ring Oedometer*
9. *Determination of California Bearing Ratio (CBR) of soaked and un-soaked soil specimens*
10. *Determination of coefficient of permeability of soil*
    (a)Constant head permeameter (b) Falling head permeameter

PCI3I002 CONSTRUCTION TECHNOLOGY

Theory L/T (Hours per week): 3/0, Credit: 3

Module I(10 classes)

Introduction of various Civil Engineeringstructures, Functions of various components ofbuilding and other structures

Fundamentals of Construction Technology: Introduction, Construction activities, construction process, construction workers, construction estimating, construction estimate, construction schedule, productivity and mechanized construction, Quality and safety

Preparatory Work and Implementation: Site layout, Infrastructure development, construction methods, construction materials, deployment of construction equipment, prefabrication in construction, falsework and temporary work,

Module II (10 classes)

Earthwork: Introduction, Classification of soil, project site development, setting out, mechanized excavation, ground water control. Piling: classification of piles, pile driving methods, load test and quality control

Concrete and Concreting: Introduction, Important properties of concrete, Use of admixtures, formwork, shotcrete, lightweight and heavyweight concrete, ready-mix concrete, high performance concrete, self-compacting concrete, extreme weather concreting, prestressed concrete, under water concreting, curing of concrete, non-destructive testing of hardened concrete

Roof and roofing: Introduction, cast-in-situ reinforced concrete roofs, precast reinforced concrete roofs, roofs covered with sheets, water proofing over roofs

Finishing Work: Introduction, plastering, pointing, facing, glazing, flooring, painting,Construction joints-need and materialsused, Plumbing and electrification- various typesof fittings and laying procedure,

Module III (10 classes)

Mechanized Construction: Introduction, general consideration, plants for earthwork-tractor, bulldozer, ripper, scraper, face shovel, backhoe, dragline, clamshell etc., roller, plants for transportation, movement and handling- derrick, crane, hoist, concrete mixers and pumps, scaffoldingBuilding items: Plastering & pointing- its purpose,various types, construction procedures,advantages and disadvantages, suitabilityofeach, Damp proof course (DPC), Anti-termite measures and treatment, Construction joints-need and materialsused, Plumbing and electrification- various typesof fittings and laying procedure,

Module IV (6 classes)

Building Maintenance and Safety Measures: Purpose, need, importance, methods, Causes and types of defects in buildings, Preparation of report on maintenance work, Remedial measures and executionprocedure of any one type of buildingmaintenance work, Importance of various Laws / Norms / Regulations / Acts for safety, Precautions and precautionary Measures, Post-accident procedures.

Text Books

1. *Construction Technology, SubirSarkar and SubhajitSaraswati, Oxford University Press*
2. *Construction Planning and Management, U.K. Srivastava, Galgotia Publications Pvt Ltd*
3. *Construction Engineering and Man agent, S. Seetharaman, Umesh Publications*

Reference Books

1. *Concrete Technology, Santha Kumar, Oxford University Press*
2. *Construction Technology Analysis and Choice, Tony Bryan, Wiley*
3. *Building Construction, B.C.Punmia, Laxmi Publication*
4. *Building Construction, Sushil Kumar, Standard Publisher*
5. *Building Construction, Rangwala, Charotar Pub House*

PEK3E001 ENGINEERING ECONOMICS

Theory L/T (Hours per week):2/1, Credit: 3

Module I (12 hours)

Engineering Economics- Nature, Scope, Basic problems of an economy, Micro Economics and Macro Economics.

Demand- Meaning of demand, Demand function, Law of Demand and its exceptions, Determinants of demand, Elasticity of demand & its measurement (Simple numerical problems to be solved), Supply-Meaning of supply, Law of supply and its exception, Determinants of supply, Elasticity of supply, Determination of market equilibrium (Simple numerical problems to be solved).

Production-Production function, Laws of returns: Law of variable proportion, Law of returns to scale

Module II (12 hours)

Cost and revenue concepts, Basic understanding of different market structures, Determination of equilibrium price under perfect competition (Simple numerical problems to be solved), Break Even Analysis-linear approach (Simple numerical problems to be solved).

Banking -Commercial bank, Functions of commercial bank, Central bank, Functions of Central Bank.

Inflation-Meaning of inflation, types, causes, measures to control inflation.

National Income-Definition, Concepts of national income, Method of measuring national income.

Module III (12 hours)

Time value of money- Interest - Simple and compound, nominal and effective rate of interest, Cash flow diagrams, Principles of economic equivalence.

Evaluation of engineering projects-Present worth method, Future worth method, Annual worth method, Internal rate of return method, Cost benefit analysis for public projects .

Depreciation- Depreciation of capital assert, Causes of depreciation, Methods of calculating depreciation (Straight line method, Declining balance method), After tax comparison of project.

Text Books

1. *Riggs, Bedworth and Randhwa, "Engineering Economics", McGraw Hill Education India*
2. *Principles of Economics, Deviga Vengedasalam; Karunagaran Madhavan, Oxford University Press.*
3. *Engineering Economy by William G.Sullivan, Elin M.Wicks, C. Patric Koelling, Pearson*

4. *R.Paneer Seelvan, " Engineering Economics", PHI*
5. *Ahuja,H.L., "Principles of Micro Economics" , S.Chand & Company Ltd*
6. *Jhingan,M.L., "Macro Economic Theory"*
7. *Macro Economics by S.P.Gupta, TMH*

POB3E002 ORGANIZATIONAL BEHAVIOUR

Credit- 3 Class Hours - 40

Objectives:

1. To develop an understanding of the behavior of individuals and groups inside organizations
2. To enhance skills in understanding and appreciating individuals, interpersonal, and group process for increased effectiveness both within and outside of organizations.
3. To develop theoretical and practical insights and problem-solving capabilities for effectively managing the organizational processes.

Unit	Contents	Class Hours
01	**Fundamentals of OB**: Definition, scope and importance of OB, Relationship between OB and the individual, Evolution of OB, Theoretical framework (cognitive), behavioristic and social cognitive), Limitations of OB.	6
02	**Attitude:** Importance of attitude in an organization, Right Attitude, Components of attitude, Relationship between behavior and attitude, Developing Emotional intelligence at the workplace, Job attitude, Barriers to changing attitudes. **Personality and values:** Definition and importance of Personality for performance, The Myers-Briggs Type Indicator and The Big Five personality model, Significant personality traits suitable to the workplace (personality and job – fit theory), Personality Tests and their practical applications. **Perception:** Meaning and concept of perception, Factors influencing perception, Selective perception, Attribution theory, Perceptual process, Social perception (stereotyping and halo effect). **Motivation:** Definition & Concept of Motive & Motivation, The Content Theories of Motivation (Maslow's Need Hierarchy & Herzberg's Two Factor model Theory), The Process Theories (Vroom's expectancy Theory & Porter Lawler model), Contemporary Theories – Equity Theory of Work Motivation.	10
04	**Organizational Culture** : Meaning & Definition of Organizational Culture, creating & Sustaining Organizational Culture, Types of Culture (Strong vs. Weak Culture, Soft Vs. Hard Culture & Formal vs. Informal Culture), Creating Positive Organizational Culture, Concept of Workplace Spirituality.	8
05	**Organizational Change:** Meaning, Definition & Nature of Organizational	7

Change, Types of Organizational Change, Forces that acts as stimulants to change.

Implementing Organizational Change : How to overcome the Resistance to Change, Approaches to managing Organizational Change, Kurt Lewin's-Three step model, Seven Stage model of Change & Kotter's Eight-Step plan for Implementing Change, Leading the Change Process, Facilitating Change, Dealing with Individual & Group Resistance, Intervention Strategies for Facilitating Organizational Change, Methods of Implementing Organizational Change, Developing a Learning Organization.

Reference Books

1. *Understanding Organizational Behaviour, Parek, Oxford*
2. *Organizational Behaviour, Robbins, Judge, Sanghi, Pearson.*
3. *Organizational Behaviour, K. Awathappa,HPH.*
4. *Organizational Behaviour, VSP Rao, Excel*
5. *Introduction to Organizational Behaviour, Moorhead, Griffin, Cengage.*
6. *Organizational Behaviour, Hitt, Miller, Colella, Wiley.*

BUILDING DRAWING LAB (0-0-2)

1. *The drawing is to be drawn using AutoCAD.*
2. *Plan, elevation, side view of residential/office building*
3. *Drawing of 2 bed room/3 bed room houses (single and two storeyed), ground and first floor plans, elevation and section for load bearing and framed structures*
4. *Detailing of doors/windows*
5. *Drawing of several types of footing, bricks work, floor, staircases, masonry, arches and lintels*
6. *Types of steel roof trusses*
7. *Project on establishments like Bank building/ Post office/ Hostel/ Library/ Hospital/ Auditorium etc*

HONOURS SUBJECT

PCI3D001 CONCRETE TECHNOLOGY

Module I (10 classes)

Cement:Portland cement- chemical composition, Hydration, Setting of cement, Structure of hydrate cement, Test on physical properties, Different grades of cement.

Admixtures: Types of admixtures - mineral and chemical admixtures -properties - dosages - effects - usage.

Aggregates: Classification of aggregate, Particle shape & texture, Bond, strength & other mechanical properties of aggregate, Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate, Bulking of sand, Deleterious substance in aggregate, Soundness of aggregate, Alkali aggregate reaction, Thermal properties, Sieve analysis, Fineness modulus , Grading curves, Grading of fine & coarse Aggregates, Gap graded aggregate, Maximum aggregate size.

Module II(8 classes)

Fresh concrete: Workability - Factors affecting workability, Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability , Segregation & bleeding, Mixing and vibration of concrete, Steps in manufacture of concrete , Quality of mixing water.

Hardened concrete: Water Cement ratio , Abram's Law, Nature of strength of concrete, Maturity concept , Strength in tension & compression, Factors affecting strength, Relation between compression & tensile strength, Curing.

Module III(10classes)

Testing of hardened concrete:Compression tests, tension tests, factors affecting strength , flexure tests , splitting tests , pull-out rest, non-destructive testing methods - codal provisions for NDT.

Elasticity, creep & shrinkage : modulus of elasticity, dynamic modulus of elasticity, posisson's ratio, creep of concrete, factors influencing creep, relation between creep & time , nature of creep, effects of creep , shrinkage , types of shrinkage.

Module IV (8 classes)

Mix design :Factors in the choice of mix proportions , Durability of concrete, Quality Control of concrete , Statistical methods , Acceptance criteria, Proportioning of concrete mixes by various methods , BIS method of mix design.

Special concretes: Light weight aggregates - Light weight aggregate concrete - Cellular concrete - **No-fipes concrete** - High density concrete -Fibre reinforced concrete - Polymer concrete - Types of Polymer concrete - High performance concrete - Self compacting concrete.

Text Books

1. *Concrete Technology - Gambhir, M.L., , McGraw Hill*
2. *Properties of Concrete by A.M.Neville*
3. *Concrete Technology by M.S.Shetty. - S.Chand& Co.*
4. *Concrete Technology by Santakumar A.R, Oxford University Press*

CONSTRUCTION PLANNING AND MANAGEMENT

OBJECTIVES:

- To study and understand the concept of planning, scheduling, cost and quality control, safety during construction, organization and use of project information necessary for construction project.
- To learn the fundamental concepts of construction management principles in the field of construction engineering and management.

UNIT I

Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems.

UNIT II

Scheduling procedures and techniques, cost control, monitoring and accounting, quality control and safety during construction, organization and use of project information.

Introduction to Construction Management - Project Organization – Construction Economics - Economic Decision Making - Time value of money - cash flow diagrams - Evaluation Alternatives - Effect of Inflation on cash flow - Evaluation of Public Projects.

Construction contract – contract document - classification of engineering contract - bidding process - CPWD contract conditions - FIDIC form contract agreement – subcontracting - earnest money deposit - security deposit - arbitration.

UNIT III

Basic concepts of resource management-class of labour - labour productivity - Classification construction equipment - selection of construction equipment - methods of calculating depreciation - replacement model - material management functions - inventory management -project cost management.

UNIT IV

Construction quality - inspection,quality control and quality assurance - total quality management - quality gurus and their teachings - cost of quality - ISO standards - conquas - audit - evaluation of safety - accident causation theories - foundation of a major injury - health and safety act and regulations - cost of 143 CE-Engg&Tech-SRM-2013 accidents - role of safety personnel - causes of accidents -principles of safety - safety and health management system.

OUTCOME:

- On completion of this course the students will know the development of construction planning, scheduling procedure and controls, and also managing a project.

REFERENCES:

1. Calin M. Popescu, Chotchai Charoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995.
2. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, McGrawHill Publishing Company, New Delhi, 1998.
3. Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
4. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.
5. Willis, E. M., Scheduling Construction Projects, John Wiley& Sons, 1986.

MINOR SUBJECT

PCI3G001 MECHANICS OF SOLID

Theory L/T (Hours per week): 3/1, Credit: 4

Module-I (12 classes)

Simple Stress and Strain -Load, Stress, Principle of St.Venant, Principle of Superposition, Strain, Hooke's law, Modulus of Elasticity, Stress-Strain Diagrams, Working Stress, Factor of safety, Strain energy in tension and compression, Resilience, Impact loads, Analysis of Axially Loaded Members, Composite bars in tension and compression, temperature stresses in composite rods, Statically indeterminate problems, Shear stress, Complimentary shear stress, Shear strain, Modulus of rigidity, Poisson's ratio, Bulk Modulus, Relationship between elastic constants.

Compound Stress and strain- Stresses in thin cylinders, thin spherical shells under internal pressure, wire winding of thin cylinders.Analysis of Biaxial Stress. Plane stress, Principal stress, Principal plane, Mohr's Circle for Biaxial Stress, Two dimensional state of strain, Mohr's circle for strain, Principal strains and principal axes of strain, strain measurements, Calculation of principal stresses from principal strains.

Module-II (10 classes)

Shear Force and Bending Moment for Determinate Beams - Types of load and Types of support. Support reactions,Shear force and bending moment, Relationship between bending moment and shear force, Point of inflection, Shear Force and Bending Moment diagrams for determinate beams

Module-III (10 classes)

Simple Bending of Beams - Theory of simple bending of initially straight beams, Bending stresses, Shear stresses in bending, Distribution of normal and shear stress, beams of two materials, Composite beams.

Deflection of Beams - Differential equation of the elastic line, Slope and deflection of beams by integration method and area - moment method.

Module-IV (8 classes)

Theory of Columns - Eccentric loading of a short strut, Long columns, Euler's column formula, Lateral buckling, Critical Load, Slenderness ratio

Torsion in solid and hollow circular shafts - Twisting moment, Strain energy in shear and torsion, strength of solid and hollow circular shafts. Stresses due to combined bending and torsion, Strength of shafts in combined bending and twisting.

TEXT BOOKS

1. *Elements of Strength of Materials by S.P.Timoshenko and D.H.Young, Affiliated East-West Press*
2. *Strength of Materials by G. H. Ryder, Macmillan Press*
3. *Strength of Materials by R.Subramaniam, Oxford University Press*
4. *Strength of Material by S. S. Ratan, McGraw Hill*

REFERENCE BOOKS

1. *Mechanics of Materials by Beer and Johnston, McGraw Hill*
2. *Mechanics of Materials by R.C.Hibbeler, Pearson Education*
2. *3.Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall of India*

Fourth Semester								
	Theory					Practical		
Code	**Course Name**	**Hours/ Week L/T**	**Credit Theory**	**University Marks**	**Internal Evaluation**	**Hours/ Week L/T**	**Credit Practical**	**Marks**
HS	Applied Mathematics - III	3-0	3	100	50			
PC	Structural Analysis-I	3-0	3	100	50			
PC	Advanced Mechanics of Solids	3-0	3	100	50	2	1	50
PC	Highway & Traffic Engineering	3-0	3	100	50	2	1	50
PC	Design of Concrete Structure	3-0	3	100	50	2	1	50
HS	Engineering Economics/ Organizational Behaviour	2-1	3	100	50			
PC	Material Testing Lab					2	1	50
	*Skill Project and Hands on					6	3	100
Total		18	18	600	300	14	7	300
Total Marks: 1200								
Total Credits: 25								
Honours	Advance Surveying /Environmental Pollution and Management / Optimization in Civil Engineering	4	4	100	50			
Minor	Highway & Traffic Engineering							

Semester: 4th

1.	PCI4D001	Honours(O2)	Advance Surveying	4-0-0	4
2.	PCI4D002	Honours(O2)	Environmental Pollution and Management	4-0-0	4
3.	PCI4D003	Honours(O2)	Optimization in Civil Engineering	4-0-0	4
4.	PCI4E001	HS(CP)	Purely Applied Mathematics for Specific Branch of Engineering	3-0-0	3
5.	PEK4E002	HS(O1)	Engineering Economics	3-0-0	3
6.	POB4E003	HS(O1)	Organizational Behavior	3-0-0	3
7.	PCI4G001	Minor(CP)	Highway & Traffic Engineering	4-0-0	4
8.	PCI4I001	PC(CP)	Structural Analysis - I	3-0-0	3
9.	PCI4I101	PC(CP)	Advanced Mechanics of Solids	3-0-1	4
10.	PCI4I102	PC(CP)	Highway & Traffic Engineering	3-0-1	4
11.	PCI4I103	PC(CP)	Design of Concrete Structures	3-0-1	4
12.	PCI4I201	PC(CP)	Material Testing Lab	0-0-1	1
13.	PCI4I202	PC(CP)	Skill Project and Hands on	0-0-3	3
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PCI4E001 APPLIED MATHEMATICS - III (3-0-0)

Module-I

Complex Analysis:

Analytic function, Cauchy-Riemann equations, Complex integration: Line integral in the complex plane, Cauchy's integral theorem, Cauchy's integral formula, Derivatives of analytic functions, Taylor's series, Maclaurin's series, Laurent's series, Singularities and zeros.

Module-II

Complex Analysis:

Residue integration method, evaluation of real integrals

Numerical Methods:

Errors of numerical results, error propagation,., Lagrange Interpolation, Newton divided difference interpolation, Newton's forward and backward interpolation, Spline interpolation.

Module-III

Numerical Methods:

Numerical integration: The trapezoidal rule, The Simpson's rules, Gauss Integration formulas.
Solution of ordinary differential equation: Euler's method, Improvement of Euler's method, Runge-Kutta methods, multi step methods, Methods for system and higher order ordinary differential equations.

Module-IV

Probability Theory and Its Applications: Probability, Random variables, Probability distributions, Mean and variance; Features of Probability Distribution: Binomial, Poisson, Uniform and Normal distribution, Distribution of several random variables.

Statistical Techniques and Its Applications: Scope of Statistics, Random sampling, Sampling Distribution,Correlation analysis, Regression Analysis,Fitting Straight Lines, Estimation of Parameters, Statistical Hypothesis.

Text books:

1. E. Kreyszig," Advanced Engineering Mathematics:,Tenth Edition, Wiley India
2. S.Pal and S.C. Bhunia, "Engineering Mathematics" Oxford University Press
3.Jay L. Devore, "Probability and Statistics for Engineering and Sciences", Seventh Edition, Thomson/CENGAGE Learning India Pvt. Ltd

Reference books:

1. E.B. Saff, A.D.Snider, "Fundamental of Complex Analysis", Third Edition, Pearson Education, New Delhi
2. P. V. O'Neil, "Advanced Engineering Mathematics", CENGAGE Learning, New Delhi

PCI4I001 STRUCTURAL ANALYSIS-I (3-0-0)

Module I

Concept of determinate and indeterminate structures, determination of degree of static and kinematic indeterminacy in plane frame and continuous structures.

Methods of Analysis: Equilibrium equations, compatibility requirements, Introduction to force and displacement methods.

Analysis of propped cantilever by consistent deformation method, Analysis of fixed and continuous beams by Moment-Area method, Conjugate beam method and theorem of three moments.

Module II

Energy theorems and its application, Strain energy method, Virtual work method, unit load method, Betti's and Maxwell's laws, Castigliano's theorem, concept of minimum potential energy.

Analysis of redundant plane trusses.

Deflection of pin jointed plane trusses. Analytical method and Williot –Mohr diagram. Introduction to space truss.

Module III

Rolling loads and influence lines for determinate structures, simply supported beams, cantilever, ILD for reaction, shear force and bending moment at a section, ILD for wheel loads, point loads and udl, maximum bending moment envelope.

Module IV

Analysis of three hinged arches, Suspension cable with three hinged stiffening girders subjected to dead and live loads, ILD for Bending Moment, Shear Force, normal thrust and radial shear for three hinged arches

Text Books:

1. Theory and Problems in Structural Analysis by L Negi, Mc Graw Hill
2. Structural Analysis by T.S. Thandamoorthy, Oxford University Press
3. Basic Structural Analysis by C S Reddy, McGraw Hill

Reference Books:

1. Elementary Structural Analysis by Norris and Wilber, McGraw Hill
2. Structural Analysis by Aslam Kassimali, Cengage Learing
3. Structural Analysis by R.C. Hibbeler, Pearson Education

PCI4I101 ADVANCED MECHANICS OF SOLIDS (3-0-1)

Module I

Theories of failure: Maximum principal stress theory, maximum shear stress theory, maximum strain theory, total strain energy theory, maximum distortion theory, octahedral shear stress theory graphical representation and comparison of theories of failure.

Thick cylinders subjected to internal and external pressures, compound cylinders, computer application in analyzing stresses in thick cylinders.

Module II

Unsymmetrical bending: Properties of beam cross selection, slope of neutral axis, stresses and deflection in unsymmetrical bending, shear centre.

Curved Beam: Bending of beam with large initial curvature, Stress distribution in beam with rectangular, circular and trapezoidal cross section, stresses in crane hooks, ring and chain links.

Module III

Elementary concept of theory of elasticity, stresses in three dimensional, equations of equilibrium and compatibility, plane stress, computer analysis of two dimensional state of stress or strain at a point.

Module IV

Advanced topics in strength of materials: Repeated stresses and fatigue in metals, concept of stress Concentration, notch and stress concentration factors.
Experimental stress analysis: Resistance strain gauges, strain Rosettes, Two dimensional photoelastic methods of stress analysis, stress optic law, light and dark field in a polariscope, Isoclinic and Isochromatic fringe patterns, Computer Analysis of strain from strain rosette measurement.

Text Books:

1 Advanced Mechanics of Solids, L.S. Srinath, Mc Graw Hill.
2. Advanced Mechanics of Materials, Kumar & Ghai, Khanna Publisher.
3. Strength of Materials by R. Subramaniam, Oxford University Press
4. Strength of Material by S. S. Ratan, McGraw Hill

Reference Books:

1. Advanced Mechanics of Materials: Seely and Smith, John Willey, New York.
2. Mechanics of Materials by Gere & Timoshenko, CBS.

Advanced Mechanics of Solids Lab

1. Tensile strength of steel
2. Compression test of cast iron
3. Rigidity modulus of mild steel/cast iron with torsion test
4. Fatigue test of steel (cyclic loading)
5. Strain measurement using strain gauge and strain rosette
6. Young's modulus and bending stress for the given steelbeam
7. Impact strength of steel by Izod impact test
8. Rockwell hardness test of mild steel
9. Two dimensional photoelastic methods of stress analysis
10. Computer analysis of two dimensional state of stress or strain at a point.

PCI4I102 HIGHWAY & TRAFFIC ENGINEERING (3-0-1)

Module-I

Modes of transportation, importance of highway transportation, history of road construction. Principle of highway planning, road development plans, highway alignments requirements, engineering surveys for highway location.

Geometric design- Design controls, highway cross section elements, cross slope or camber, road width, road margins, typical cross sections of roads, design speed, sight distance, design of horizontal and vertical alignments, horizontal and vertical curves.

Module-II

Highway Materials:- Properties of subgrade , sub-base , base course and surface course materials , test on subgrade soil, aggregates and bituminous materials.

Traffic Engineering:- definition , fundamentals of traffic flow , traffic management, prevention of road accidents , elements of transport planning , highway drainage

Module-III

Design of Highway Pavements: Flexible pavements and their design, review of old methods, CBR method, IRC:37-2012, equivalent single wheel load factor, rigid pavements, stress in rigid pavement, IRC design method (IRC:58-2011).

Module-IV

Highway Construction: Construction of various layers, earthwork, WBM, GSB, WMM, various types of bituminous layers, joints in rigid pavements, Hot Mix Plants, Construction of Rigid Pavements

Highway Maintenance: Various type of failures of flexible and rigid pavements.

Text Books:

1. Highway Engineering, by S.K.Khanna and CEG Justo, Nem Chand & Bros.
2. Transportation Engineering-Highway Engineering by C Venkatramaiah, Universities Press.
3. A course in Highway Engineering by Dr. S.P. Bindra, Dhanpat Rai Publications.

Reference Books:

1. Principles of Highway Engineering and Traffic Analysis by Mannering Fred L., Washburn Scott S. and Kilaresk Walter P., Wiley India Pvt. Ltd
2. Traffic Engineering and Transportation Planning by Kadiyali, L.R.,Khanna Publishers
3. Transportation Engineering and Planning by Papacostas, C.S. and Prevedouros, P.D.,Prentice Hall.

Highway & Traffic Engineering Lab

1. Determination of aggregate crushing value.
2. Determination of Los Angeles abrasion value of aggregates.
3. Determination of aggregate impact value.
4. Determination of penetration value of bitumen.
5. Determination of softening point value of bitumen.
6. Determination of ductility value of bitumen.
7. Determination of flash and fire point of bitumen.
8. Determination of specific gravity of bitumen.
9. Determination of stripping value of aggregate.
10. Determination of flakiness index and elongation index of coarse aggregate.
11. Determination of specific gravity and water absorption of coarse aggregate.
12. Determination of CBR of soil subgrade
13. Design of GSB and WMM
14. Marshall method of mix design
15. Demonstration of advanced equipment for characterization of pavement materials.

PCI4I103 DESIGN OF CONCRETE STRUCTURES (3-0-1)

Module I

Properties of concrete and reinforcing steel, philosophy, concept and methods of reinforced concrete design, introduction to limit state method, limit state of collapse and limit state of serviceability, application of limit state method to rectangular beams for flexure, shear, bond and torsion

Module II

Design of doubly reinforced beams, design of T and L beams, design of one way and two way slabs, design of staircases.

Module III

Design of short and long columns with axial and eccentric loadings, Design of isolated and combined column footings

Module IV

Retaining walls, various forces acting on retaining wall, stability requirement, design of cantilever and counterfort retaining walls,

Design of water tanks, design requirements, design of tanks on ground, under ground and elevated water tanks.

Text Books:

1. Design of Reinforced Concrete Structue by N. Subramanian, Oxford University Press
2. Limit State Design by A.K.Jain, Neemchand & Bros
3. Reinforced Concrete Design by S U Pillai & D. Menon, McGraw Hill

Reference Books:

1. Design of concrete structures by J.N.Bandyopadhyay, PHI
2. Limit State Design of Reinforced Concrete -P.C Verghese
3. Reinforced Concrete Design by S.N.Sinha, McGraw Hill
4. RCC Design-B.C.Punmia, A.K.Jain and A.K.Jain-Laxmi Publications

Design of Concrete Structures Lab

1. Workability test of concrete:Slump test, compaction factor test and flow table test
2. Cube Test of Concrete(Nominal Mix)
3. Cylinder Test for Concrete(Nominal Mix): Determination of axial stress, longitudinal strain, lateral strain and Poision's ratio. Plotting of stress-strain curve and determination of modulus of elasticity.
4. Split Tensile Strength Test of Concrete
5. Prism test for determining modulus of rupture of concrete
6. Design of Concrete Mix (As per Indian Standard Method)
7. Failure of RC beam in bending and shear (two point and one point loading)
8.Complete design of a simple load bearing residential building comprising of beams, slab, column, footing, staircases, etc. and the detailing of steel reinforcement.

PCI4I201 MATERIAL TESTING LAB (0-0-1)

Brick: (a) Shape and size test for brick
(b) Water absorption test for brick
(c) Compressive strength of brick

Cement: (a) Fineness of cement
(b) Soundness of cement by Lechattelier test
(c) Specific gravity of cement
(d) Fineness of cement by air permeability
(e) Standard consistency of a given sample by Vicat test
(f) Initial and final setting time of cement
(g) Fineness modulus of fine and coarse aggregate
(h) Aggregate crushing value of coarse aggregate
(i) Compressive strength of cement mortar
(j) Tensile strength of cement mortar

Steel: (a) Tensile strength of steel
(b) Compression test of cast iron
(b) Rigidity modulus of cast iron
(c) Fatigue test of steel (cyclic loading)
(d) Strain measurement using strain gauge and strain rosette

PCI4D001 ADVANCED SURVEYING (4-0-0)
(HONOR)

Module-I

Tacheometry: General principles of stadia system, determination of tacheometric constants, analytic lens, fixed and movable hair methods, inclined sights with staff vertical, inclined sight with staff normal to the line of sight, tangential system, errors in tacheometer. **Curves:** Types of curves, elements of curve, different methods of setting out simple circular curves, compound curves, reverse curves, transition curves, types of transition curves, super elevation, vertical curves.

Module-II

Triangulation: Classification of triangulation system, operation in triangulation survey, reconnaissance, selection of site for base line, its measurement and extension, correction to base line measurement using EDM and Total station, selection of stations, triangulation figures, scaffolds and signals, marking of stations, inter visibility, strength of figures, reduction to centre.
Theory of Errors: Definitions, law of weight, probable errors, most probable value, distribution of error, normal equations, method of least square.

Module-III

Photogrammetric Surveying – Principle, Scale, Number of Photographs, Deduction of distance &height, Elements of Astronomical survey, Solution of problems dealing with celestial triangle.

Module-IV

Setting out of work: Laying out of buildings and sewer lines.
Remote Sensing & GIS-Principles of Remote Sensing & Geographic Information System, Application to Civil Engineering.

Text Books:

1. Surveying &Levelling. Vol-II by T.P.Kanethar&S.V.Kulkarni, Pune VidyarthiGrihaPrakashan
2. Surveying and Leveling by R. Subramanian, Oxford University Press
3. Surveying- Vol.II, by B.C. Punmia, Laxmi Publications

Reference Books:

1. Surveying Vol-1 by R Agor, Khanna Publishers
2. A Textbook of Surveying, C. Venkatramaiah, Universities Press
3. Surveying and Levelling, N.N. Basak, McGraw-Hill Education
4. Remote Sensing and GIS, Basudeb Bhatta, Oxford University Press

PCI4D002 ENVIRONMENTAL POLLUTION AND MANAGEMENT
(4-0-0)
(HONOR)

Module-I

Man and environment, Their inter relationships. Types of environmental pollutants, their sources and effects.

Water Pollution and Control, water quality in surface water, BOD and COD, nitrification, eutrophication and its effects, bacterial contamination of water, toxins and heavy metals,

Ground water pollution, principal sources of ground water pollution

Marine pollution, toxic ocean pollutants, sewage disposal in ocean, cleanup of marine pollution

Module-II

Air pollution, Classification of air pollutants and their emission sources, air quality standards, transport and removal of air pollutants, indoor air pollution

Module-III

Noise pollution and control, Measurement of Noise Pollution, Assessment and measurement of sound, Sources of noise from automobiles and industrial operation and control measures

Module-IV

Industrial wastes and their treatment. Solid wastes, generation, collection, processing and disposal.

Environmental impact assessment and auditing. Introduction to Environmental standards, laws and policies. Global issues on environment, Waste minimization, Building environment services.

Text Books:

1. Introduction to Environmental Science by Y Anjaneyulu, BS Publications.
2. Environmental Engineering by G Kiely, McGraw Hill

Reference Books:

1. Environmental Studies from Crisis to Cure by R. Rajagopalan, Oxford University Press
2. Sewage Disposal and Air Pollution Engineering by S.K. Garg, Khanna Publication.
3. Principles of Environmental Science by Cunningham W.P. and Cunningham M.A. McGraw-Hill.
4. Basic Environmental Technology by J.A Nathanson, Prentice Hall of India, New Delhi.
5. Introduction to Environmental Engineering and Science by G.M. Masters and W.P Ela, Pearson Education.

PCI4D003 OPTIMIZATION IN CIVIL ENGINEERING
(4-0-0)
(HONOR)

Module-I

Idea of Engineering optimization problems, Classification of optimization algorithms, Modeling of problems and principle of modeling. Linear programming: Formulation of LPP, Graphical solution, Simplex method, Big-M method, Revised simplex method, Duality theory and its application, Dual simplex method , Sensitivity analysis in linear programming.Transportation problems: Northwest Corner rule, Least Cost rule, Vogel's approximation method, Degeneracy, Optimality test. Stepping stone method. Assignment problems: Hungarian method.Integer Programming: Branch and Bound algorithm.

Module-II

Dynamic Programming: Sequential optimization; Representation of multistage decision process; Recursive equations – Forward and backward recursions; Computational procedure in dynamic programming (DP); Discrete versus continuous dynamic programming; Multiple state variables; Problem formulation and applications for Design of continuous beam, Optimal geometric layout of a truss, Water allocation as a sequential process, Capacity expansion, Reservoir operation etc.

Module-III

Non-linear programming,Unconstraint optimization, Fibonacci and Golden Section Search method. Constrained optimization with equality constraint: Lagrange multiplier, Projected gradient method, Constrained optimization with inequality constraint: Kuhn-Tucker conditions, Quadratic programming.

Module-IV

Introduction to Genetic algorithm (GA), Difference and similarities between GA and traditional methods.Basic operations of GA: reproduction, crossover, mutation and elitism. Applicationof Optimization techniques: Water resource planning management, Structural Optimization, Transportation planningand Management, Slope stability and optimal dimensioning of foundations multi-objective optimization models

Text Books

1. Introduction to Optimum Design, J. S. Arora, Elsevier, 2nd Edition, 2004.
2. Optimization for Engg. Design: Algorithms & Examples, K. Deb,Prentice Hall India, 2006.

Reference Books

1. Engineering Optimization: Theory & Practice, S. S. Rao, New Age International (P) Ltd, 3rd Edition, 1996, Reprint : June, 2008
2. Multi-Objective Optimization Using Evolutionary Algorithms, K. Deb, John Wiley, 2003
3.Operations Research, F.S.Hiller, G.J.Lieberman, Eighth Edition, McDraw Hill
4. Operations Research by Pravakar Pai, Oxford University Press.

PCI4G001 HIGHWAY & TRAFFIC ENGINEERING (4-0-0) (MINOR)

Module-I

Modes of transportation, importance of highway transportation, history of road construction. Principle of highway planning, road development plans, highway alignments requirements, engineering surveys for highway location.

Geometric design- Design controls, highway cross section elements, cross slope or camber, road width, road margins, typical cross sections of roads, design speed, sight distance, design of horizontal and vertical alignments, horizontal and vertical curves.

Module-II

Highway Materials:- Properties of subgrade , sub-base , base course and surface course materials , test on subgrade soil, aggregates and bituminous materials.

Traffic Engineering:- definition , fundamentals of traffic flow , traffic management, prevention of road accidents , elements of transport planning , highway drainage

Module-III

Design of Highway Pavements: Flexible pavements and their design, review of old methods, CBR method, IRC:37-2012, equivalent single wheel load factor, rigid pavements, stress in rigid pavement, IRC design method (IRC:58-2011).

Module-IV

Highway Construction: Construction of various layers, earthwork, WBM, GSB, WMM, various types of bituminous layers, joints in rigid pavements, Hot Mix Plants, Construction of Rigid Pavements

Highway Maintenance: Various type of failures of flexible and rigid pavements.

Text Books:

4. Highway Engineering, by S.K.Khanna and CEG Justo, Nem Chand & Bros.
5. Transportation Engineering-Highway Engineering by C Venkatramaiah, Universities Press.
6. A course in Highway Engineering by Dr. S.P. Bindra, Dhanpat Rai Publications.

Reference Books:

4. Principles of Highway Engineering and Traffic Analysis by Mannering Fred L., Washburn Scott S. and Kilaresk Walter P., Wiley India Pvt. Ltd
5. Traffic Engineering and Transportation Planning by Kadiyali, L.R.,Khanna Publishers
6. Transportation Engineering and Planning by Papacostas, C.S. and Prevedouros, P.D.,Prentice Hall.

Fifth Semester								
	Theory					Practical		
Code	**Course Name**	**Hours/week L/T**	**Credit Theory**	**University Marks**	**Internal Evaluation**	**Hours/week L/T**	**Credit Practical**	**Marks**
PC	Structural Analysis-II	3-0	3	100	50	2	1	50
PC	Design of Steel Structures	3-0	3	100	50	2	1	50
PC	Water Supply & Sanitary Engineering	3-0	3	100	50	2	1	50
PE	Water Resource Engineering/ Ground Water Hydrology/Open Channel Flow	3-1	4	100	50			
OE	Human Resources Management /Marketing Management/ C++ & Object Oriented Programming/ Internet & Web Technology	3-1	4	100	50			
PC	Advance Lab-I (Structural Engineering Lab /Advanced Geotechnical Engineering Lab)					8	4	200
Total		17	17	500	250	14	7	350
Total Marks: 1100								
Total Credits: 24								
Honours	GIS and Remote Sensing / Quantity Surveying & Estimating	4	4	100	50			
Minor	Water Supply & Sanitary Engineering							

Semester : 5th

1.	PCI5D001	Honours(O4)	GIS and Remote Sensing	4-0-0	4
2.	PCI5D002	Honours(O4)	Quantity Surveying & Estimating	4-0-0	4
3.	PCI5G001	Minor(CP)	Water Supply & Sanitary Engineering	4-0-0	4
4.	PCI5H001	OE(CP)		4-0-0	4
5.	PCI5I101	PC(CP)	Structural Analysis - II	3-0-1	4
6.	PCI5I102	PC(CP)	Design of Steel Structures	3-0-1	4
7.	PCI5I103	PC(CP)	Water Supply & Sanitary Engineering	3-0-1	4
8.	PCI5I201	PC(O1)	Advance Lab - I (Structural Engineering Lab)	0-0-4	4
9.	PCI5I202	PC(O1)	Advanced Geotechnical Engineering Lab	0-0-4	4
10.	PCI5J001	PE(O3)	Water Resource Engineering	4-0-0	4
11.	PCI5J002	PE(O3)	Ground Water Hydrology	4-0-0	4
12.	PCI5J003	PE(O3)	Open Channel Flow	4-0-0	4
					28

PCI5I101 STRUCTURAL ANALYSIS-II (3-0-1)

Module - I

Analysis of continuous beams and plane frames by slope deflection method and moment distribution method, analysis of continuous beam and simple portals by Kani's method

Module – II

Analysis of two hinged and fixed arches for dead and live loads, Suspension cables with two hinged stiffening girders

Module - III

Matrix methods of analysis: flexibility and stiffness methods; Application to simple trusses and beams

Module - IV

Plastic Analysis: Plastic modulus, shear factor, plastic moment of resistance, Load factor, Plastic analysis of continuous beam and simple rectangular portals, Application of upper bound and lower bound theorems

Text Books:

1. Structural analysis by C.S. Reddy Mc Graw Hill
2. Structural Analysis by T.S. Thandamoorthy, Oxford University Press
3. Structural analysis a matrix approach by Pandit & Gupta, Mc Graw Hill.
4. Limit Analysis of Structures: Monikaselvam, Dhanpat Ray Publication

Reference Books

1.Indeterminate Structures: J.S.Kinney
2. Indeterminate Structural Analysis: C.K.Wang ,Mc Graw Hill
3. Structural Analysis by D.S.Prakash Rao, Universities Press
4. Matrix Analysis of Structures by P.K.Singh, Cengage Learing

STRUCTURAL ANALYSIS II LAB

1. To verify strain in an externally loaded beam with the help of a strain gaugeindicator and to verify theoretically.

2. To study behavior of columns with different types of end conditions and find Euler's buckling load foreach case.

3. To find the value of flexural rigidity (EI) for a given beam and compare it with theoretical value.

4. To determine the deflection of a pin connected truss analytically & graphically and verify the same experimentally.

5. To verify Maxwell's reciprocal theorem.

6. To verify the moment area theorem regarding the slopes and deflections of the beam.

7. To determine the horizontal thrust in a threehinged arch for a given system of loadsexperimentally and verify the same withcalculated values.

8. To study two hinged arch for the horizontal displacement of the roller end fora given system of loading and to compare the same with those obtainedanalytically

9. To study the behavior of a portal frame under different end conditions.

10. To determine the moment required to produce a given rotation (rotational stiffness) at one end of the beamwhen the other end is pinned.

PCI5I102 DESIGN OF STEEL STRUCTURE (3-0-1)

Module I

Introduction, advantages/disadvantages of steel, structural steel, rolled steel section, various types of loads, design philosophy.

Limit state design method, limit states of strength and serviceability, probabilistic basis for design

Riveted, bolted and pinned connections,

Welded connections-assumptions, types, design of fillet welds, intermittent fillet weld, plug and slot weld, failure of welded joints, welded joints vs bolted and riveted joints

Module II

Tension members, types, net cross-sectional area, types of failure, slenderness ratio, design of tension members, gusset plate.

Compression members, effective length, slenderness ratio, types of cross-section, classification of cross-section, design of axially loaded compression members, lacing, battening, design of column bases, and foundation bolts.

Module III

Design of beams, types of c/s, lateral stability of beams, lateral torsional buckling, bending and shear strength, web buckling and web crippling, deflection, design procedure.

Module IV

Plate girders- various elements and design of components Eccentric and moment connections, roof trusses

Text Books:

1. Design of Steel Structures- Limit State Method by N. Subramanian, Oxford University Press
2. Limit State Design of Steel structures by S.K. Duggal, Mc-Graw Hill

Reference Books:

1. Design of steel structures by S.S.Bhavikatti, I.K. International Publishing house.
2. Design of Steel Structures by K. S. Sairam, Pearson
3. Steel Design by William T. Segui, Cengage Learning
4. Fundamentals of Structural Steel Design by M.L.Gambhir, Mc Graw Hill
5. Steel Structures-Design and Practice by N. Subramanian, Oxford University Press

DESIGN OF STEEL STRUCTURE LAB

1. Design and detailing of steel roof trusses/ industrial buildings
2. Design of columns(with lacing and battening) and column bases
3. Design of plate girders and gantry girder
4. Detailing of structural steel connections, seated and framed connections

PCI5I103 WATER SUPPLY AND SANITARY ENGINEERING (3-0-1)

Module – I

General requirement for water supply, sources, quality of water, intake, pumping and transportation of water. Physical, chemical and biological characteristics of water and their significance, water quality criteria, water borne diseases, natural purification of water sources.

Module – II

Engineered systems for water treatment : aeration, sedimentation, softening coagulation, filtration, adsorption, ion exchange, and disinfection. Design of water distribution system.

Module – III

Generation and collection of waste water, sanitary, storm and combined sewerage systems, quantities of sanitary waste and storm water, design of sewerage system

Primary, secondary and tertiary treatment of wastewater. Waste water disposal standards,

Module – IV

Basic of microbiology. Biological wastewater treatment system : Aerobic processes activated sludge process and its modifications, trickling filter, RBC, Anaerobic Processes conventional anaerobic digester, High rate and hybrid anaerobic reactors, Sludge digestion and handling, Disposal of effluent and sludge, Design problems on water distribution, sewerage, water treatment units, wastewater treatment units and sludge digestion.

Text Books:

1. Water Supply Engineering-Environmental Engineering v.1 by S.K.Garg, Khanna Publishers
2. Sewage Disposal and Air Pollution Engineering - Environmental Engineering v.2 by S.K.Garg, Khanna Publishers
3. Water Supply and Sanitary Engineering by B.S.Birdi Dhanpat Rai Publishing Company

Reference Books:

1. Water Supply Engineering by B. C. Punmia and A.K.Jain, Laxmi Publications
2. Water and Wastewater Technology by M.J.Hammer, PHI

WATER SUPPLY AND SANITARY ENGINEERING LAB

LIST OFEXPERIMENTS:

1. ***Analysis of water Quality Parameter***

    a) Measurement of pH, Electrical conductivity
    b) Determination of Turbidity of water samples.
    c) Determination of Chlorides in water.
    d) Determination of Iron and Fluoride in water.
    e) Determination of Acidity and Alkalinity of water.
    f) Determination of Sulphate in water.
    g) Determination of Hardness of water.
    h) Determination of Residual Chlorine of water.
    i) Determination of Total Dissolved Solids.
    j) Determination of optimum coagulant dosage.
    k) Microbiological culture analysis of bacterial samples
    l) MPN Test

    .

2. ***Analysis of Waste Water Characteristics***

    a) Determination of Total Solids, Settlable Solids, Dissolved Solids, Suspended Solids and Volatile Solids.
    b) Determination of Dissolved Oxygen, COD and BOD.
    c) Determination of Ammonia–nitrogen and Nitrates.

PCI5J001 WATER RESOURCE ENGINEERING (3-1-0)

Module-I

Precipitation, its Measurement and Analysis: Hydrologic cycle, catchment area and watershed, Rainfall and its characteristics, Rain gauges, Non-Recording and Recording type, Average rainfall over a catchment, Evapo-transpiration, Pan evaporation, Pan coefficient, Infiltration, W-Index and -Index.

Module-II

Discharge Measurement: Stream gauging, Flow rating curve, Use of current meters for velocity measurement, Dye-dilution method of discharge measurement, Estimation of discharge.

Module-III

Hydrograph: Characteristics of a Run off hydrograph, Unit hydrograph, S-hydrograph, Instantaneous Unit hydrograph, Synthetic Unit hydrograph, Duration Curve, Mass flow hydrograph.

Flood Control: Flood flows, Frequency studies, Statistical analysis for flood prediction, Method of flood control, Flood routing, Reservoir routing and Channel routing, River training works.

Module-IV

Open Channel Flow: Definition, Uniform flow, Chezy's Kutter's equation, Most economical section, specific energy, critical, subcritical, supercritical flow, Non-uniform flow, Gradual varied flow, Hydraulic jump,

Text Books:

1. Engg. Hydrology by K. Subramanian, McGraw-Hill
2. Hydrology and Water Resources Engineering by K. C. Patra, Narosa Publishing House, New Delhi

Reference Books:

1. Engineering Hydrology by C.S.P. Ojha, Oxford University Press
2. Hydrology by H.M. Raghunath, New age Int. Publication, New Delhi
3. Hydrology by P.J.R. Reddy, University Science Press, New Delhi

PCI5J002 GROUND WATER HYDROLOGY (3-1-0)

Module I

Hydrologic cycle, Water balance, Occurrence of ground water: Origin, geological formations as aquifers, type of aquifers, groundwater basins, springs. Darcy's Law, validity of Darcy's Law permeability, laboratory and field measurement of permeability, groundwater Flow lines. Steady flow to a well, steady radial flow to a well in confined aquifer and unconfined aquifer, Unsteady radial flow into a confined aquifer, Non equilibrium Theis equation, Theis method of solution, multiple well system.

Module II

Methods of constructions of deep and shallow wells: The percussion (or cable tool) method of drilling, Direct circulation hydraulic rotary method, Down the hole hammer method, well logs-receptivity logging, testing of wells for yield, Effect of irrigation, stream flow, rainfall on groundwater fluctuations, seasonal and secular variations, fluctuation due to miscellaneous causes.

Surface and Subsurface investigations of groundwater: Geophysical exploration, Electrical resistivity method, aerial photo interpretation, remote sensing applications to ground water exploration, test drilling, Artificial recharge by water spreading, through pits and shaft, recharge through other methods;

Module III

Ground water pollution: Municipal sources, liquid wastes from domestic uses, solid wastes, Industrial sources, tank and pipeline leakage, Mining activity, agricultural sources, septic tank and cesspools, saline water intrusion in coastal aquifers, methods to control saline water intrusion ;

Module IV

Groundwater management: Concepts of Basin management, Equation of hydrologic equilibrium, groundwater basin investigations, conjunctive use of surface and groundwater.

Reference Books:

1. Groundwater Hydrology, D. K. Todd, John Wiley and Sons.
2. Ground Water, H. M. Raghunath,.
3. Groundwater and Tube Wells, S. P. Garg, Oxford and IBH Publishing Co., New Delhi.

PCI5J003 OPEN CHANNEL FLOW (3-1-0)

Module I

Basic Fluid flow concepts: Classification of open channels, classification of flow, basic equations, velocity distribution, pressure distribution, energy and momentum coefficients.

Uniform flow in rigid boundary channels: Shear stress on the boundary, flow over scattered roughness elements, Chezy's equation, Manning's equation, effect of channel shape on resistance equation, section factor curves for rectangular and trapezoidal channels, flow in a circular channel, relation between conveyance and depth.

Module II

Uniform flow in mobile boundary channels: Incipient motion condition, regimes of flow, resistance to flow in alluvial streams. Design of channels: Rigid boundary channels, non-scouring erodible boundary channels, alluvial channels. Specific energy: Specific energy, specific force, critical depth computations, control section, application of specific energy and critical depth concepts.

Module III

Gradually varied flow: Types of non uniform flow, governing equations, characteristics of surface curves, classification of water surface profiles, sketching of water surface profiles, discharge from reservoir, profiles in compound channels, computation of gradually varied flow in prismatic channels, gradually varied flow in non prismatic channels.

Module IV

Rapidly varied flow: Application of conservation laws, channel transitions, supercritical flow past weirs, spillways, hydraulic jumps

Unsteady flow: Waves and their classification, celerity of a wave, surges, equation of motion, method of characteristics, dam break problem.

Text Books

1. Flow through open channels, Rajesh Srivastava, Oxford University Press
2. Flow through open channels - K. G. Ranga Raju

Reference Books:

1. Open channel flow - M. Hanif Chaudhry
2. Open Channel Hydraulics - V. T. Chow
3. Flow in open channels - K. Subramanya

HONOUR SUBJECT

PCI5D001 GIS AND REMOTE SENSING (4-0-0)

MODULE-I

Remote sensing- introduction, physics of remote sensing- electromagnetic radiations and their characteristics, thermal emissions, multi-concept in remote sensing, remote sensing satellites and their data products, sensors and orbital characteristics, spectral reflectance curves for earth surface features, methods of remotely sensed data interpretation- visual interpretation, concept of fcc, digital image processing- digital image and its characteristics, satellite data formats, image rectification and restoration, image enhancement- contrast manipulation, spatial feature manipulation, multi-image manipulation

MODULE-II

Fundamentals of GIS: introduction, definition of GIS, evolution of GIS, roots of GIS, definition, GIS architecture, models of GIS, framework for GIS, GIS categories, map as a model, spatial referencing system, map projections, commonly used map projections, grid systems, cartographic symbolization, types of maps, typography, map design, map productions, map applications,

MODULE-III

data management, models and quality issues: conceptual models, geographical data models, data primitives, data types - raster and vector approach, digital terrain modeling , approaches to digital terrain data modeling , acquisition of digital terrain data, data modeling and spatial analysis, sources of geographical data, data collectors and providers, creating digital data sets, data presentation, data updating, data storage

MODULE-IV

GIS data processing, analysis and visualization: raster based GIS data processing, vector based GIS data processing, human computer interaction and GIS, visualization of geographic information, principles of cartographic design in GIS, generation of information product, image classification and GIS, visual image interpretation, types of pictorial data products, image interpretation strategy, image interpretation process,

Text Books:

1. Remote Sensing and GIS, Basudeb Bhatta, Oxford University Press
2. Remote Sensing And GIS, M.A. Reddy, B.S. Publication, Hyderabad

Reference Books:

1. Fundamental of Remote Sensing by G. Joseph, Universities Press
2. Introduction Of GIS, Kang-Tsung Chang, Mcgraw-Hill
3. GIS, N. Panigrahi, Universities Press

HONOUR SUBJECT

PCI5D002 QUANTITY SURVEYING AND ESTIMATING (4-0-0)

Module – I

Quality estimation:

Principles of estimation, methods and units, Estimation of materials in buildings, Culverts and bridges.

Module II

Principles of general and detailed specification for various types building works.

Analysis of rates, description, Prime cost, Schedule rates, Analysis of rates for various types of works. Estimate of R.C.C and Steel works, Scheduling, Slab, beam, column

Module – III

Estimation of Road – earthwork fully in banking, cutting,partly cutting & partly filling. Detailed estimate for WBM, Bituminous road.

Valuation, rent fixation, tenders, contracts, accounting procedure, measurement book, stores, cost & quality control ,PWD & CPWD practice, Software Applications for Estimation of Buildings.

Module – III

Network techniques, Introduction to CPM/ PERT methods and their use in project planning construction schedules for jobs, materials equipments, labour and finance.

Reference Books:

1. Estimating and Costing in Civil Engineering Theory & Practice, B.N. Dutta, UBS Publishers
2. PERT and CPM, L.S. Sreenath, East West Press
3. Civil engineering contracts and estimates by B.S. Patil, University Press.

MINOR SUBJECT

PCI5G001 WATER SUPPLY AND SANITARY ENGINEERING (3-0-1)

Module – I

General requirement for water supply, sources, quality of water, intake, pumping and transportation of water. Physical, chemical and biological characteristics of water and their significance, water quality criteria, water borne diseases, natural purification of water sources.

Module – II

Engineered systems for water treatment : aeration, sedimentation, softening coagulation, filtration, adsorption, ion exchange, and disinfection. Design of water distribution system.

Module – III

Generation and collection of waste water, sanitary, storm and combined sewerage systems, quantities of sanitary waste and storm water, design of sewerage system

Primary, secondary and tertiary treatment of wastewater. Waste water disposal standards,

Module – IV

Basic of microbiology. Biological wastewater treatment system : Aerobic processes activated sludge process and its modifications, trickling filter, RBC, Anaerobic Processes conventional anaerobic digester, High rate and hybrid anaerobic reactors, Sludge digestion and handling, Disposal of effluent and sludge, Design problems on water distribution, sewerage, water treatment units, wastewater treatment units and sludge digestion.

Text Books:

4. Water Supply Engineering-Environmental Engineering v.1 by S.K.Garg, Khanna Publishers
5. Sewage Disposal and Air Pollution Engineering - Environmental Engineering v.2 by S.K.Garg, Khanna Publishers
6. Water Supply and Sanitary Engineering by B.S.Birdi Dhanpat Rai Publishing Company

Reference Books:

3. Water Supply Engineering by B. C. Punmia and A.K.Jain, Laxmi Publications
4. Water and Wastewater Technology by M.J.Hammer, PHI

OTHER ELECTIVE

PME5H002 HUMAN RESOURCE MANAGEMENT

Module I:
Concept scope and objectives of HRM. Relationship between HRM and HRD. The challenges for HRM – Environmental, organizational and Individual. Role and functions of HR managers in the changing business scenario. Human Resources Planning – overview, Recruitment – concept, objectives, legal framework regulating recruitment in India, Selection – Objectives and methods, Test and interviews, Induction and orientation, validity and reliability of Tests and interviews.

Module II:
Career Planning – concept, objectives. Different stages of career and its implications, Methods of career planning and development, Promotion – types and process, Transfer – types. Separations including lay off and retrenchment. Performance Management – concept and objectives. Performance Appraisal – concept objectives and methods – management by objectives (MBO), Assessment centre, 360 degree feedback. Appraisal errors. Competency mapping – concept, objectives and the process.

Module III:
Compensation Management – objectives and principles. wage & salary. Wage concept – minimum wage, Fair wage, living wage. nominal wage and real wage. Components of wages, methods of wage determination, job evaluation – methods wage differentials and its functions. Training and Development – Training need Assessment, Types of Training Programs – on the job and off the job training programs, Evaluation of effectiveness of training programs.

Books Recommended
1. Personnel & HRM – P. subha Rao, Himalaya Publishing House.
2. HRM - Text and cases – Aswathappa, THM
3. Managing Human Resources – Gomez, Belkin &Cardy, PHI. HRM – Snell, Bohlander, Vohra – Cengage Publication

PME5H002 MARKETING MANAGEMENT

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

PME5H004 C++ AND OBJECT ORIENTED PROGRAMMING

Module I(08 hrs)
Introduction to object oriented programming, user defined types, structures, unions, polymorphism, encapsulation. Getting started with C++ syntax, data-type, variables, strings, functions, default values in functions, recursion, namespaces, operators, flow control, arrays and pointers.

Module II(16 hrs)
Abstraction mechanism: Classes, private, public, constructors, destructors, member data, member functions, inline function, friend functions, static members, and references. Inheritance: Class hierarchy, derived classes, single inheritance, multiple, multilevel, hybrid inheritance, role of virtual base class, constructor and destructor execution, base initialization using derived class constructors. Polymorphism: Binding, Static binding, Dynamic binding, Static polymorphism: Function Overloading, Ambiguity in function overloading, Dynamic polymorphism: Base class pointer, object slicing, late binding, method overriding with virtual functions, pure virtual functions, abstract classes. Operator Overloading: This pointer, applications of this pointer, Operator function, member and non member operator function, operator overloading, I/O operators. Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration.

Module III(08 hrs)
Dynamic memory management, new and delete operators, object copying, copy constructor, assignment operator, virtual destructor. Template: template classes, template functions. Namespaces: user defined namespaces, namespaces provided by library.

Text Books:
1. Object Oriented Programming with C++ - E. Balagurusamy, McGraw-Hill Education (India)
2. ANSI and Turbo C++ - Ashoke N. Kamthane, Pearson Education

Reference Books:
1. Big C++ - Wiley India
2. C++: The Complete Reference- Schildt, McGraw-Hill Education (India)
3. “C++ and Object Oriented Programming” – Jana, PHI Learning.
4. “Object Oriented Programming with C++ “- Rajiv Sahay, Oxford
5. Mastering C++ - Venugopal, McGraw-Hill Education (India) “Object Oriented Programming with C++”, David Parsons, Cengage Learning.

PME5H005 INTERNET AND WEB TECHNOLOGY

Module –I (Lecture Hour 12)

The Internet and WWW

Understanding the WWW and the Internet, Emergence of Web, Web Servers, Web Browsers, Protocols, Building Web Sites

HTML

Planning for designing Web pages, Model and structure for a Website, Developing Websites, Basic HTML using images links, Lists, Tables and Forms, Frames for designing a good interactive website

Module –II (Lecture Hour 12)

JAVA Script

Programming Fundamentals, Statements, Expressions, Operators, Popup Boxes, Control Statements, Try…. Catch Statement, Throw Statement, Objects of Javascript: Date object, array object, Boolean object, math object

CSS

External Style Sheets, Internal Style Sheets, Inline Style, The class selector, div & span tag

DOM

HTML DOM, inner HTML, Dynamic HTML (DHTML), DHTML form, XML DOM

Module –III (Lecture Hour 11)

CGI/PERL

Introduction to CGI, Testing & Debugging Perl CGI Script, Using Scalar variables and operators in Perl

Java Applet

Introduction to Java, Writing Java Applets, Life cycle of applet

Textbooks

1. Web Warrior Guide to Web Design Technologies, Don Gosselin, Joel Sklar& others, Cengage Learning

Reference Books

1. Web Programming: Building Internet Applications, Chris Bates, Wiley Dreamtech
2. Programming the World Wide Web, Robert W Sebesta, Pearson
3. Web Technologies, Uttam K Roy, Oxford
4. Web Technology: A developer perspective, Gopalan&Akilandeswari, PHI

ADVANCE LAB-I

ADVANCED GEOTECHNICAL ENGINEERING LAB

1. Demonstration of Augur Boring and Wash Boring
2. Demonstration of Methods of Soil Sampling, disturbed samples and undisturbed samples
3. In-situ Testing (i) Standard Penetration test (ii) Cone Penetration Test (iii) Vane Shear Test (iv) Pressure Meter Test (v) Plate Load Test (vi) Dilatometer Test
4. Cyclic Triaxial test
5. Free Swell and Swell Potential
6. Swelling Pressure Test

STRUCTURAL ENGINEERING LABORATORY

1. Fabrication, casting and testing of simply supported reinforced concrete beam for strength and deflection behaviour.
2. Testing of simply supported steel beam for strength and deflection behaviour.
3. Determination of in-situ strength and quality of concrete using
   i) Rebound Hammer and
   ii) Ultrasonic Pulse Velocity Tester.

Sixth Semester								
	Theory					Practical		
Code	**Course Name**	**Hours/ week L/T**	**Credit Theory**	**University Marks**	**Internal Evaluation**	**Hours/ week L/T**	**Credit Practical**	**Marks**
PC	Foundation Engineering	3-0	3	100	50	2	1	50
PC	Irrigation Engineering	3-0	3	100	50	2	1	50
PE	Advanced Transportation Engineering/ Pavement Design / Mass Transit System	3-1	4	100	50			
PE	Structural Dynamics/ FEM/Pre-stressed Concrete	3-1	4	100	50			
MC & GS	Environmental Science & Engineering	3-0	3	100	50			
OE	Industrial Lecture #					3	1	50
HS	Business Communication & Skill for Interview # #	2-0	1		50	4	2	100
MC	Yoga					2	1	50
Total		19	18	500	300	13	6	300
Total Marks: 1100								
Total Credits: 24								
Honours	Applications of Matrix Method in Structural Analysis/Earthquake Engineering/Town Planning	4	4	100	50			
Minor	Irrigation Engineering							

Semester : 6th

1.	PCI6D001 Honours(O3)	Applications of Matrix Method in Structural Analysis	4-0-0	4
2.	PCI6D002 Honours(O3)	Earthquake Engineering	4-0-0	4
3.	PCI6D003 Honours(O3)	Town Planning	4-0-0	4
4.	PCI6E101 HS(CP)	Business Communication & Skill for Interview	1-0-2	3
5.	PCI6G001 Minor(CP)	Irrigation Engineering	4-0-0	4
6.	PCI6H301 OE(CP)	Industrial Lecture #	0-0-1	1
7.	PCI6I101 PC(CP)	Foundation Engineering	3-0-1	4
8.	PCI6I102 PC(CP)	Irrigation Engineering	3-0-1	4
9.	PCI6J001 PE(O1)	Advanced Transportation Engineering	4-0-0	4
10.	PCI6J002 PE(O1)	Pavement Design	4-0-0	4
11.	PCI6J003 PE(O1)	Mass Transit System	4-0-0	4
12.	PCI6J004 PE(O2)	Structural Dynamics	4-0-0	4
13.	PCI6J005 PE(O2)	FEM	4-0-0	4
14.	PCI6J006 PE(O2)	Pre-stressed Concrete	4-0-0	4
				28

PCI6I101 FOUNDATION ENGINEERING (3-0-1)

Module:I

Lateral Earth Pressure and Retaining Structures: Concept of earth pressure, Earth pressure at rest, active and passive earth pressure for both cohesionless and cohesive soils, Earth pressure theories: Rankine's theory, Coumb's Wedge theory, Graphical methods: Rebhan's and Culmann's graphical solutions, Stability conditions for retaining walls.

Module: II

Bearing Capacity: Definitions, Rankine's analysis, Types of failures: General and local shear failure, Terzaghi's Analysis, Brinch-Hansen analysis, Meyerhof's analysis, Vesics's bearing capacity equation, Effect of water table on bearing capacity, IS code method for computing bearing capacity, Field Methods: Plate load test and its limitations, Standard penetration test.

Shallow Foundations: Types of foundations: Spread footing, combined and strap footing, mat or raft footing, Settlement of footings.

Module: III

Deep Foundations: Difference between shallow and deep foundations, Types of deep foundations. Pile Foundations: Types of piles, pile driving, load carrying capacity of piles-static and dynamic formulae, Pile load test and its limitations, correlation with penetration tests, Group action in piles-settlement and efficiency of pile groups in clay, negative skin friction, Under reamed pile foundation. Basics of well foundation - types, component parts and ideas about the forces acting on a well foundation.

Module: IV

Subsoil Exploration: Necessity and planning for subsoil exploration, Methods - direct (test pits and trenches), indirect (sounding, penetration tests and geophysical methods).

Soil sampling – types of samples, standard penetration test, static and dynamic cone penetration test, in-situ vane shear test, Rock coring, soil exploration report.

Rock Mechanics: Introduction, problems, defects in rock mass, joints, faults, folds, methods of geophysical prospecting, seismic and electrical method.

Text Books:

1. Principles of Foundation Engineering by B. M. Das, Cenage Learning
2. Foundation Analysis and Design by Joseph E. Bowles, Mc Graw Hill
3. Soil Mechanics And Foundation Engineering by K.R.Arora, STANDARD PUBLISHER DIST.

Reference Books:

1. Geotechnical Engineering by S. K. Gulati & Monoj Gupta, Mc Graw Hill
2. Soil Mechanics and Foundations by Dr B. C. Punmia et al., Laxmi Publications
3. Soil Mechanics & Foundation Engineering by B.N.D. Narasinga Rao, WILEY
4. Geotechnical Engineering by C. Venkatramiah, New Age International Publishers
5. Basic and Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New Age International Publishers

FOUNDATION ENGINEERING LAB

1. Interpretation of a bore log data
2. Preparation of a Soil Investigation Report
3. Design of foundation basing on the soil investigation Report
4. Design of a foundation using the result of SPT and CPT
5. Design of a Pile Foundation on Expansive Soil
6. Computer aided design using MATLAB or any other software
   i. Geotechnical design of Spread Footing Foundation
   ii. Geotechnical design of Raft Foundation
   iii. Geotechnical design of Pile Foundation
   iv. Geotechnical design of Well Foundation
   v. Geotechnical design of Retaining Wall

PCI6I102 IRRIGATION ENGINEERING (3-0-1)

MODULE-I

Introduction: Necessity of Irrigation in India, Advantages and disadvantages of Irrigation, Techniques of water distribution in firms, Quality of irrigation water.

Water requirements of Crops: Crops and crop season, Duty and Delta, Consumptive use, Irrigation requirements, Estimation of consumptive use of water by climatic approaches, Irrigation efficiencies, Soil moisture-irrigation relationship.

MODULE-II

Canal Irrigation: Classification of canals, Canal losses, Alignment of canals, Design of stable channels using Kennedy's and Lacey's theory, Garret's diagram, Cross section of irrigation canals

Lining of Irrigation Canals: Advantages and economics of lining, Various types of lining, Design of lined canals.

MODULE-III

Reclamation of Water Logged and Saline Soils: Causes and control of water logging. Reclamation of saline and alkaline land, Surface and Sub-surface drainage.

Types of Cross-Drainage Works: Types of CD works, Selection of a suitable type to suite a particular condition, Design consideration for CD works.

Diversion Head works: Weirs and Barrages, Types of weirs and barrages, Layout of a diversion head works, Introduction to different components of a diversion head works.

Design of weirs and barrages: Bligh's creep theory, Design of weir using Bligh's theory, Lane's weighted creep theory, Khosla's theory, Khosla's method of independent variables, Exit gradient.

Canal Falls: Necessity, Proper location, Types, Design and detailing of one type of fall.

MODULE-IV

Gravity Dams: Typical cross section, Various forces acting on gravity dam, Combination of forces for design, Modes of failure and criteria for structural stability, High and low gravity dam, Design of high dam, Typical section of low gravity dam.

Earth Dams: Types, Causes of failure, Preliminary section of an earth dam, Seepage control in earth dams

Spillways: Descriptive study of various types of spillways.

Text Books:

1. Irrigation Engineering and Hydraulic Structures by S. K. Garg, Khanna Publication, New Delhi
2. Irrigation Engg. By B.C. Punmia and Pande, Laxmi Publication, New Delhi

Reference Books:

1. Irrigation Engg. By Birdie and Das, Dhanpat Rai, New Delhi
2. Irrigation Engg. By Sharma and Sharma, S. Chanda and Company, New Delhi

IRRIGATION ENGINEERING LAB

1. Design of Gravity Dam
2. Design of Earthen Dam
3. Design of different type of Spillways
4. Design of Weirs and Barrages
5. Design of Different Types of Cross Drainage Works and Falls
6. Design of head regulator and cross head regulator
7. Design of canal in alluvium by Kennedy's &Lacey's methods
8. Design of Cross section of canals in cutting, filling, partly in cutting and partly in filling.
9. Design and layout of Drip irrigation system
10. Design and layout of Sprinkler irrigation system

PCI6J001 ADVANCED TRANSPORTATION ENGINEERING (3-1-0)

MODULE-I

History of Indian railways, component parts of railway track, problems of multi gauge system, coning of wheels, alignments and survey, permanent way track components , Type of rail sections ,creep of rails, wear and failure in rails , Ballast requirements, sleeper requirements, types of sleepers, various train resistances

MODULE-II

Geometric design: Gradients and grade compensation, various speeds on a railway track, super-elevation, horizontal and vertical curves, Points and crossings, Design of simple turn-out, Signalling and interlocking,

MODULE-III

Airport site selection, Air craft characteristics, various surface of an airport, Wind rose diagram, Geometric elements of run way and taxiway , holding apron, parking configuration , terminal building , visual aids, air traffic control, airport marking and lighting.

MODULE-IV

Harbour Engineering: Classification of Harbour basin, general layout of harbours, Docks, Different components of docks.

Reference Books:

1. A text book of railway engineering , By S.C.Saxena and M.G.Arora
2. Railway Engineering by Satish Chandra & MM Agrawal, Oxford University Press.
3. Transportation Engineering, Volume-II- Railways, Airports, Docks and Harbours, Bridges and Tunnels by C. venkatramaih, Universities Press
4. Air-port Engineering by S.K.Khanna and M.G.Arora

PCI6J002 PAVEMENT DESIGN (3-1-0)

Module – I

Introduction: Classification of pavements, Difference between highway and runway pavements, Factors affecting structural design, Characteristics of traffic loading, Concept of VDF and Computation of design traffic.

Module – II

Principles of pavement design: Concepts of structural and functional failures, Performance criteria; Analysis of pavements: ESWL, Analysis of flexible and concrete pavements.

Module – III

Design of pavements: IRC, AASHTO and other important methods of design of bituminous and concrete pavements.

Module – IV

Pavement evaluation techniques: Benkelman beam, Falling weight deflectometer and other equipments, Concepts of pavement maintenance management.

Reference Books:

1. Principles of Pavement Design, E. J. Yoder & M.W. Witzack, John Wiley
2. Pavement Design by R Srinivasa Kumar, Universities Press
3. Principles of Transportation Engineering, P. Chakroborty & A. Das, PHI Publication
4. Pavement Analysis and Design, Y. H. Huang, Prentice Hall

PCI6J003 MASS TRANSIT SYSTEM (4-0-0)

MODULE-I

TRANSIT SYSTEM AND ISSUES

Introduction to Mass Transport, Role of various modes of Mass Transport, Transport System Performance at National, State, Local and International levels, National Transport Policy, Urban transportation problems and their impact, Modes of mass transit- their planning, construction and operation, Case studies of existing mass transit systems
Technical and economic evaluation of mass transit projects

PUBLIC TRANSIT SYSTEM

Urban Transport System, Public Transport System Re-genesis and Technology, Physical performance of Public Transport System, Public Transport and Urban Development Strategies, Mass Transit concepts- Trip interchanges and assignments, Characteristics of Rail Transit, Vehicle Characteristics

MODULE-II

BUS TRANSIT PLANNING AND SCHEDULING

Route Planning and Scheduling, Bus Transport System, Performance and Evaluation, Scheduling, Conceptual patterns of bus service, Network Planning and Analysis, Bus Transport System Pricing, Bus Transit System Integration, Analytical Tools and Techniques for Operation and Management, Bus Rapid Transit Systems, Case Studies

MODULE-III

RAIL TRANSIT TERMINALS AND PERFORMANCE EVALUATION

Performance Evaluation, Efficiency, Capacity, Productivity and Utilisation, Performance Evaluation Techniques and Application, System Network Performance, Transit Terminal Planning and Design

MODULE-IV

IMPACT OF TRANSIT

Policies and Strategies for Mass Transport, Need for Integrated Approach, Unified Transport Authorities, Institutional arrangement, Urban Transport Fund, Parking Policies, Private Sector in Mass Transport, Bus and Rail Integration, Co-ordination of Feeder Services, Transit Oriented Land Use Development, Case Studies, Urban Transportation and Land use, Impact of Transport Development on Environment, Remedial measures, Policy Decisions, Recent Trends in Mass Transportation Planning and Management

Reference Books

1. Michael J.Bruton , "An Introduction to Transportation Planning", Hutchinson,1985
2. Michael D.Meyer and Eric J.Miller , "Urban Transportation Planning – A Decision Oriented Approach", McGraw Hill Book Company, New York,1984
3. F.D.Hobbs, "Traffic Planning and Design", PoargamonOress
4. John W.Dickey, "Metropolitan Transportation Planning" – Tata McGraw Hill Publishing Company Limited, New Delhi, 1980
5. Paul H.Wright, "Transportation Engineering – Planning and Design", John Wiley and Sons, New York, 1989.

PCI6J004 STRUCTURAL DYNAMICS (3-1-0)

Module I:

Single degree of freedom system: Equation of motion, Damped and undamped free vibration, Response to harmonic, periodic, impulse load and general dynamic load, Duhamel's integral;

Module II:

Multi-degrees of freedom system: Equation of motion, Free vibration analysis, Dynamic response and modal analysis.

Module III:

Free and Forced vibration of distributed mass system: Longitudinal, flexural and torsional vibration of rods, transeverse vibration of beams. Raleigh's principle.

Module IV:

Analysis of structural response to Earthquakes: Seismological background, Deterministic analysis of Earthquake.

Reference Books:

1. Dynamics of Structures: Theory and Applications to Earthquake Engineering, A K Chropra , Prentice Hall of India
2. Theory of Vibration with application, W. T. Thomson.
3. Structural Dynamics, M Mukhopadhyay: Ane Books Pvt Ltd, New Delhi
4. Structural Dynamics - Theory and Computation, M. Paz, Van Nostrand, 1985.
5. Dynamics of structures, W. Clough and J Penzien, McGraw-Hill, Inc,

PCI6J005 FINITE ELEMENT METHOD (3-1-0)

Module I:

Introduction: The Continuum, Equations of Equilibrium, Boundary Conditions, Strain displacement relations, Stress strain Relations, Plane stress and plane Strain problems, Different methods of structural analysis including numerical methods. Basics of finite element method (FEM), different steps involved in FEM, Different approaches of FEM, Direct method, Energy approach, Weighted residual Method.

Module II:

One and Two Dimensional Problems: Detail formulation including shape functions. stress strain relations, strain displacement relations and derivation of stiffness matrices using energy approach, Assembling of element matrices, application of displacement boundary conditions, Numerical solution of one dimensional problems using bar, truss, beam elements and frames. Derivation of shape function using Lagrange's interpolation, Pascal's triangle, Convergence criteria.

Module III:

Finite Element modeling of two dimensional problems using Constant strain Triangle(CST) elements, Stress strain relations for isotropic and orthotropic materials, Four nodded rectangular elements, axisymmetric solids subjected to axisymmetric loading.

Isoparametric Elements: Natural coordinates, isoparametric elements, four node, eight node elements. Numerical integration, order of integration.

Module IV:

Plate Bending: Bending of plates, rectangular elements, triangular elements and quadrilateral elements, Concept of 3D modeling.

Text Books:

1. C. S. Krishnamoorthy, Finite Element analysis-Theory and Programming, TMH
2. Finite Element Method, R. Dhanraj and K. P. Nair, Oxford University Press
3. Finite Element Methods for Engineers by U.S. Dixit, Cegage Learning

Reference Books:

1. R. D. Cook., Concepts and Applications of Finite Element Analysis , Wiley.
2. M. Mukhopadhyay-Matrix and Finite Element Analysis of Structures
3. O. C Zienkiewicz .and R. L. Taylor, Finite Element Method, Mc Graw Hill
4. Introduction to Finite Elements in Engineering, T.P. Chandrupatla and A.D. Belegundu
5. Finite Element Analysis in Engineering Design, S. Rajasekharan.

PCI6J006 PRESTRESSED CONCRETE (3-1-0)

Module I

Prestressing system, materials and codes: Basic concept, Losses of prestress, analysis of prestress and bending stresses. Need for high strength steel and concrete. Advantages and applications. Pre-tensioning and post tensioning systems.

Module – II

Design of beams : Analysis and design of section for bending and shear, pressure line, concept of load balancing, cracking moment, bending of cables, limit state analysis and design, anchorage zone stresses, design of end block, Application to bridges.

Module –III

Selection of prestress concrete members, short term and long term deflections of uncracked members.

Module –IV

Flexural strength of prestresed concrete sections
Continuous beams, Design concept concordancy of cables, Secondary design consideration. Design pre-tensioned and post tensioned beam

Reference Books:

1. Prestressed Concrete, Raju,N.K., Tata McGraw Hill
2. Prestressed Concrete, T. Y. Lin

PMG6M001 ENVIRONMENTAL SCIENCE AND ENGINEERING (3-0-0)

Module I

Multidisciplinary nature of environmental studies

Definition, scope and importance, Need for public awareness.

Natural Resources:

Renewable and non-renewable resources:

Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
e) Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
    - Role of an individual in conservation of natural resources.
    - Equitable use of resoureces for sustainable lifestyles.

Module II

Ecosystems

Concept of an ecosystem.

- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem :-
    a) Forest ecosystem
    b) Grassland ecosystem
    c) Desert ecosystem
    d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Environmental Pollution Definition

- Cause, effects and control measures of :-

a) Air pollution
b) Water pollution
c) Soil pollution
d) Marine pollution
e) Noise pollution
f) Thermal pollution
g) Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.

- Pollution case studies.
- Disaster management: floods, earthquake, cyclone and landslides.

Module III
Social Issues and the Environment

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rahabilitation of people; its problems and concerns. Case Studies
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

Module IV
Human Population and the Environment

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies.

References

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. R. Rajagopalan, Environmental Studies, Oxford University Press.
3. Ajith Sankar, Environmental Management, Oxford University Press.
4. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)
5. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
6. Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)
7. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
8. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
9. Down to Earth, Centre for Science and Environment (R)

PEN6E101 BUSINESS COMMUNICATION AND SKILL FOR INTERVIEW

Course Objectives

- To develop communication competence in prospective engineers.
- To enable them to convey thoughts and ideas with clarity and focus.
- To develop report writing skills.
- To equip them to face interview & Group Discussion.
- To inculcate critical thinking process.
- To prepare them on problem solving skills.
- To provide symbolic, verbal, and graphical interpretations of statements in a problem description.
- To understand team dynamics & effectiveness.
- To create an awareness on Engineering Ethics and Human Values.
- To install Moral and Social Values, Loyalty and also to learn to appreciate the rights of others.
- To learn leadership qualities and practice them.

MODULE I

Communication Skill: Introduction to Communication, The Process of Communication, Barriers to Communication, Listening Skills, Writing Skills, Technical Writing, Letter Writing, Job Application, Report Writing, Non-verbal Communication and Body Language, Interview Skills, Group Discussion, Presentation Skills, Technology-based Communication.

MODULE II

Critical Thinking & Problem Solving: Creativity, Lateral thinking, Critical thinking, Multiple Intelligence, Problem Solving, Six thinking hats, Mind Mapping & Analytical Thinking.

Teamwork: Groups, Teams, Group Vs Teams, Team formation process, Stages of Group, Group Dynamics, Managing Team Performance & Team Conflicts.

MODULE III

Ethics, Moral & Professional Values: Human Values, Civic Rights, Engineering Ethics, Engineering as Social Experimentation, Environmental Ethics, Global Issues, Code of Ethics like ASME, ASCE, IEEE.

MODULE IV

Leadership Skills: Leadership, Levels of Leadership, Making of a leader, Types of leadership, Transactions Vs Transformational Leadership, VUCA Leaders, DART Leadership, Leadership Grid & leadership Formulation.

Expected outcome:

The students will be able to

- Communicate effectively.
- Make effective presentations.
- Write different types of reports.
- Face interview & group discussion.

- Critically think on a particular problem.
- Solve problems.
- Work in Group & Teams
- Handle Engineering Ethics and Human Values.
- Become an effective leader.

References:

1. Barun K. Mitra; (2011), "Personality Development & Soft Skills", First Edition; Oxford Publishers.
2. Kalyana; (2015) "Soft Skill for Managers"; First Edition; Wiley Publishing Ltd.
3. Larry James (2016); "The First Book of Life Skills"; First Edition; Embassy Books.
4. Shalini Verma (2014); "Development of Life Skills and Professional Practice"; First Edition; Sultan Chand (G/L) & Company
5. John C. Maxwell (2014); "The 5 Levels of Leadership", Centre Street, A division of Hachette Book Group Inc.

PCI6D001 APPLICATION OF MATRIX METHOD IN STRUCTURAL ANALYSIS (HONOR) (4-0-0)

Module I

Introduction to Flexibility Matrices and Stiffness Matrices, Static and kinematic indeterminacy - properties of stiffness and flexibility matrices, concept of co-ordinates,s olution of simple problems.

Module II

Analysis of Beams: Flexibility and stiffness matrices for beams, solution of problems, bending moment diagram

Analysis of Plane Truss: Flexibility and stiffness matrices for plane truss, solution of problems, internal forces due to thermal expansion, lack of fit.

Module III

Analysis of Plane Frame: Flexibility and stiffness matrices for plane frame, solution of problems, bending moment diagram.

Module IV

Use of Software Packages

Analysis of beam, plane truss & plane frame by STAAD-PRO.

Reference Books

1. Mukkopadhyay M and Sheikh A.H (2004) Matrix and Finite element analyses of structures, First edition, Ane Books Pvt. Ltd.

2. Pandit G.S., & Gupta S.P. (1998), Structural Analysis (A matrix approach), Tata McGraw Hill Publishing Ltd.

PCI6D002 EARTHQUAKE ENGINEERING (HONOR) (4-0-0)

Module I

Elements of Earthquake origin & Propagation: Elements of Seismology, Earthquakes, Structure of the Earth, History of the Earth, Earthquake Mechanism, Propagation of Seismic Waves , Earthquake Phenomena, Earthquake Measurements, Definitions of magnitude, intensity, epicenter etc; Plate tectonics, seismographs, liquefaction, Types, effects and controlling factors

Module II

Theory of Vibration Effects: Dynamic Loads. D'Alembert's Principle and inertia forces, Stiffness and flexibility of elastic structures, Theory of Vibrations, Free vibrations of single and multiple degree freedom systems, computations of dynamic response to time dependent forces, mass and stiffness matrices, natural frequencies, Plate Tectonics Theory.

Module III

Earthquake Resistant Design: Principles of Earthquake Resistant Design, Response spectrum theory. Time – Acceleration method, Application of response spectrum theory to seismic design of structures.

Module IV

Earthquake Damages: Earthquake Damages to Various Civil Engineering Structures, Case Histories Earthquake, Earthquake response of structures, Soft storey collapse, Slender structures, unsymmetrical structures

Methods of disaster prevention: Earthquake resistant building Regulations, specification, guidelines for construction – Materials selection.

Reference Books

1. A K. Chopra (2003), Dynamics of Structures-Theory and Applications to Earthquake Engineering, Second Edition, Printice-Hall India Pvt Ltd.
2. Pauley & Priestly (1995), Seismic design of reinforced concrete and masonry buildings, John Wiley & Sons.
3. Stratta.J.L. (2000), Manual of Seismic Design, Prentice-Hall India Pvt Ltd.
4. Kramer.S.L. (2000), Geotechnical Earthquake Engineering, Prentice-Hall India Pvt Ltd.
5. Agarwal & Shrinkhardo (2006), Earthquake Resistant design of a structures, Prentice-Hall India.
6. Earthquake Resistant Design of Structures, S.K.Duggal, Oxford University Press

PCI6D003 TOWN PLANNING (HONOR) (4-0-0)

Module – I

Principles of architectural design –primary elements, form, space, organization, circulation, proportion and scale, ordering principles.

Functional planning of buildings: Planning, designing and construction, General building requirements, Permit and Inspection (as per the National building Code)

Module – II

Town Planning ; Evolution of towns : History and trends in town planning:-origin and growth, Historical development of town planning in ancient valley civilizations; Objects and necessary of town planning; Surveys and analysis of a town

Module – III

New Concepts in town planning : Garden city movement, Linear city and Satellite city concepts, Neighborhood Planning.

Module – IV

Planning Principles, Practice and Techniques: Elements of City plan, Estimating future needs, Planning standards, Zoning:- its definition, procedure and districts, height and bulk zoning, F.A.R., Master Plan; Concepts of urban planning , design and landscaping.

Reference Books:

1. B. Gallion and S. Eisner, The Urban Pattern: City planning and Design - C B S publishers.
2. D. K. Francis Ching, Architectures: Form, Space and Order, John Wiley.
3. S. Eisner, A. B. Gallion and S. Eisner, The Urban Pattern: City planning and Design, JohnWiley

PCI6I102 IRRIGATION ENGINEERING (MINOR) (3-0-1)

MODULE-I

Introduction: Necessity of Irrigation in India, Advantages and disadvantages of Irrigation, Techniques of water distribution in firms, Quality of irrigation water.

Water requirements of Crops: Crops and crop season, Duty and Delta, Consumptive use, Irrigation requirements, Estimation of consumptive use of water by climatic approaches, Irrigation efficiencies, Soil moisture-irrigation relationship.

MODULE-II

Canal Irrigation: Classification of canals, Canal losses, Alignment of canals, Design of stable channels using Kennedy's and Lacey's theory, Garret's diagram, Cross section of irrigation canals

Lining of Irrigation Canals: Advantages and economics of lining, Various types of lining, Design of lined canals.

MODULE-III

Reclamation of Water Logged and Saline Soils: Causes and control of water logging. Reclamation of saline and alkaline land, Surface and Sub-surface drainage.

Types of Cross-Drainage Works: Types of CD works, Selection of a suitable type to suite a particular condition, Design consideration for CD works.

Diversion Head works: Weirs and Barrages, Types of weirs and barrages, Layout of a diversion head works, Introduction to different components of a diversion head works.

Design of weirs and barrages: Bligh's creep theory, Design of weir using Bligh's theory, Lane's weighted creep theory, Khosla's theory, Khosla's method of independent variables, Exit gradient.

Canal Falls: Necessity, Proper location, Types, Design and detailing of one type of fall.

MODULE-IV

Gravity Dams: Typical cross section, Various forces acting on gravity dam, Combination of forces for design, Modes of failure and criteria for structural stability, High and low gravity dam, Design of high dam, Typical section of low gravity dam.

Earth Dams: Types, Causes of failure, Preliminary section of an earth dam, Seepage control in earth dams

Spillways: Descriptive study of various types of spillways.

Text Books:

1. Irrigation Engineering and Hydraulic Structures by S. K. Garg, Khanna Publication, New Delhi
2. Irrigation Engg. By B.C. Punmia and Pande, Laxmi Publication, New Delhi

Reference Books:

1. Irrigation Engg. By Birdie and Das, Dhanpat Rai, New Delhi
2. Irrigation Engg. By Sharma and Sharma, S. Chanda and Company, New Delhi

Seventh Semester								
	Theory					Practical		
Code	**Course Name**	**Hours/ week L/T**	**Credit Theory**	**University Marks**	**Internal Evaluation**	**Hours/ week L/T**	**Credit Practical**	**Marks**
GS	Nano Science & Bio Technology	3-1	4	100	50			
PE	Architecture & Town planning / Ground improvement Technique/ Soil Dynamics & Machine Foundation	3-1	4	100	50			
PE	Environmental Impact Assessment/ Industrial Waste Management & Disposal / Quantity Surveying & Estimating	3-1	4	100	50			
OE	Soft Computing */ Other subjects	3-1	4	100	50			
PC	Advance Lab-II/ Project					8	4	200
	Projects on Internet of Things					8	4	200
Total		16	16	400	200	16	8	400
Total Marks: 1000								
Total Credits: 24								
Honours	Water Resources System and Management/ Advanced Design of Reinforced Concrete Structures / Computational Fluid Dynamics	4	4	100	50			
Minor	Design of Concrete Structures							

Semester : 7th

1.	PCI7C001	GS(CP)	Nano & Bioscience	4-0-0	4
2.	PCI7D001	Honours(O5)	Water Resources System and Management	4-0-0	4
3.	PCI7D002	Honours(O5)	Advanced Design of Reinforced Concrete Structures	4-0-0	4
4.	PCI7D003	Honours(O5)	Computational Fluid Dynamics	4-0-0	4
5.	PCI7G001	Minor(CP)	Design of Concrete Structures	4-0-0	4
6.	PCI7H001	OE(O4)	Soft Computing	4-0-0	4
7.	PCI7H002	OE(O4)	Other subjects	4-0-0	4
8.	PCI7H201	FE(CP)	Projects on Internet of Things	0-0-4	4
9.	PCI7I201	PC(O3)	Advance Lab - II	0-0-4	4
10.	PCI7I202	PC(O3)	Project	0-0-4	4
11.	PCI7J001	PE(O1)	Architecture & Town planning	4-0-0	4
12.	PCI7J002	PE(O1)	Ground improvement Technique	4-0-0	4
13.	PCI7J003	PE(O1)	Soil Dynamics & Machine Foundation	4-0-0	4
14.	PCI7J004	PE(O2)	Environmental Impact Assessment	4-0-0	4
15.	PCI7J005	PE(O2)	Industrial Waste Management & Disposal	4-0-0	4
16.	PCI7J006	PE(O2)	Quantity Surveying & Estimating	4-0-0	4

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Semester : 8th

1.	PCI8I201	PC(O1)	Entrepreneurship Training cum Project	0-0-20	20
2.	PCI8I202	PC(O1)	Startup Training cum Project	0-0-20	20
3.	PCI8I301	PC(O1)	Industrial Training cum Project	0-0-20	20

					20

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PAE7J001/ PAE7J002	Wind Tunnel Techniques/ Experimental Fluid Dynamics	3-0-0	3	100	50
PAE7J003/ PAE7J004/ PAE7J005	Combustion/ Space Mechanics/ Helicopter Engineering	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PAE7N201	Seminar	0-0-1	2	-	100
PAE7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PAE7D010/ PAE7D011/ PAE7D012/ PAE7D013	Hypersonic Aerodynamics/ Satellite Technology/ Helicopter Engineering/ Rocket & Missiles	4-0-0	4	100	50
Minors					
PAE7G003	Flight Mechanics	4-0-0	4	100	50

PAE7J001 WIND TUNNEL TECHNIQUES 3-0-0

UNIT I WIND TUNNELS

Classification –non-dimensional numbers-types of similarities - Layout of open circuit and closed circuit subsonic wind tunnels – design parameters-energy ratio – HP calculations. Calibration.

UNIT II HIGH SPEED WIND TUNNELS

Blow down, in draft and induction tunnel layouts and their design features, Transonic, supersonic and hypersonic tunnels, their peculiarities and calibration. Helium and gun tunnels, Shock tubes,

UNIT III WIND TUNNEL MEASUREMENTS

Pressure,velocity and temperature measurements – Force measurements – types of balances-Three component and six component balances – calibration of measuring instruments.

UNIT IV FLOW VISUALIZATION

Smoke and Tuft grid techniques – Dye injection special techniques – Optical methods of flow visualization.

UNIT V NON-INTRUSIVE FLOW DIAGNOSTICS

Laser – Doppler anemometry. Particle image velocimetry. Laser induced fluorescence.

TEXT BOOK

1. Rae, W.H. and Pope, A. “Low Speed Wind Tunnel Testing”, John Wiley Publication, 1984.

REFERENCE

1. Pope, A., and Goin, L., “High Speed wind Tunnel Testing”, John Wiley, 1985.

PAE7J002 Experimental Fluid Dynamics 3-0-0

Objectives: To present the measurement techniques involved in aerodynamic testing.

UNIT I WIND TUNNEL TESTING

Low speed wind tunnels-estimation of energy ratio and power required supersonic win tunnels-calculation of running time and storage tank requirements.

UNIT II EXPERIMENTS IN SUBSONIC WIND TUNNELS

Estimation of flow angularity and turbulence factor-calculation of C_L and C_D on aero foils from pressure distribution- C_D from wake survey-Test section average velocity using traversing rakes-span wise load distribution for different taper ratios of wing

UNIT III EXPERIMENTS IN HIGH SPEED TUNNELS

Mach number estimation in test section by pressure measurement and using a wedge – preliminary estimates of blowing and running pressures, nozzle area ratios, mass flow for a given test section size and Mach number-starting problem and starting loads.

UNIT IV MEASUREMENT TECHNIQUES

Hot wire anemometer and laser Doppler anemometer for turbulence and velocity measurements-Use of thermocouples and pyrometers for measurement of static and total temperatures-Use of pressure transducers, Rotameters and ultrasonic flow meters.

UNIT V SPECIAL PROBLEMS

Pitot-static tube correction for subsonic and supersonic Mach numbers-boundary layer velocity profile on a flat plate by momentum-integral method -Calculation of C_D from wall shear stress-Heating requirements in hypersonic wind tunnels-Re-entry problems.

REFERENCES:

1. Rae W.H and Pope. A “Low speed wind tunnel testing” John Wiley Publication, 1984

2. Pope. A and Goin. L “High speed wind tunnel testing” John Wiley, 1985

3. Rathakrishnan. E “Instrumentation, Measurement and Experiments in Fluids”, CRC Press, London, 2007.

PAE7J003 COMBUSTION 3-0-0

UNIT I FUNDAMENTAL CONCEPTS IN COMBUSTION, CHEMICAL KINETICS AND FLAMES

Thermo chemical equations – heat of reaction- first, second and third order reactions – premixed flames – diffusion flames – measurement of burning velocity – various methods – effect of various parameters on burning velocity – flame stability – deflagration – detonation – Rankine-Hugoniot curves – radiation by flames

UNIT II COMBUSTION IN AIRCRAFT PISTON ENGINES

Introduction to combustion in aircraft piston engines – various factors affecting the combustion efficiency - fuels used for combustion in aircraft piston engines and their selection – detonation in piston engine combustion and the methods to prevent the detonation

UNIT III COMBUSTION IN GAS TURBINE AND RAMJET ENGINES

Combustion in gas turbine combustion chambers - recirculation – combustion efficiency, factors affecting combustion efficiency, fuels used for gas turbine combustion chambers – combustion stability – ramjet combustion – differences between the design of ramjet combustion chambers and gas turbine combustion chambers- flame holders types – numerical problems.

UNIT IV SUPERSONIC COMBUSTION

Introduction to supersonic combustion – need for supersonic combustion for hypersonic airbreathing propulsion- supersonic combustion controlled by diffusion, mixing and heat convection – analysis of reactions and mixing processes - supersonic burning with detonation shocks - various types of supersonic combustors.

UNIT V COMBUSTION IN SOLID, LIQUID AND HYBRID ROCKETS

Solid propellant combustion - double and composite propellant combustion – various combustion models – combustion in liquid rocket engines – single fuel droplet combustion model – combustion hybrid rockets

TEXT BOOKS

1. Sharma, S.P., and Chandra Mohan, “Fuels and Combustion”, Tata Mc. Graw Hill Publishing Co., Ltd., New Delhi, 1987.

2. Mathur, M.L., and Sharma, R.P., “Gas Turbine, Jet and Rocket Propulsion”, Standard Publishers and Distributors, Delhi, 1988.

REFERENCES

1. Loh, W.H.T., “Jet, Rocket, Nuclear, Ion and Electric Propulsion: Theory and Design”, Springer Verlag, New York, 1982.

2. Beer, J.M., and Chiger, N.A. “Combustion Aerodynamics”, Applied Science Publishers Ltd., London, 1981.

3. Sutton, G.P., “Rocket Propulsion Elements”, John Wiley & Sons Inc., New York, 5th Edition, 1993.

PAE7J005 HELICOPTER Engineering 3-0-0

UNIT I

ELEMENTS OF HELICOPTER AERODYNAMICS

Configurations based on Torque reaction – Jet rotors and compound helicopters – Methods of Control, rotor blade pitch control, –Collective pitch and and Cyclic pitch – Lead – Lag and flapping hinges

UNIT II

IDEAL ROTOR THEORY

Hovering performance – Momentum and simple blade element theories – Figure of merit – Profile and induced power estimation – Constant Chord and ideal twist rotors.

UNIT III

POWER ESTIMATES

Induced, profile and parasite power requirements in forward flight – Performance curves with effects of altitude – Preliminary ideas on helicopter stability.

UNIT V

LIFT, PROPULSION AND CONTROL OF V/STOL AIRCRAFT

Various configurations – propeller, rotor, ducted fan and jet lift – Tilt wing and vectored thrust –Performance of VTOL and STOL aircraft in hover, transition and

forward motion.

GROUND EFFECT MACHINES

Types – Hover height, lift augmentation and power calculations for plenum chamber and peripheral jet machines – Drag of hovercraft on land and water –Applications of hovercraft.

TEXT BOOKS

1. Gessow, A.and Myers, G. C., Aerodynamics of Helicopter, MacMillan & Co., 1987.

2. Gupta, L., Helicopter Engineering, Himalayan Books, 1996.

REFERENCES

1. Johnson, W., Helicopter Theory, Princeton University Press, 1980.

2. MacCromick, B. W., Aerodynamics of V/STOL Flight, Academic Press, 1987.

PAE7J004 SPACE MECHANICS 3-0-0

OBJECTIVE

To study the basic concepts of orbital Mechanics with particular emphasis on

interplanetary trajectories

UNIT I BASIC CONCEPTS

The Solar System – References Frames and Coordinate Systems – The Celestial Sphere

– The Ecliptic – Motion of Vernal Equinox – Sidereal Time – Solar Time – Standard Time –

The Earth's Atmosphere.

UNIT II THE GENERAL N-BODY PROBLEM

The many body Problem – Lagrange – Jacobian Identity –The Circular Restricted Three

Body Problem – Libration Points- Relative Motion in the N-body Problem –Two –Body

Problem – Satellite Orbits – Relations Between Position and Time – Orbital Elements.

UNIT III SATELLITE INJECTION AND SATELLITE ORBIT PERTURBATIONS

General Aspects of satellite Injections – Satellite Orbit Transfer –Various Cases – Orbit

Deviations Due to Injection Errors – Special and General Perturbations – Cowell's Method

– Encke's Method – Method of vibrations of Orbital Elements – General Perturbations

Approach.

UNIT IV INTERPLANETARY TRAJECTORIES

Two Dimensional Interplanetary Trajectories –Fast Interplanetary Trajectories – Three

Dimensional Interplanetary Trajectories – Launch if Interplanetary Spacecraft – Trajectory

about the Target Planet.

UNIT V BALLISTIC MISSILE TRAJECTORIES AND MATERIALS

The Boost Phase – The Ballistic Phase –Trajectory Geometry- Optimal Flights – Time of Flight – Re – entry Phase – The Position of the Impact Point – Influence Coefficients.

Space Environment – Peculiarities – Effect of Space Environment on the Selection of

Spacecraft Material.

TEXT BOOK

1. Cornelisse, J.W., “Rocket Propulsion and Space Dynamic”, W.H. Freeman & Co., 1984.

REFERENCES

1. Sutton, G.P., “Rocket Propulsion Elements”, John Wiley, 1993.

2. Van de Kamp, P., “Elements of Astro-mechanics”, Pitman, 1979.

3. Parker E.R., “Materials for Missiles and Spacecraft”, McGraw-Hill Book Co. Inc., 1982.

PCP7H007 IOT 3-0-0

Course description and objectives:

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:

· *Able to understand the application areas of IOT*
· *Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks*
· *Able to understand building blocks of Internet of Things and characteristics.*

Module I

Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.

Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II

M2M & System Management with NETCONF-YANG: M2M, Difference between IOT

and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III

Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:

1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On-Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:

1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication

The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo- SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:

Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:

Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Biodevice and application

Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)

Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, -Nanobiotechnology: Concepts, Applications and Perspectives, Wiley-VCH, (2004).
2. 4 T. Pradeep, -Nano: The Essentials, McGraw - Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical

Applications, Techniques, Tools, Applications and Impact, Wiley - VCH, (2005).

5. Nicholas A. Kotov, -Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 **IPR** **3-0-0**

Module-I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING
3-0-0

MODULE – I (8 hours)

Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non - linear Error surface and optimization.

MODULE – II (8 hours)

Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)

Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self - organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)

Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. 0. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design - Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.

2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.

4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 Introduction to Management & Function 3-0-0

Module – I:Introduction

Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH
2. Principles and Practices of Management – Kaul, Vikas
3. Management, Robbins, Coulter &Vohra, Pearson.
4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product -market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Educatio

Honour

PAE7D010 Hypersonic Aerodynamics 4-0-0

OBJECTIVE:

To present the basic ideas of hypersonic flow and the associated problem areas.

UNIT I FUNDAMENTALS OF HYPERSONIC AERODYNAMICS

Introduction to hypersonic aerodynamics-differences between hypersonic aerodynamics and supersonic aerodynamics-concept of thin shock layers-hypersonic flight paths-hypersonic similarity parameters-shock wave and expansion wave relations of in viscid hypersonic flows.

UNIT II SIMPLE SOLUTION METHODS FOR HYPERSONIC IN VISCID FLOWS

Local surface inclination methods-Newtonian theory-modified Newtonian law-tangent wedge and tangent cone and shock expansion methods-approximate theory-thin shock layer theory.

UNIT III VISCOUS HYPERSONIC FLOW THEORY

Boundary layer equation for hypersonic flow-hypersonic boundary layers-self similar and non self similar boundary layers-solution methods for non self similar boundary layersaerodynamic

heating.

UNIT IV VISCOUS INTERACTIONS IN HYPERSONIC FLOWS

Introduction to the concept of viscous interaction in hypersonic flows-strong and weak viscous interactions-hypersonic viscous interaction similarity parameter-introduction to shock wave boundary layer interactions.

UNIT V INTRODUCTION TO HIGH TEMPERATURE EFFECTS

Nature of high temperature flows-chemical effects in air-real and perfect gases-Gibb's free energy and entropy-chemically reacting mixtures-recombination and dissociation.

TEXT BOOKS:

1. John D. Anderson. Jr., "Hypersonic and High Temperature Gas Dynamics",

Mc.Graw hill Series, New York, 1996.

REFERENCES:

1. John D. Anderson. Jr., "Modern Compressible flow with historical Perspective",

Mc. Graw Hill Publishing Company, New York, 1996.

2. John T. Bertin, "Hypersonic Aerothermodynamics", published by AIAA Inc.,Washington. D.C., 1994

PAE7D011 SATELLITE TECHNOLOGY 4-0-0

UNIT I INTRODUCTION TO SATELLITE SYSTEMS

Common satellite applications and missions – Typical spacecraft orbits – Definitions of spin the three axis stabilization-Space environment – Launch vehicles – Satellite system and their functions (structure, thermal, mechanisms, power, propulsion, guidance and control, bus electronics).

UNIT II ORBITAL MECHANICS

Fundamental of flight dynamics – Time and coordinate systems – Orbit determination and prediction – Orbital maneuvers – GPS systems and application for satellite/orbit determination – Ground station network requirements.

UNIT III SATELLITE STRUCTURES & THERMAL CONTROL

Satellite mechanical and structural configuration: Satellite configuration choices, launch loads, separation induced loads, deployment requirements – Design and analysis of satellite structures – Structural materials and fabrication – The need of thermal control: externally induced thermal environment – Internally induced thermal environment - Heat transfer mechanism: internal to the spacecraft and external heat load variations – Thermal control systems: active and passive methods.

UNIT IV SPACECRAFT CONTROL

Control requirements: attitude control and station keeping functions, type of control maneuvers – Stabilization schemes: spin stabilization, gravity gradient methods, 3 axis stabilization – Commonly used control systems: mass expulsion systems, momentum exchange systems, gyro and magnetic torquer - Sensors star and sun sensors, earth sensor, magnetometers and inertial sensors

UNIT V POWER SYSTEM AND BUS ELECTRONICS

Solar panels: Silicon and Ga-As cells, power generation capacity, efficiency – Space battery systems – battery types, characteristics and efficiency parameters – Power

electronics. Telemetry and telecommand systems: Tm & TC functions, generally employed communication bands (UHF/VHF, S, L, Ku, Ka etc), their characteristics and applications- Coding Systems – Onboard computer- Ground checkout Systems.

TEXT BOOKS

1. Analysis and Design of Flight Vehicle Structures, Tri-State off set company, USA, 1980.

2. Space Systems Engineering Rilay, FF, McGraw Hill, 1982.

3. Principles of Astronautics Vertregt.M., Elsvier Publishing Company, 1985.

4. Introduction Space Flight, Francis J. Hale Prentice Hall, 1994.

5. Space Vehicle Design, Michael D. Griffin and James R. French, AIAAEducation Series, 1991.

REFERENCES

1. Spacecraft Thermal Control, Hand Book, Aerospace Press, 2002.

2. Structural Design of Missiles & Space Craft Lewis H. Abraham, McGrawHill, 1992.

3. Space Communications Systems, Richard.F, Filipowsky Eugen I Muehllorf Princtice Hall, 1995.

4. Hughes, P.C. Space Craft Altitude Dynamics, Wilsey, 1986.

5. Gebmart, Heat Transfer, McGraw Hill, Martin J. Communication SatelliteSystems, McGraw Hill, 1978.

PAE7D013 ROCKETS AND MISSILES 4-0-0

UNIT I ROCKET SYSTEMS

Ignition system in rockets – types of igniters and igniter design considerations – injection system and propellant feed systems of liquid rockets and their design considerations – design considerations of liquid rocket thrust chambers – combustion mechanisms of liquid and solid propellants.

UNIT II AERODYNAMICS OF ROCKETS AND MISSILES

Airframe components of rockets and missiles – forces acting on a missile while passing through atmosphere – classification of missiles – slender body aerodynamics - method of describing forces and moments – lift force and lateral moment –lateral aerodynamic damping moment – longitudinal moment – drag estimation – body upwash and body downwash in missiles – rocket dispersion.

UNIT III ROCKET MOTION IN FREE SPACE AND GRAVITATIONAL FIELD

One dimensional and two-dimensional rocket motions in free space and homogeneous gravitational fields – description of vertical, inclined and gravity turn trajectories – determination of range and altitude – simple approximations to burn out velocity and altitude – estimation of culmination time and altitude.

UNIT IV STAGING AND CONTROL OF ROCKETS AND MISSILES

Design philosophy behind multistaging of launch vehicles and ballistic missiles – multistage vehicle optimization – stage separation techniques in atmosphere and in space – stage separation dynamics and lateral separation characteristics – various types of thrust vector control methods including secondary injection thrust vector control – numerical problems on stage separation and multistaging.

UNIT V MATERIALS FOR ROCKETS AND MISSILES

Selection criteria of materials for rockets and missiles – materials for various airframe components and engine parts – materials for thrust control devices – various adverse

conditions faced by aerospace vehicles and the requirement of materials to perform under these conditions.

TEXT BOOKS:

1. Cornelisse, J.W., “Rocket Propulsion and Space Dynamics”, J.W. Freeman & Co.,Ltd, London, 1982

2. Sutton, G.P., “Rocket Propulsion Elements”, John Wiley & Sons Inc., New York, 5th Edition, 1993.

REFERENCES:

1. Parker, E.R., “Materials for Missiles and Spacecraft”, Mc.Graw Hill Book Co. Inc., 1982.

2. Mathur, M.L., and Sharma, R.P., “Gas Turbine, Jet and Rocket Propulsion”, Standard Publishers and Distributors, Delhi, 1988.

Minor

PAE7G003 Flight Mechanics 4-0-0

OBJECTIVE

To study the performance of airplanes under various operating conditions and the static and dynamic response of aircraft for both voluntary and involuntary changes in flight conditions

UNIT I CRUISING FLIGHT PERFORMANCE

International Standard Atmosphere - Forces and moments acting on a flight vehicle - Equation of motion of a rigid flight vehicle - Different types of drag –estimation of parasite drag co-efficient by proper area method- Drag polar of vehicles from low speed to high speeds - Variation of thrust, power with velocity and altitudes for air breathing engines . Performance of airplane in level flight - Power available and power required curves. Maximum speed in level flight - Conditions for minimum drag and power required

UNIT II MANOEUVERING FLIGHT PERFORMANCE

Range and endurance - Climbing and gliding flight (Maximum rate of climb and steepest angle of climb, minimum rate of sink and shallowest angle of glide) -Turning performance (Turning rate turn radius). Bank angle and load factor – limitations on turn - V-n diagram and load factor.

UNIT III STATIC LONGITUDINAL STABILITY

Degree of freedom of rigid bodies in space - Static and dynamic stability - Purpose of controls in airplanes -Inherently stable and marginal stable airplanes – Static, Longitudinal stability - Stick fixed stability - Basic equilibrium equation - Stability criterion - Effects of fuselage and nacelle - Influence of CG location - Power effects - Stick fixed neutral point - Stick free stability-Hinge moment coefficient - Stick free neutral points-Symmetric

maneuvers - Stick force gradients - Stick _ force per 'g' - Aerodynamic balancing.

UNIT IV LATERAL AND DIRECTIONAL STABILITY

Dihedral effect - Lateral control - Coupling between rolling and yawing moments - Adverse yaw effects - Aileron reversal - Static directional stability - Weather cocking effect - Rudder requirements - One engine inoperative condition - Rudder lock.

UNIT V DYNAMIC STABILITY

Introduction to dynamic longitudinal stability: - Modes of stability, effect of freeing the stick - Brief description of lateral and directional. dynamic stability - Spiral, divergence, Dutch roll, auto rotation and spin.

TEXT BOOKS

1. Perkins, C.D., and Hage, R.E., “Airplane Performance stability and Control”, John Wiley & Son:, Inc, NY, 1988.

2. Nelson, R.C. “Flight Stability and Automatic Control”, McGraw-Hill Book Co., 2004.

3. Mc Cornick. W., “Aerodynamics, Aeronautics and Flight Mechanics”, John Wiley, NY, 1979.

REFERENCES

1. Etkin, B., “Dynamics of Flight Stability and Control”, Edn. 2, John Wiley, NY, 1982.

2. Babister, A.W., “Aircraft Dynamic Stability and Response”, Pergamon Press, Oxford, 1980.

3. Dommasch, D.O., Sherby, S.S., and Connolly, T.F., “Aeroplane Aero dynamics”, Third Edition, Issac Pitman, London, 1981.

4. Mc Cornick B. W, “Aerodynamics, Aeronautics and Flight Mechanics”, John Wiley, NY, 1995.

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PAU7J001/ PAU7J002	Sensor & Transducers/ CAD & CAM	3-0-0	3	100	50
PAU7J003/ PAU7J004	Trouble Shooting Servicing & Maintenance of Automobile/Simulation, Modelling & Control	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PAU7N201	Seminar	0-0-1	2	-	100
PAU7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PAU7D011/ PAU7D012/ PAU7D013	New Generation and Hybrid Vehicles/Heat Transfer/ Advanced Mechanics of Solids	4-0-0	4	100	50
Minors					
PAU7G001	Flight Mechanics	4-0-0	4	100	50

PAU7J001 SENSORS AND TRANSDUCERS 3-0-0

Module –1
Elements of a general measurement system;
Static Characteristics: systematic characteristics, statistical characteristics, calibration;
Dynamic characteristics of measurement systems: transfer functions of typical sensing elements, step and frequency response of first and second order elements, dynamic error in measurement systems. (Bentley: Chapters 1-4)

Module-2
Sensing elements: Resistive sensing elements: potentiometers, Resistance Temperature Detector (RTD), thermistors, strain gages.
Capacitive sensing elements: variable separation, area and dielectric;
Inductive sensing elements: variable reluctance and LVDT displacement sensors;
Electromagnetic sensing elements: velocity sensors,
Thermoelctric sensing elements: laws, thermocouple characteristics, installation problems, cold junction compensation.
IC temperature sensor
Elastic sensing elements: Bourdon tube, bellows, and diaphragms for pressure sensing, force and torque measurement.
(Bentley: Sections 8.1 to 8.6; Ghosh: Section 10.3 to 10.4).

Module-3
Signal Conditioning Elements:
Deflection bridges: design of resistive and reactive bridges, push-pull configuration for improvement of linearity and sensitivity
Amplifiers: Operational amplifiers-ideal and non-ideal performances, inverting, non-inverting and differential amplifiers, instrumentation amplifier, filters. A.C. carrier systems, phase sensitive demodulators and its applications in instrumentation.
(Bentley: Sections 9.1 to 9.3; Ghosh: Sections 15.1 and 15.2) .

Text Books:
1. Principles of Measurement Systems- J.P. Bentley (3/e), Pearson Education, New Delhi, 2007.
2. Introduction to Measurement and Instrumentation- A.K. Ghosh(3/e), PHI Learning, New Delhi, 2009.
3. Transducers and Instrumentation- D.V.S. Murthy (2/e), PHI Learning, New Delhi, 2009.

Reference Books:
1. Measurement Systems Application and Design- E.O. Doeblin (4/e), McGraw-Hill, International, NY.
2. Instrumentation for Engineering Measurements- J.W. Dally, W.F. Riley and K.G. McConnel (2/e), John Wiley, NY, 2003.
3. Industrial Instrumentation- T.R. Padmanabhan, Springer, London, 2000.

PAU7J002COMPUTER AIDED DESIGN AND COMPUTER AIDED MANUFACTURING (CAD & CAM) 3-0-0

Module I (11 hour)
Fundamentals of CAD: Design process, Applications of computer for design, Creating the Manufacturing Database, The Design workstation, Graphical Terminal, Operator input Devices, Plotters and other devices, Central Processing Unit, Memory types.

Module II (11 hour)
Computer graphics Software and Database: Configuration, Graphics Packages, Constructing the Geometry, Transformations of geometry, Database structure and content, Wire frame versus solid modeling, Constraint– Based modeling, Geometric commands, Display control commands, Editing.

Module III (14 hour)
CAM - Numerical Control and NC Part Programming: Numerical Control, Numerical Control elements, NC Cordinate system, NC motion control system, Manual and Computer Aided programming, the APT language, Miscellaneous Functions, M, Advanced part-programming methods.
Problems with conventional NC, NC technology: CNC, DNC, Combined DNC/ CNC system, Adaptive control manufacturing systems, Computer Integrated Manufacturing system, Machine Tools and related equipment, Materials Handling system: AGV, Robots, Lean manufacturing.

Text Books
1. CAD/CAM Computer Aided Design and Manufacturing, M.P.Goover and E.W.Zimmers, Jr., Pearson

Reference Books
1. CAD/CAM Theory and Practice, Zeid and Subramanian, TMH
2. CAD/CAM Principles, Practice and Manufacturing Management, McMahon and Browne, Pearson Education
3. CAD/CAM Concepts and Applications, C.R.Alavala, PHI
4. Computer Aided Design and Manufacturing, Lalit Narayan, Mallkarjuna Rao and Sarcar, PHI
5. CAD/CAM Theory and Conepts, K.Sareen and C.Grewal, S.Chand Publication
6. CAD/CAM/CAE, N.K.Chougule, Scitech
7. Principle of Interactive Computer Graphics, W.W.Newman, R.F.Sproull, TMH

PAU7J003 TROUBLE SHOOTING, SERVICING AND MAINTENANCE OF AUTOMOBILE 3-0-0

MODULE I : RECORD KEEPING, ENGINE MAINTENANCE AND SERVICING

Maintenance Records and Schedule : Importance of maintenance, scheduled and unscheduled maintenance, preventive maintenance and its advantages, breakdown maintenance and its disadvantages, vehicle movement and maintenance log books, different service garages & its layout., site selection for service garages..

Dismantling of engine components and cleaning, cleaning methods, visual inspections, minor and major reconditioning of engine components, engine assembly, special tools used for maintenance / overhauling, engine tune-up.

MODULE II: CHASIS MAINTENANCE AND SERVICING

Servicing, repair and maintenance of clutch, clutch adjustment, maintenance, repair and servicing of gear box, servicing of propeller shaft, servicing and maintenance of differential unit, servicing of front axle and rear axle, suspension system of both rigid and independent types, servicing of hydraulic and air brake systems, brake bleeding and brake adjustment, maintenance and servicing of steering system, wheel balancing, wheel alignment

MODULE III: CIRCULATORY SYSTEMS

Servicing and maintenance of ignition system of petrol and diesel engine, Servicing and maintenance of fuel system of different types of vehicles, engine tuning for optimum fuel supply. Cooling systems-water pump, radiator, thermostat, anticorrosion and antifreeze additives.

MODULE IV: LUBRICATION AND VEHICLE BODY MAINTENANCE

Lubrication maintenance, lubricating oil changing, greasing of vehicle components.

Maintenance and Repair of Vehicle Body : Special tools used for body repair, minor body panel beating, polishing and painting of new and old vehicle body, servicing of door locks.

TEXT BOOK

1. John Doke “Fleet Management”, McGraw-Hill Co. 1984.

REFERENCES BOOKS

1. Judge.A.N., " Motor vehicle engine servicing, 3rd, Edition ", Pitman Paperpack,London, 69.
2. Judge.A.W., " Maintenance of High speed diesel engines ", Chapman Hall Ltd.,London,'56.
3. Maleev.V.L., " Diesel Engine operation and Maintenance ", Maintenance, McGrawHill Book Co., New York, 1954.
4. John.W.Vale.J.R., " Modern Auto Body and Finder repair ".
5. Venk.Spicer." Automotive Maintenance and Trouble shooting ".
6. " Vehicle Service Manuals of reputed manufactures ".

PAU7J004 SIMULATION, MODELLING AND CONTROL 3-0-0

Module I 14 hours
Basic simulation modeling, Discrete event simulation, Simulation of queuing and Monte Carlo simulations. Inventory systems, Continuous, Discrete-continuous and Mon
Statistical models in simulation, Discrete and continuous distributions, Poisson process, Empirical distribution, Generation of pseudo random numbers, Analysis of simulation data, Parameter estimation, Goodness-of-fit tests, Multivariable time series models.

Module II 12 hours
Overview of feedback control systems, Dynamics of mechanical systems, Differential equations and state variable form, Models of electromechanical, Heat-and fluid flow models, Linearization and scaling, Models from experimental data, Dynamic response using pole-zero locations, Time domain specifications, Classical 3-term controllers and its digital implementation, Stability analysis by Routh Criterion.

Modules III 10 hours
Simulation of manufacturing and material handling systems, Goals and performance measures, Modelling downtime and failures, Trace driven models, Case studies.

Text Books :
1. Discrete-Event system simulation by Jerry Banks, J.S. Carson, B.L. Nelson and D.M. Nicol (Pearson Publications).
2. Feedback control of dynamic systems by G.F. Franklin, J.D. Powell, A-Naeini, Pearson Publications.
3. Simulation modeling and analysis by A.M. Law, W.D. Kelton, Tata McGrawHill Publications.

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· *Able to understand the application areas of IOT*
· *Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks*
· *Able to understand building blocks of Internet of Things and characteristics.*

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On-Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

PAU7D011 NEW GENERATION AND HYBRID VEHICLES 4-0-0 (HONORS ELECTIVE)

Module I Hours

New generation vehicles and its power system: Electric and hybrid vehicles, flexible fuel vehicles (FFV), solar powered vehicles, magnetic track vehicles, fuel cells vehicles. Hybrid Vehicle engines, Stratified charge engines, learn burn engines, low heat rejection engines, hydrogen engines, HCCI engine, VCR engine, surface ignition engines, VVTI engines. High energy and power density batteries, fuel cells, solar panels, flexible fuel systems.

Module II Vehicle operation and control 9 **Hours**

Computer Control for pollution and noise control and for fuel economy – Transducers and actuators - Information technology for receiving proper information and operation of the vehicle like optimum speed and direction.

Module III Vehicle automated tracks 9 **Hours**

Preparation and maintenance of proper road network - National highway network with automated roads and vehicles - Satellite control of vehicle operation for safe and fast travel, GPS.

Module IV Suspension, brakes, aerodynamics and safety 8 Hours

Air suspension – Closed loop suspension, compensated suspension, anti skid braking system, retarders, regenerative braking, safety gauge air backs- crash resistance. Aerodynamics for modern vehicles, safety systems, materials and standards.

TEXT BOOKS:

1. Heinz, "Modern Vehicle Technology" Second Edition, Bu
2. Bosch Hand Book, SAE Publication, 2000

REFERENCES BOOKS

1. Light weight electric for hybrid vehicle design.
2. Advance hybrid vehicle power transmission, SAE.
3. Noise reduction, Branek L.L., McGraw Hill Book company, New York, 1993.

PAU7D012 HEAT TRANSFER 4-0-0
(HONORS ELECTIVE)

Module-I Introduction: (10hr)

Modes of heat transfer: conduction, convection, and radiation ,Mechanism & basic laws governing conduction, convection, and radiation heat transfer; Thermal conductivity, Thermal conductance &Thermal resistance, Contact resistance, convective heat transfer coefficient, radiation heat transfer coefficient , Electrical analogy, combined modes of heat transfer.initial conditions *and* Boundary conditions of 1st, 2nd and 3rd Kind.

Heat Conduction: (10hr)

The General heat conduction in Cartesian, polar-cylindrical and polar-spherical co-ordinates, Simplification of the general equation for one and two dimensional steady/ transient conduction with constant/ variable thermal conductivity with / without heat generation. Solution of the one dimensional steady state heat conduction problem in case of plane walls, cylinders and spheres for simple and composite cases. Critical insulation thickness, Heat transfer in extended surfaces (pin fins) without heat generation, Long fin, short fin with insulated tip and without insulated tip and fin connected between two heat sources. Fin efficiency and fin effectiveness.

Conduction in solids with negligible internal temperature gradient (Lumped heat analysis).

Module-II (10hr)

Convective Heat Transfer:

Introduction to convective flow - forced and free. Dimensional analysis of forced and free connective heat transfer. Application of dimensional analysis, physical significance of Grashoff , Reynolds, Prandtl, Nusselt and Stanton numbers.

Conservation equations for mass, momentum and energy for 2-dimensional convective heat transfer in case of incompressible flow, Hydrodynamic and thermal boundary layers for flow over a flat plate. Critical Reynolds number; general expressions for drag coefficient and drag force Reynolds-Colbourn analogy. Thermal boundary layer; general expression for local heat transfer coefficient; Average heat transfer Coefficient; Nusselt number. Flow inside a duct-velocity boundary layer, hydrodynamic entrance length and hydro dynamically developed flow; flow through tubes (internal flow). Use of empirical relations for solving turbulent conditions for external and internal flow.

Mechanism of heat transfer during natural convection, Experimental heat transfer correlations for natural convection in the following cases

(a) Vertical and horizontal plates

(b) Inside and outside flows in case of tubes

Module-III Radiative heat exchange : (10hr)

Introduction, Radiation properties, definitions of various terms used in radiation heat transfer; Absorptivity,reflectivity & transmissivity.Emissive power & emissivity, Kirchoff's identity, Planck's relation for monochromatic emissive power of a black body, Derivation of Stefan-Boltzmann law and Wien's displacement law from Planck's relation, Radiation shape factor, Relation for shape factor and shape factor algebra. Heat exchange between black bodies through non-absorbing medium. Gray bodies and real bodies, Heat exchange between gray bodies. Radiosity and Irradiation, Electrical analogy and radiation network for 2-body and 3-body radiations exchange in non-absorbing medium, Radiation shields.

Module-IV (10hr)

Heat transfer for boiling liquids and condensing vapours :

Types of condensation, use of correlations for condensation on vertical flat surfaces, horizontal tube and; regimes of pool boiling, pool boiling correlations. Critical heat flux, concept of forced boiling. Numerical problems.

Heat Exchangers :

Introduction, Types of heat exchanger, The overall heat transfer coefficient and fouling factors, LMTD and - NTU analysis of heat exchangers.

Text Books:

1. 1.Heat Transfer Incropera and Dewitt, Willey publications
2. Heat Transfer : J.P.Holman, TMH Publications
3. 3.Fundamentals of Engineering Heat and Mass Transfer: R.C.Sachdeva, New Age International Publishers, 4th Edition
4. 4.Heat Transfer: P.S.Ghosdastidar, Oxford University Press

References books:

1. Heat Transfer by P.K. Nag, TMH
2. Heat Transfer by S.P. Sukhatme, TMH
3. Heat Transfer: A.F.Mills and V.Ganesan, Pearson Education, 2nd Edition
4. Heat and Mass Transfer: Domkundwar and Arora, Danpatrai and sons
5. Heat Transfer : R.K.Rajput, Laxmi Publications
6. Heat and Mass Transfer: A Practical Approach, Y.A.Cengel, Tata Macgraw Hills EducationPrivateLimited

PAU7D013 ADVANCED MECHANICS OF SOLIDS 4-0-0
(Honours Elective)

Module – I (12 hours)

Elementary concept of elasticity, stresses in three dimensions, Principal Stresses, Stress Invariants, Mohr's Circle for 3-D state of stress, Octahedral Stresses, State of pure shear, Differential equations of equilibrium and compatibility conditions, plane stress. Analysis of strain, State of strain at a point, Strain Invariant, Principal Strains, Plane state of strain, Strain measurements. Theories of Failure, Various yield criteria

Module – II (14 hours)

Energy Methods: Work done by forces and elastic strain energy stored. Reciprocal relations, Theorem of virtual work, Castigliano's theorems, Bending of beams: Asymmetrical bending, Shear centre, Bending of curved beams, Stress distribution in beam with rectangular, circular and trapezoidal cross section, stresses in crane hooks, ring and chain links., Deflection of thick curved bars. Axisymmetric problems: Thick walled cylinder subjected to internal and external pressures, Compound cylinders, Shrink fit,

Module – III (10 hours)

Repeated stresses and fatigue in metals, Fatigue tests and fatigue design theory, Goodman, Gerber and Soderberg criteria, Concept of stress concentration, Notch sensitivity. Introduction to Mechanics of Composite Materials: Lamina and Laminates, Micromechanics of FRP Composites. Introduction to Fracture Mechanics: Basic modes of fracture, Fracture toughness evaluation.

Text books:

1. Advanced Mechanics of Solids, L.S. Srinath, Tata McGraw Hill
2. Advanced Mechanics of Materials : Boresi and Schmdt, Willey

Reference books:

1. Advanced Mechanics of Materials : Siley and Smith
2. Strength of Materials Vol.II, by S.Timoshenko
3. Mechanical Metallurgy by Dieter
4. Strength of Materials by G. H. Ryder, Macmillan Press
5. Mechanics of Materials by Beer and Johnston, Tata McGraw Hill
6. Mechanics of Materials by R.C.Hibbeler, Pearson Education
7. Mechanics of Materials by William F.Riley, Leroy D.Sturges & Don H.Morris, Wiley Student.
8. Mechanics of Materials by James M. Gere, Thomson Learning
9. Engineering Machanics of Solids by Egor P. Popov, Prentice Hall of India
10. Strength of Materials by S.S.Rattan, Tata Mc Graw Hill

PAU7G001 FUELS AND LUBRICANTS 4-0-0
(WILL BE UPLOADED SOON)

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PBM7J001/ PBM7J002	Medical Imaging Techniques/Artificial Organs & Rehabilitation Engineering	3-0-0	3	100	50
PBM7J003/ PBM7J004	Hospital Management/ Bioethics	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PBM7N201	Seminar	0-0-1	2	-	100
PBM7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PBM7D011/ PBM7D012	Immuno Technology/ Prosthetic Design	4-0-0	4	100	50
Minors					
PBM7G001	Organs and Rehabilitation Engineering	4-0-0	4	100	50

PBM7J001 MEDICAL IMAGING TECHNIQUES 3-0-0

Module I (15 Hours)

X-Ray Machines:
Basis of Diagnostic Radiology, Nature of X-rays, Properties of X-rays, Units of X-radiation, Production of X-rays : stationary anode tube & rotating anode tube.
X-Ray Machine: High Voltage Generation, High frequency Generator, High Tension Cable, Collimators & Grids, Exposure Time Systems, and Automatic Control.
Visualization of X-rays & Digital Radiography:
X-ray Films, X-ray Image Intensifier Television System, Dental X-ray machines, portable & mobile X-ray units, Digital Radiography, Flat Panel detector for Digital Radiography.

Module II (15 Hours)

Ultrasonic Imaging System: Physics of Ultrasonic waves, generation & detection of ultrasound, basic pulse-echo apparatus, brief description of different modes of scans like A-scan, M-mode, B-scan with its applications in medicine.

Computed Tomography Machine (CT):
Basic Principle of CT, System components: scanning system, Detector, Processing system, Viewing system, storing & documentation, Gantry geometry, Patient dose in CT Scan & Advantages of CT Scanning.

Module III (10 Hours)

MRI Machine & Gamma Camera:
Principles of NMR Imaging System, Basic NMR Components – Block Diagram Description, Advantages of NMR Imaging, The Gamma Camera – Block Diagram Description. Study of Working Principle of Emission CT, SPECT & PET scanners and Introduction to recent developments like Infrared Imaging, Ophthalmic Imaging, and Double headed CT & PET scanner.

Text Book:

1. Hand Book of Biomedical Instrumentation – 2nd Ed, R.S. Khandpur, Tata McGraw Hill-2003.

Reference Books:

1. Introduction to Biomedical equipment technology, 4e. By JOSEPH.J.CAAR & JOHN.M.BROWN (Pearson education publication)
2. Medical Instrumentation-application & design. 3e – By JOHN.G.WEBSTER
3. John Wiley & sons publications
4. Leslie. Cromwell – Biomedical instrumentation & measurements, 2e PHI
5. Dr. M. Arumugam – Biomedical instrumentations, Anuradha Publishers

PBM7J002 ARTIFICIAL ORGANS & REHABILITATION 3-0-0

Module I (18 Hours)

Introduction to Artificial Organ Design:

Substitutive Medicine, Out Look for replacement, Design Consideration, Evaluation process & basic concepts of Kidney & liver transplant

Cardiac Assist Devices Design: Steps in Engineering Design, Detailed steps in Engineering Design of artificial heart & circulatory assistive devices.

(Text Book –I – Section VI -Chapter -63 & Text Book III- Chapter 15)

Cardiac Valve Prostheses:

Brief history valve prostheses: Mechanical Valves & Tissue Valves. Current Types of prostheses, Tissue verses Mechanical valves, Medtronic-Hall-Tilting disc valve, St.Jude Medical Bileaflet valve, Carpentier Edwards Porcine valve (model 2625) , Hancock Modified Orifice Porcine valve (model 250), Carpentier-Edwards pericardial Valve (Model 2900), Implication of Thrombus Deposition, Durability : Wear, Fatigue, Mineralization and Current Trends in Valve Design.

(Text Book –I – Chapter – 64)

Module II (12 Hours)

Artificial Kidney: Brief Review of Structure & Function of Kidney, Changes in the Body Fluids in renal Diseases.

Principle of Dialysis in Artificial Kidney, Dialyzers: Parallel Flow Dialyzer, Coil-Hemodialzer, Hollow-Fiber Hemodialzer. Performance analysis of the dialzers, Block diagram description of Hemodialysis machine. (Text Book – II –Chapter 30)

Introduction to Design & working of Artificial Liver & Pancreas (Text Book –I)

Module III (10 Hours)

Implants: General concepts of Implants, classification of implants: Soft tissues replacements and Hard tissue replacements. Body Response to Implants: Cellular Response to Implants, Systemic Effects by Implants, Blood Compatibility & Factors affecting blood compatibility. Brief Study of Percutaneous & Skin implants, Ear & Eye Implants like Corneal Implants & Cochlear Implant.

(Text Book –III – Chapter – 10 & 11)

Text Books:

1. Biomedical Engineering Hand Book 3rd Edition (Tissue Engineering & Artificial Organs) – Joseph D. Bronzino- CRC- Tylor & Francis-2006.
2. Hand Book of Biomedical Instrumentation -2nd Ed- R.S.Khandpur - TMH 2003.
3. Biomaterials –An Introduction 3rd Ed– Joon Park & R.S.Lakes- Springer- 2007.

PBM7J003 HOSPITAL MANAGEMENT 3-0-0

Module –I (15 Hours)

Organization of the Hospital : Organizational Structure, Governance, Duties & Responsibilities of Governing Board, Management Structure, Duties, responsibilities & functions of CEO, CEO & his management team.

Classification of Hospitals – Primary Health Care Centre, General Hospital, Specialty Hospital, Teaching & Research Hospital- Their Role and Functions.

Planning the Hospital Building- General principles, General Features, Building Contracts &

Contract Documents, Furnishing & Equipping the Hospital. The Design team & its role – The

Architect, Engineers & Hospital Administers

Module –II (15 Hours)

Overview, Location, Design & Organization of the Following Departments: Emergency Services, Clinical Laboratories, Diagnostic Radiology, Surgical Department (OT), Intensive Care Units (ICU), Central Sterilization & Supply Department (CSSD).

Overview, Design, Location & Organization of the following Engineering services:

Electrical Engineering, Civil Engineering, Maintenance Engineering, Air–Conditioning system,

Centralized Medical Gas System, Information Technology (IT), and Telecommunication

Engineering.

Module –III (10 Hours)

Clinical Engineering: Definition of Clinical Engineering, Evolution of Clinical Engineering, Hospital Organization & role of Clinical Engineering, Clinical Engineering programs, Major Functions of Clinical Engineering department.

Management & Assessment of Medical Technology: The Heath Care Delivery System, Strategic Technology planning, Technology Assessment, Equipment Acquisition & Deployment.

Text Books:

1. Hospital: Planning, Design & Management – G.D. Kunders, S.Gopinath, A, Katakam-Tata McGraw Hill -1998.
2. Biomedical Engineering Hand Book 3rd Edition (Medical Devices & Systems) – Joseph D. Bronzino-CRC-Tylor&Francis-2006.

PBM7J004 BIOETHICS 3-0-0

Module-I:

Concept of property, rights, duties and their correlation; Intellectual property rights and its types-Patents, Trademarks, Copyright & Related Rights, Industrial Design, Traditional Knowledge, Geographical Indications, Protection of new GMOs; Process patent vs product patent; International framework for the protection of IP; IP as a factor in R&D; IPs of relevance to Biotechnology and few Case Studies; Introduction to History of GATT, WTO,
WIPO and TRIPS.

Module-II:

Basic requirement of a patentable invention- novelty, inventive step, Prior art and Stae of art; Patent databases; Searching International Databases; Analysis and report formation; Indian Patent Act 1970 and Recent Amendments; Filing of a patent application; Precautions before patenting-disclosure/non-disclosure; WIPO Treaties; Budapest Treaty; PCT and Implications; Role of a Country Patent Office; Procedure for filing a patent, International patenting-requirement, Patent infringement- meaning, scope, litigation, remedies; Case studies and examples-Rice, Neem etc.

Module-III:

Introduction to Biosafety regulations; Primary Containment for Biohazards and Biosafety Levels; Biosafety Levels of Specific Microorganisms; Recommended Biosafety Levels for Infectious Agents and Infected Animals; Biosafety guidelines - Government of India. Definition of GMOs & LMOs; Roles of Institutional Biosafety Committee, RCGM, GEAC etc. for GMO applications in food and agriculture; Environmental release of GMOs; Overview of

National Regulations and relevant International Agreements including Cartagena Protocol. Concept of Bioethics, Public concerns on Human genome research and transgenics- Genetic testing and screening, Ethics in clinical trials and GCP, ELSI & Human genome projects; Ethics in human cloning-a case study.

Text Book

1. Stanley SA, Bioethics, Wisdom educational services
2. Sateesh MK, Bioethics and Biosafety, IK International Pvt. Ltd.

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· *Able to understand the application areas of IOT*
· *Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks*
· *Able to understand building blocks of Internet of Things and characteristics.*

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On-Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli,TataMcGrawHillPublishingCompanyLtd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

Honours:

PBM7D011 IMMUNOTECHNOLOGY 4-0-0

Module-I:

The origin of Immunology, types of immunity, humoral and cell mediated immunity, Primary and secondary lymphoid organ, antigen, cells of immune system, immunoglobulin and antibodies, Major Histocompatibility Complex (MHC)

Module-II:

Antigen processing and presentation, synthesis of antibody and secretion, Molecular basis of Immunology, Molecular basis of antibody diversity, polyclonal and monoclonal antibody, complement system, antigen-antibody reaction.

Module-III

Immune response and tolerance: Regulation of immune response, immune tolerance, hyper sensitivity, autoimmunity; graft versus host reaction, Immuno- deficiency and immuno-proliferate diseases. Dysfunctions of immune system and their modulation, Approaches for correcting immune dysfunction, Vaccinology, Monoclonal antibody technology.

Text Books:

1. Immunology: Lydyard, P.M., Whelan, A., Fanger, M.W., 1st Ed., Viva Books.

2. Essential Immunology: Roitt, I.M., 9th Ed.(1997) Blackwell Scientific, Oxford, UK.

3. Immunology: Kuby, J. 3rd Ed. (1997) Freeman W. H., oxford.

4. Immunotechnology by A Khan, Pearson Publication

Reference:

1. Microbiology and Immunology by B K Patnaik, T.C. Kar, H.N. Thatoi, India-Tech publication. New Delhi

PBM7D012 PROSTHETIC DESIGN 4-0-0

Module-I

Introduction to artificial organs: Biomaterials used in artificial organs and prostheses, Rheological properties of blood, blood viscosity variation, Casson equation, flow properties of blood, problems associated with extra corporeal blood flow;

Module-II

Artificial kidney: kidney filtration, artificial waste removal methods, hemodialysis, equation for artificial kidney and middle molecule hypothesis. Hemodialysers, mass transfer Analysis, regeneration of dialysate, membrane configuration, wearable artificial kidney machine, separation of antigens from blood in ESRD patients; Artificial heart lung machine: lungs gaseous sexchange/ transport, artificial heart-lung devices. Oxygenators, Liver support system, artificial pancreas,

Module-III

Blood and skin; Audiometry: air conduction, bone conduction, masking, functional diagram of an audiometer. Hearing aids, Opthalmoscope, etinoscope, I. A. B. P principle and application; Rehabilitation Engineering: Impairments, disabilities & handicaps, measurement & assessment, engineering concepts in sensory & motor rehabilitation. Engg. Concept in communication disorders, Rehabs for locomotion, visual, speech & hearing, Artificial limb & hands, prosthetic heart valves, Externally powered & controlled orthotics & prosthetics, Myoelectric hand & arm prostheses, marcus intelligent hand prostheses, gait study, spinal rehabilitation.

Books

1. Gerald EMiller, Artificial Organs, Morgan & Claypool, 2006
2.Kondraske,G.V,RehabilitationEngineering.CRCpress1995

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PBT7J001	Environmental Biotechnology	3-0-0	3	100	50
PBT7J002	Medical & Pharmaceutical Biotechnology	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PBT7N201	Seminar	0-0-1	2	-	100
PBT7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PBT7D003	Ethics and IPR in Biotechnology	4-0-0	4	100	50
Minors					
PBT7G007/ PBT7G008	Downstream Process Engineering/ Environmental Technology	4-0-0	4	100	50

PBT7J001 ENVIRONMENTAL BIOTECHNOLOGY 3-0-0

Module-I

Introduction to environmental biotechnology, Environmental monitoring bioreporter, biomarker. Bioprospecting, Biomicroelectronics and biosensor technology

Introduction to environmental pollutants: Water, Soil and Air: their sources and effects. Removal of Specific Pollutants: Sources of Heavy Metal Pollution, Microbial Systems for Heavy Metal Accumulation, Biosorption & detoxification mechanisms. Microbiology and biochemistry of waste water treatment: Biological Treatment of anaerobic and aerobic; methanogenesis, methanogenic, acetogenic, and fermentative bacteria- technical process and conditions; Use of Genetically Engineered Organisms. emerging biotechnological processes in waste - water treatment; Applications include treatment of municipal and industrial wastewaters,

Module-II

Biodegradation of xenobiotic compounds: Xenobiotic compounds : Aliphatic, Aromatics, Polyaromatic Hydrocarbons, Polycyclic aromatic compounds, Pesticides, Surfactants and microbial treatment of oil pollution. Biotransformations and biocatalysts: Basic organic reaction mechanism, Common prejudices against Enzymes. Advantages & Disadvantages of Biocatalysts, Isolated Enzymes versus whole cell systems. Mechanistic Aspects and Enzyme Sources. Biocatalytic Application, Catalytic Antibodies; Stoichiometry, kinetics, and thermodynamics of microbial processes for the transformation of environmental contaminants.

Module-III

Biooxidation & microbial leaching: Biooxidation – Direct and Indirect Mechanisms, Recovery of metals from solutions; Microbes in petroleum extraction; Microbial desulfurization of coal.

Clean technologies: Composting Technology and Organic farming, biofertilizers, biopesticides, microbial polymer production and bio plastic technology. Biotechnology of fossil fuels: desulfurization of coal, oil shales, microbial enhanced oil recovery (MEOR). Biofuels: Biogas technology, biohydrogen, bioethahnol production. Biotechnology of mineral processing. Ethical issues in environmental biotechnology and regulatory framework.

Text Books

1. Rittmann B and McCarty P, Environmental Biotechnology Principles and Applications Mc Graw Hill 2001
2. Evans, G.M., Furlong, J C.," Environmental Biotechnology- Theory and application", John Wiley & Sons, Ltd, USA. 2003
3. Environmental biotechnology, Scragg Alan, Oxford University Press, 2005
4. Environmental Microbiology, W.D. Grant & P.E. Long, Blakie, Glassgow and London.
5. Microbial Gene Technology, H. Polasa (ED.) South Asian Publishers, New Delhi.
6. Biotreatment Systems, Vol. 22, D. L. Wise (Ed.), CRC Press, INC.
7. Standard Methods for the Examination of Water and Waste Water (14 th Education) , 1985. American Public health Association
8. Environmental Biotechnology by Bruce Rittmann and Perry McCarty 6. Biotransformations : K.Faber(1995),Springer-Verla

PBT7J002 MEDICAL AND PHARMACEUTICAL BIOTECHNOLOGY 3-0-0

Module-I Drug Development in Pharmaceutical Process

Production of pharmaceuticals by genetically engineered cells (hormones, interferon), Microbial transformation for production of important pharmaceuticals (steroids and semi-synthetic antibiotics), Techniques for development of new generation antibiotics, Protein engineering, drug design, drug targeting

Module-II Disease Diagnosis and Therapy

ELISA and hybridoma technology, Use of enzymes in clinical diagnosis, Use of biosensors for rapid clinical analysis, Diagnostic kit development for microanalysis, Genetic diseases and DNA based diagnoses, DNA vaccine, Gene Therapy, Toxicogenomics

Module III Proteomics in Drug Development

Role of Proteomics in Drug Development, Diagnosis of disease by Proteomics, Separation and identification techniques for protein analysis, Development of antibody based protein array for diagnosis

Text Books

1. Balasubramanian, Bryce, Dharmalingam, Green and Jayaraman(ed), Concepts in Biotechnology, University Press, 1996
2. Epenetos A.A.(ed), Monoclonal antibodies: applications in clinical oncology, Chapman and Hall Medical, London
3. Text book of industrial pharmacy by S R Hiremath, Orient Black Swan publication

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:

1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:

1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).

5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, TataMcGrawHillPublishingCompanLtd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". MorganKaufmannPublishers(IndianReprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Book

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

HONORS
PBT7D003 ETHICS AND IPR IN BIOTECHNOLOGY 4-0-0

Module-I:
Concept of property, rights, duties and their correlation; Intellectual property rights and its types- Patents, Trademarks, Copyright & Related Rights, Industrial Design, Traditional Knowledge, Geographical Indications, Protection of new GMOs; Process patent vs product patent; International framework for the protection of IP; IP as a factor in R&D; IPs of relevance to Biotechnology and few Case Studies; Introduction to History of GATT, WTO,WIPO and TRIPS.

Module-II:
Basic requirement of a patentable invention- novelty, inventive step, Prior art and Stae of art; Patent databases; Searching International Databases; Analysis and report formation; Indian
Patent Act 1970 and Recent Amendments; Filing of a patent application; Precautions before patenting-disclosure/non-disclosure; WIPO Treaties; Budapest Treaty; PCT and Implications;
Role of a Country Patent Office; Procedure for filing a patent, International patenting-requirement, Patent infringement- meaning, scope, litigation, remedies; Case studies and examples-Rice, Neem etc.

Module-III:
Introduction to Biosafety regulations; Primary Containment for Biohazards and Biosafety Levels; Biosafety Levels of Specific Microorganisms; Recommended Biosafety Levels for Infectious Agents and Infected Animals; Biosafety guidelines - Government of India. Definition of GMOs & LMOs; Roles of Institutional Biosafety Committee, RCGM, GEAC etc. for GMO applications in food and agriculture; Environmental release of GMOs; Overview of

National Regulations and relevant International Agreements including Cartagena Protocol. Concept of Bioethics, Public concerns on Human genome research and transgenics- Genetic testing and screening, Ethics in clinical trials and GCP, ELSI & Human genome projects; Ethics in human cloning-a case study.

Text Book

1. Stanley SA, Bioethics, Wisdom educational services
2. Sateesh MK, Bioethics and Biosafety, IK International Pvt. Ltd.

Minor

PBT7G007 DOWNSTREAM PROCESS ENGINEERING 4-0-0

Module -I:

Introduction; An overview of bioseparation. Role and importance of Bioseparation process in biotechnological processes. Problems and requirements of bioproduct purification. Cost- cutting strategies Characteristics of biological mixtures – Process of Classification of Bioproducts - Biological activity Analysis of purity-Process economics-Capital and operating cost analysis, Separation of cells and other insolubles from fermented broth. Filtration and microfiltration, centrifugation (batch, continuous, basket).

Module -II:

Cell disruption: Physical methods (osmotic shock, grinding with abrasives, solid shear, liquid shear), Chemical methods (alkali, detergents), Enzymatic methods Ultra-filtration: Semipermeable membranes, membrane geometry and ultrafiltration module configuration. Chromatography in bioseparation.

Module-III:

Separation of soluble bio-products: Liquid-liquid extraction, aqueous two-phase extraction, precipitation, adsorption. Other bioseparation techniques like Dialysis, electro-dialysis, Liquid Electrophoresis. Products polishing : Crystallization and drying.

Text Books:

1. M.R. Ladisch, Bioseparations Engineering, Wiley Interscience 2001
2. Kennedy and Cabral, Recovery processes for biological materials.
3. Heinemann, Product Recovery in Bioprocess Technology, Butterworth Publication.
4. Roger G. Harrison, Paul W. Todd, Scott R. Rudge, and Demetri Petrides, Bioseparations Science and Engineering, Oxford University Press, USA (October 31, 2002)
5. Belter PA and Cussler E, " Bioseparations ", Wiley 1985

Reference Books

1. Wankat P.C, " Rate controlled separations ", Elsevier, 1990
2. Asenjo J.M., " Separation processes in Biotechnology " Marcel Dekker Inc. 1993.

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PCE7J001/ PCE7J002	Pulp & Paper Technology/Petroleum Refinery Engineering	3-0-0	3	100	50
PCE7J003/ PCE7J004	Pinch Technology/ Green Technology	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PCE7N201	Seminar	0-0-1	2	-	100
PCE7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PCE7D001	Advanced Process Control	4-0-0	4	100	50
Minors					
PCE7G002	Colloid and Interfacial Engineering	4-0-0	4	100	50

PCE7J001 Pulp and Paper Technology 3-0-0

Module I:
Importance of paper, definitions of pulp, paper, and paperboard. Flow sheet of complete pulp and paper making process.Fibrous raw materials for paper making: Plant fibers, plant kingdom, plant body and organization of fibers and other cells in plant.Raw material structure: Structure of softwoods, hardwoods, and non-woods. Pulpwood species. Cell types. Physical properties and defects of raw materials.

Module II:
Chemistry of fibrous raw materials: Gross composition. Distribution of wood constituents, cellulose, hemi-cellulose, lignin,extractives, and inorganic components. Lignin-hemicellulose bonds. Comparison of different raw materials.Preparation of fibrous Raw material: Transportation, procurement,handling, storage, and preservation. Debarking, chipping, depithing,screening, cleaning, and conveying operations.

Module III:
Pulping and recovery: Pulping processes. Washing, screening and cleaning. Recovery of chemicals. Bleaching of pulp. Preparations ofstock for paper making. Secondary fiber utilization. Additives for papermaking. Papermaking: Paperforming, pressing, and drying;Surface treatments, finishing, and coating. Properties and testing of pulp and paper.

Text and Reference Books:

1. Handbook of Pulp and Paper Technology, 2nd ed. by K W Britt, John Wiley.
2. Handbook of Pulping and Papermaking, 2nd ed. by C J Biermann, Academic Press.
3. Handbook for Pulp & Paper Technologists, 3rd ed. by G A Smook, Angus Wilde Publications.
4. Wood Chemistry: Fundamentals and Applications, 2nd ed. by E Sjostrom, Academic Press.
5. Pulp and Paper Chemistry and Technology: Paper Chemistry and Technology, 1st ed. by M Ek, G Gellerstedt, and G Henriksson, Walter De Gruyter Inc.

PCE7J002 Petroleum Refinery Engineering 3-0-0

Module I:
Origin and formation of petroleum, reserves and deposits of the world, Indian petroleum industries, composition of petroleum.Crude pretreatment: dehydration and desalting. Pipe still heater, atmospheric and vacuum distillation of crude oil.
Important products, properties, and test methods: natural gas, associated gas, dissolved gas, refinery off gas, LPG, Reid vapour pressure, ASTM distillation, octane and cetane numbers.

Module II:
Treatment of products, additives, blending of gasoline. Treatment of gasoline, kerosene, lubes and lubricating oils, waxes.

Module III:
Thermal and catalytic cracking, hydro cracking and hydro treating.
Coking, visbreaking, alkylation, isomerization, asphalt, and air blown asphalt.

Text and Reference Books:

1. Petroleum Refinery Engineering, W L Nelson, McGraw-Hill.
2. Modern Petroleum Refining Processes, 5th ed. by B K B Rao, Oxford & IBH.
3. Petroleum Refining: Technology and Economics, 5th ed. by J H Gary, G E Handwerk, and M J Kaiser, CRC Press.
4. Handbook of Petroleum Processing, 2nd ed. by S A Treese, P R Pujado, and D S J Jones, Springer.

PCE7J003 Pinch Technology 3-0-0

Module I:
Process integration and its building blocks: Definition of process integration (PI), areas ofapplications and techniques available for PI.
Pinch Technology: Introduction, basic concept, How it is different than energy auditing ?Role of thermodynamic laws, problems addressedby pinch technology. Key steps of pinch technology: Data extraction, targeting, designing, optimization, supertargeting. Basic elements of pinch technology: Grid diagram, composite curve, problem table algorithm, grand composite curve.

Module II:
Targeting of Heat Exchanger Network (HEN): Energy targeting, areatargeting, number of units targeting, shell targeting, cost targeting. Designing of HEN: Pinch design methods,Heuristic rules, and stream splitting. Design of maximum energy recovery (MER). Design of multiple utilities and pinches. Design for threshold problem, Loops and Paths.

Module III:
Heat integration of equipments: Heat engine, heatpump, distillation column, reactor, evaporator, drier, refrigeration systems. Heat and power integration: Cogeneration,steam turbine, and gas turbine.

Reference Books:

1. Pinch Analysis and Process Integration: A User Guide on Process Integration for the Efficient Use of Energy, 2nd ed. by I C Kemp, Butterworth-Heinemann.
2. Chemical Process Design and Integration, 2nd ed. by R Smith, Wiley.
3. Heat Exchanger Network Synthesis: Process Optimization by Energy and Resource Analysis by U V Shenoy, Gulf Publishing.
4. Sustainable Design Through Process Integration: Fundamentals and Applications to Industrial Pollution Prevention, Resource Conservation, and Profitability Enhancement by MMEl-Halwagi, Butterworth-Heinemann.

PCE7J004 Green Technology 3-0-0

Module I:
Principles of green technology and engineering, Principles of atom and mass economy, E-factor.

Module II:
Design of greener and safer chemicals, Solvent-free methods: Microwave, Ultraviolet, and Solar. Green catalysts: ionic liquids, zeolites, photocatalyst, PEG, nanocatalyst, and biocatalyst. Green solvents: Supercritical fluids, fluorous phase, and non-aqueous solvents.

Module III:
Scale-up effect, reactors, separators, Process intensification. Bio-conversion of renewables.

Reference Books:

1. Handbook of Green Chemistry, Vol. 1 to 9 by P T Anastas, Wiley VCH.
2. Green Chemistry and Engineering: A Practical Design Approach by C J González and D J C Constable, Wiley.
3. Green Chemistry and Engineering: A Pathway to Sustainability by A E Marteel-Parrish and M A Abraham, Wiley.
4. Green Chemistry for Environmental Sustainability by S K Sharma and AMudhoo, CRC Press.
5. Green Engineering: Environmentally Conscious Design of Chemical Processes by D T Allen and D R Shonnard, PHI.

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On-Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

Honor Subject
PCE7D001 Advanced Process Control 4-0-0

Module I:
A brief review on preliminary concepts of process control. Modeling of a few complicated systems. Understandingof first and second order systems and PID controllers. State space and transfer function matrix models. Stabilitycriterion of transfer function matrix models.

Module II:
Development of empirical model from process data. Identifyingdiscrete time models from experimental data. Design of Feedforward and Ratio control. Study of CascadeControl system.

Module III:
Digital Sampling, Filtering, and Control: Sampling period, Analog and digital filters, Z-transform. Use of SIMULINK, Design of digital controller. Multiloop Control. Calculation of extent of interaction and pairingof controlled and manipulated variable, Implementation of real time optimization in computer control. Study ofModel Predictive Control (MPC), Concepts of Statistical process control.

Reference Books:

1. Process Dynamics and Control, 3rd ed. by D E Seborg, T F Edgar, D A Mellichamp, and F J Doyle, John Willey& Sons.
2. Process Dynamics, Modeling, and Control by BAOgunnaike and W H Ray, Oxford University Press.
3. Process Control: Modeling, Analysis, and Simulation by BWBequette, PHI.
4. Computer Control of Processes by MChidambaram, Narosa Publishing House.
5. Process Systems Analysis and Control, 3rd ed. by DRCoughanowr and S E LeBlanc, McGraw-Hill.

PCE7G002 Colloid and Interfacial Engineering (Minor) 4-0-0

Module I:
General introduction of colloids, interfaces, surfactants, and micellization. Intermolecular forces, van der Waals'forces (Keesom, Debye, and London interactions). Colloidal systems and colloidal stability (van der Waals' attractionand potential energy curves). Brownian motion and Brownian flocculation.

Module II:
Surface and interfacial tension and surfacefree energy. Surface tension for curved interfaces. Surface excess and Gibbs equation. Theory of surface tension,contact angle, and wetting.

Module III:
Thermodynamics of interfaces, thermodynamics of micelle and mixed micellar formation.Electrical phenomena at interfaces (Electrokinetic phenomena, Electrical double layer). Emulsion and microemulsion. General applications. Enhanced petroleum recovery, super hydrophobic and self-cleaningsurfaces.Novel fabrication of nanostructured particles. Measurement techniques of surface tension, Contact angle,Zetapotential, Particle size.

Reference Books:

1. Principles of Colloid and Surface Chemistry, 3rd ed. by PCHiemenz and RRajagopalan, Mercel Dekker.
2. Introduction to Colloid & Surface Chemistry, 4th ed. by D J Shaw, Butterworth Heinemann.
3. Colloid and Surface Chemistry by PSomasundaran, CreateSpace Independent Publishing Platform.
4. Introduction to Applied Colloid and Surface Chemistry by GMKontogeorgis and S Kiil, John Wiley & Sons.

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PCI7J001/ PCI7J002/ PCI7J005	Architecture & Town planning / Ground improvement Technique/ Soil Dynamics & Machine Foundation	3-0-0	3	100	50
PCI7J003/ PCI7J004	Environmental Impact Assessment/ Industrial Waste Management & Disposal	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PCI7N201	Seminar	0-0-1	2	-	100
PCI7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PCI7D001/ PCI7D002/ PCI7D003	Water Resources System and Management / Advanced Design of Reinforced Concrete Structures/ Computational Fluid Dynamics	4-0-0	4	100	50
Minors					
PCI7G004	Design of Concrete Structures	4-0-0	4	100	50

*Those who taken the subject Marketing Management in 5th semester are not allowed to avail in 7th Semester

PCI7J001 ARCHITECTURE & TOWN PLANNING 3-0-0

Module – I

Principles of architectural design –primary elements, form, space, organization, circulation, proportion and scale, ordering principles.

Functional planning of buildings: Planning, designing and construction, General building requirements, Permit and Inspection (as per the National building Code)

Module – II

Town Planning ; Evolution of towns : History and trends in town planning:-origin and growth, Historical development of town planning in ancient valley civilizations; Objects and necessary of town planning; Surveys and analysis of a town ; New Concepts in town planning : Garden city movement, Linear city and Satellite city concepts, Neighborhood Planning.

Module – III

Planning Principles, Practice and Techniques: Elements of City plan, Estimating future needs, Planning standards

Module – IV

Zoning:- its definition, procedure and districts, height and bulk zoning, F.A.R., Master Plan; Concepts of urban planning , design and landscaping.

Reference Books:

1. B. Gallion and S. Eisner, The Urban Pattern: City planning and Design - C B S publishers.
2. D. K. Francis Ching, Architectures: Form, Space and Order, John Wiley.
3. S. Eisner, A. B. Gallion and S. Eisner, The Urban Pattern: City planning and Design, JohnWiley.

PCI7J002 GROUND IMPROVEMENT TECHNIQUES 3-0-0

Module – I

Introduction, Necessity of ground improvement, selection of ground improvement techniques, stabilization ofexpansive soil.

Module-II

Dewatering, Well points-Vaccum / electro osmatic methods, Analysis of seepage, Two Dimensional Flow, heattreatment, ground freezing., Analysis and design of dewatering systems. Grouting types, Properties, Method of grouting, Ground selection and control.

Module – III

Compaction, Methods of compaction, Engineering properties of compacted soil, Field compaction and its control. dynamic compaction, Vibro flotation, Compaction piles, Consolidation, Sand drains, Preloading, Stone column, Construction methods, Merits and demerits of various techniques

Module – IV

Soil stabilization, Use of chemical additives, Reinforced earth, Concept, Materials, Application and design, Use of geo-synthetics and geo-cells in construction work.

Reference Books:

1.Grond improvement techniques by P.P.Raj, Laxmi Publications.
2.Foundation Design and Construction, M.J. Tomlinson
2. Foundation Engineering, G.A. Leonard, Tata McGraw Hill
3. Modern Geotechnical Engineering, Alam Singh, IBT Publishers
4.GeotechnicalEngineering.ShashKGulhati&ManojDatta,TataMc-GrawHil

PCI7J005 SOIL DYNAMICS & MACHINE FOUNDATION 3-0-0

Module – I

Introduction: Soil mechanics and soil dynamics, problems of dynamic loading on soil structure.

Theory of vibrations: Introduction, definitions, Single degree freedom system, Free and Forced vibrations with and without damping; transient response of single degree freedom system.

Module-II

Wave Propagation in Soil media: Wave propagation in an elastic homogeneous isotropic medium, Rayleigh, Shear and compression waves, waves inelastic half space and its equation.

Coefficient of elastic, uniform and non-uniform compression and shear, effect of vibration on the dissipative properties of soils, determination of dynamic properties of soil, Codal provisions.

Module-III

Dynamic loads, simple design procedures for foundations under reciprocating machines, machines producing impact loads, rotary type machines, Codal provision.

Module-IV

Vibration Isolation: Vibration Isolation Technique; Mechanical isolation, Foundation Isolation, isolation by location, isolation by barriers, active and passive isolation tests.

Reference Books:

1. Soil Dynamics and Machine Foundations, Swami Saran, Galgotia Publications Pvt Ltd.
2. Hand book on Machine Foundations, Srinivasulu.P. & Vaidyanathan.C. McGraw Hill Publications.
3. Soil Dynamics and Design Foundation, S.Prakash & V.K.Puri , McGraw Hill Publications.
4. Geotechnical Engineering, Shashi K Guhati & Manoj Datta, McGraw Hill Ltd.

PCI7J003 ENVIRONMENTAL IMPACT ASSESSMENT 3-0-0

Module I: Overview

Concept of environmental impact, Introduction to Environmental impact assessment(EIA) definitions, terminology and concepts; Evolution of EIA, EIA at project, Regional and policy levels; Impact of development on environment and Environmental Impact Assessment (EIA) and Environmental Impact; Statement (EIS), Objectives, Historical development, EIA capability and limitations, Legal provisions on EIA.

Module II: EIA Methods

Methods of EIA, Strengths, weaknesses and applicability, Appropriate methodology, Case studies.

Module III: EIA Procedures

Socio Economic Impact, Assessment of Impact on land, water and air, energy impact; Impact on flora and fauna;Mathematical models; public participation, Reports, Exchange of Information, Post Audit, Rapid andcomprehensive EIA.

Module IV: Quantitative Methods

Use the mathematical models in EIA, Water quality, air quality and noise; assumptions and limitations**.** Basic tenets ofGlobal Climate Models

Module V: Infrastructure Development Projects and Impacts

Case studies, highway, airport, dams, power plans, etc, Plan for mitigation of adverse impact on environment, optionsfor mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the project affectedpeople, climate impacts and EIA

Text Books:

1. Anjaneyalu,Y. (2002), Environmental Impact Assessment Methodologies, B.S. Publications, Hyderabad.
2. Canter R.L. (1991), Environmental Impact Assessment, McGraw Hill Inc., New Delhi.
3. B. M. Noble, Introduction to Environmental Impact Assessment: A Guide to Principles and Practice. Oxford University Press, USA, 2005.
4. J. Glasson, Introduction to Environmental Impact Assesment: Principles, and Procedures, Process, Practice and Prospects (The Natural and Built Environment Series), Routledge.

PCI7J004
INDUSTRIAL WASTE MANAGEMENT & DISPOSAL 3-0-0

Module I:
Industrial Pollution: Types of industries and industrial pollution, Characteristics of industrial wastes, Effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health, Hazardous wastes, Environmental legislations related to prevention and control of industrial effluents and hazardous wastes, Pollution Control Boards.

Module II:
Waste Management Approach*:*Waste management approach, Waste Audit, Volume and strength reduction, Material and process modifications, Recycle, Reuse and by-product recovery, Applications.

Module III:
Industrial Waste Water Treatment*:* Sources, Quantification and characterization of effluent, Waste water treatment process, Primary and secondary treatment of waste water, Aerobic and anaerobic treatment processes, various reactor configurations.
Advanced Waste Water Treatment Processes: Fundamentals and mechanism of adsorption, adsorption isotherms, absorption, membrane separation and chemical oxidation processes andtheir design principles.

Module IV:
Case Studies of Industrial Pollution Control:Sources & their Characteristics, Waste water and air quality management in specific industries: Textiles, Tanneries, Distilleries, Refineries, Thermal power plants, Fertilizer plant, Steel plant, Pulp and paper, Sugar and dairies, Cement, Sponge iron industries.

Text Book:
1. M.N.Rao & A.K.Dutta (1995), Wastewater Treatment, Oxford IBH Publication.
2. Nelson, L. Nemerow (2000), Liquid Waste of Industry, Theories, Practices and Treatment, Addison-WesleyPublishing Company, London.
3. Wastewater treatment processes, Metcalf and Eddy, Tata McGraw hill
4. Environmental Engineering, Peavy and Rowe, Tata McGraw Hill

Reference books:
1. T.T.Shen, 1999, Industrial Pollution Prevention, Springer publications.
2. R.L.Stephenson & J.B.Blackburn Jr. (1998), Industrial Wastewater Systems Hand book, Lewis Publishers, NewYork.
3. Environmental Assessment Source book (1991), Vol.I, II & III., The World Bank, Washington, D.C.
4. Judith Petts (1999), Hand book of Environmental Impact Assessment, Vol.I & II, Blackwell Science.

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, ―Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, ―Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, ―Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

PCI7D001 Water Resources System and Management 3-0-0

Module I

Introduction to water resources systems : Elements of a water system, concept of a system, systems analysis techniques, issues in systems approach, advantages and limitations of systems approach, challenges in water sector.

Module II

Acquisition and processing of water resources data: Types of data, design of hydromet networks, data validation, acquisition and processing of precipitation and other meteorological data, acquisition and processing of stream flow data, water quality and other data, water resource information system. Emerging techniques of data acquisition and systems modelling.

Module III

System Techniques in Water Resources: Optimization using calculas, Linear programming, Dynamic programming and Simulation, Combination of Simulation and Optimization.
Economic Considerations in Water Resources Systems: Basics of Engineering Economics, Economic Analysis, Conditions of project optimality, Benefit-cost Analysis.

Module IV

Environmental and social considerations: Water in environment, environmental impact of water resources projects, environmental impact of reservoirs, environmental problems in command areas, environmental impact assessment, sustainable development. Social impacts.

Books Recommended:

1. S K Jain and V P Singh. Water Resources Systems : Planning and Management.
2. Loucks, D. P., Stedenger, and Haith, D. A. – Water Resources Systems Planning & Analysis,
3. S Vedula and P P Majumdar. Water Resources Systems.
4. Ossenbruggen, P. J. – System Analysis for Civil Engineering, John Wiley, New York
5. Taha, H. –Operational Research-An Introduction, Vth Edn, Prentice Hall.
6. Prentice Hall.
7. Jain, S. K. and Singh, V. P. – Water Resources Systems Planning & Management, Elesvier,
8. Amsterdam
9. Water Resource System by Subhash Chander & Rajesh k Prasad
10. Water Resource System by P R Bhave

PCI7D002 DESIGN OF ADVANCED CONCRETE STRUCTURES 4-0-0

Module-I (10 Hours)

Introduction to EQ Engineering: Cyclic behavior of concrete and reinforcement, Computation of earthquake forces on building frame using Seismic Coefficient Method as per IS 1893-2002, base shear and storey shear calculation for multi-storeyed building frames

Significance of ductility, ductility of beam, design and detailing for ductility, simple problems based on above concept as per IS 13920.

Module-II (10 Hours)

Retaining walls: Forces acting on retaining wall, Stability requirement, Design of Cantilever and Counterfort Retaining walls

Module-III (10 Hours)

Introduction: classification and components of a standard bridge, economical span, location of piers and abutments, vertical clearance above HFL, scour depth and choice of bridge type.

Standard Loadings for Road Bridges, Impact effect and impact factor calculation for RCC and steel bridges

Design of single vent rectangular slab culvert

Module-IV (10 Hours)

Design of Foundations: Design of Rectangular and Trapezoidal Combined footing

Text Books/Reference Books:

1. Limit state design- A K Jain, Nem Chand and Brothers

2. Limit state design of reinforced concrete by B.C. Punmia, AK Jain and A.K. Jain, Laxmi Publishers New Delhi

3. Design of Bridge Structures, by T. R. Jagadeesh, PHI.

PCI7D003 COMPUTATIONAL FLUID DYNAMICS 4-0-0

MODULE-I (10 HRS.)

Basics of Computational Fluid Dynamics (CFD)- Introduction to One dimensional computation: Finite difference methods (FDM)-Finite element method(FEM)-Finite volume method(FVM). Solution of Discretised Equations:

The tri-diagonal matrix algorithm (Thomas Algorithm for one dimensional case) The Finite Volume Method for Diffusion Problems-Introduction -Finite volume method for one-dimensional steady state diffusion -Worked examples: one-dimensional steady state diffusion

MODULE-II (12 HRS.)

The Finite Volume Method for Convection-Diffusion Problems – Introduction - Steady one-dimensional convection and diffusion –

The central differencing scheme - Assessment of the central differencing scheme for convection-diffusion problems - The upwind differencing scheme - Assessment of the upwind differencing scheme - The hybrid differencing scheme - Assessment of the hybrid differencing scheme - The power-law scheme - Higher order differencing schemes for convection-diffusion problems - Quadratic upwind differencing scheme: the QUICK scheme .

MODULE-III (08 HRS.)

The Finite Volume Method for Unsteady Flows - Introduction - One-dimensional unsteady heat conduction - Explicit scheme - Crank-Nicolson scheme - The fully implicit scheme - Illustrative examples

MODULE-IV (08 HRS)

Implicit method for two- and three-dimensional problems - Discretisation of transient convection-diffusion equation - Worked example of transient convection-diffusion using QUICK differencing.

TEXT BOOK

1. Versteeg, H. K. , Malalasekera W , An Introduction to Computational Fluid Dynamics-The Finite Volume Method, Longman Scientific & Technical.
1. Patenkar V. Subas, Numerical Heat Transfer & Fluid Flow, Taylor & Francis
2. Muralidhar, K. and Sundararajan, T., Computational Fluid Flow and Heat Transfer, Norosa Publishing House, N. Delhi.

REFERENCE BOOKS

1. Ozisik, M. N. , Finite Difference Method, CRC Press.
2. Anderson, D. A. Jr, Computational Fluid Mechanics and Heat Transfer, McGraw-Hill

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PCS7J001/ PCS7J002/ PCS7J003	Cryptography & Network Security/ Robotics/ VLSI Design	3-0-0	3	100	50
PCS7J004/ PCS7J005/ PCS7J006	Mobile Computing/ Software Project Management/ Social Networks	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PCS7N201	Seminar	0-0-1	2	-	100
PCS7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PCS7D001	Computational Numbers Theory	4-0-0	4	100	50
Minors					
PCS7G002	Cryptography & Network Security	4-0-0	4	100	50

*Those who taken the subject IOT in 5th semester are not allowed to avail in 7th Semester

PCS7J001 Cryptography & Network Security 3-0-0

OBJECTIVES: The student should be made to:

- Understand OSI security architecture and classical encryption techniques.
- Acquire fundamental knowledge on the concepts of finite fields and number theory.
- Understand various block cipher and stream cipher models.
- Describe the principles of public key cryptosystems, hash functions and digital signature.

Module I : INTRODUCTION & NUMBER THEORY [10 hours]
Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid‟s algorithm-Finite fields- Polynomial Arithmetic – Prime numbers-Fermat‟s and Euler‟s theorem-Testing for primality -The Chinese remainder theorem- Discrete logarithms.

Module II : BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY [10 hours]
Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management – Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.

Module III : HASH FUNCTIONS AND DIGITAL SIGNATURES [10 hours]
Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 – SHA – HMAC – CMAC – Digital signature and authentication protocols – DSS – EI Gamal – Schnorr.
SECURITY PRACTICE & SYSTEM SECURITY [8 hours]
Authentication applications – Kerberos – X.509 Authentication services – Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls – Firewall designs – SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

Module IV : E-MAIL, IP & WEB SECURITY [9 hours]
E-mail Security: Security Services for E-mail-attacks possible through E-mail – establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IPSecurity: Overview of IPSec – IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: SSL/TLS Basic Protocol-computing the keys- client authentication-PKI as deployed by SSLAttacks fixed in v3- Exportability-Encoding-Secure Electronic Transaction (SET).
TOTAL: 45 PERIODS

OUTCOMES: Upon Completion of the course, the students should be able to:

- Compare various Cryptographic Techniques
- Design Secure applications
- Inject secure coding in the developed applications

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education, March 2013. (UNIT I,II,III,IV).

2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002. (UNIT V).

REFERENCES:

1. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2007.
2. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
3. Charles Pfleeger, "Security in Computing", 4th Edition, Prentice Hall of India, 2006.
4. Ulysess Black, "Internet Security Protocols", Pearson Education Asia, 2000.
5. Charlie Kaufman and Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication in Public World", PHI 2002.
6. Bruce Schneier and Neils Ferguson, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
7. Douglas R Simson "Cryptography – Theory and practice", First Edition, CRC Press, 1995.
8. http://nptel.ac.in/.

PCS7J002 Robotics 3-0-0

Module I
Robot Anatomy Arm Geometry-Direct & Inverse Kinematics Problem. Arm Dynamics, D Alembert Equations of Motion, Synthesis of elements with movalulity constraints, manipulations-trajectory planning, joint interpolated trajectories. [15L]

Module II
Control of Robot Manipulation-computed torque technique sequencing & adaptive control, resolved motion control Moluie Robots. [6L]

Module III
Robot sensing-Range & Proximity & Higher-Level vision, illumination techniques, Imaging Geometry, Segmentation Recognition & Interpretation. [8L]

Module IV
Robot Programming Language Characteristics of Robot Level & Task Level languages. Robot intelligence-State Space search, Robot learning, Robot Task Planning, Knowledge Engineering.
[10L]

References:

1. K.S Fu R.C . CSG Lee-Robotics Control, Sensing, Vision & Intelligence, McGraw-Hill.
2. M.P. Groover, M.Weins, R.N. Nagel, N.C. Odrey –Industrial Robotics, McGraw Hill
3. Andrew C. Straugard-Robotics & AI,PHI
4. S. Sitharama Iyengar, Alberto Elefes-Autonomous Mobile Robots Control, Planning & Achitecture, IEEE Computer Society Press

PCS7J003 VLSI DESIGN 3-0-0

Objective: To cater the needs of students who want a comprehensive study of the principle and techniques of modern VLSI design and systems.

Module 1(12 hrs)
Process steps in IC fabrication: Silicon wafer preparation-Diffusion of impurities-physical mechanism-ion implantation- Annealing process- Oxidation process-lithography-Chemical Vapour Deposition -epitaxial growth –reactors- metallization-patterning-wire bonding -packaging

Module 2 (12 hrs)
Monolithic components: Isolation of components-junction isolation and dielectric isolation. Monolithic diodes- schottky diodes and transistors-buried layer-FET structures- JFET-MOSFET-PMOS and NMOS. Control of threshold voltage- silicon gate technology- monolithic resistors-resistor design-monolithic capacitors- design of capacitors- IC crossovers and vias.

Module 3 (12 hrs)
CMOS technology: CMOS structure-latch up in CMOS, CMOS circuits- combinational logic circuit-invertor- NAND-NOR-complex logic circuits, full adder circuit. CMOS transmission gate(TG)T-realization of Boolean functions using TG. Complementary Pass Transistor Logic (CPL)-CPL circuits: NAND, NOR-4 bit shifter. Basic principle of stick diagrams.

Module 4 (12hrs)
CMOS sequential logic circuits: SR flip flop, JK flip flop, D latch circuits. BiCMOS technology-structure-BiCMOS circuits: inverter, NAND, NOR-CMOS logic systems-scaling of MOS structures-scaling factors-effects of miniaturization.
Gallium Arsenide Technology: Crystal structure-doping process-channeling effect-MESFET fabrication-Comparison between Silicon and GaAs technologies. Introduction to PLA and FPGA

References:

1. N Weste and Eshrangian, “Principles of CMOS VLSI Design: A system perspective”, Addison Wesley
2. S M SZE, “VLSI Technology”, Mc Graw Hill
3. Douglass Pucknell, “Basic VLSI design”, Prentice Hall of India.
4. K R Botkar,” Integrated circuits”, Khanna Publishers
5. Jan M Rabaey, Anantha Chandrakasan and Borivoje Nikolic, “Digital Integrated Circuits- a Design perspective”, Prentice Hall.
6. S M Kang & Y Leblebici, “CMOS digital integrated circuits”, Mc Graw Hill.

PCS7J004 MOBILE COMPUTING 3-0-0

Module - I (10 Hours)

Introduction to Personal Communications Services (PCS): PCS Architecture, mobility management, Networks signalling, Global System for Mobile Communication (GSM) System overview: GSM Architecture, Mobility management, Network signalling. General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes, Mobile Data Communication; WLANs (Wireless LANs) IEEE 802.II standard, Mobile IP.

Module - II (12 Hours)

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark-up Languages (WML), Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies. Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000

Module - III (10 Hours)

Global Mobile Satellite Systems; case studies of the IRIDIUM, ICO and GLOBALSTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Server-side programming in Java, Pervasive web application architecture, Device independent example application.

Module - IV (08 Hours)

Mobile Device Operating System, Commercial mobile operating systems, Software development kit, iOS, Android, Windows phones, M-Commerce, Mobile transaction system, related security issues, 4G technology, fundamental concepts of mobile cloud computing and different application instances.

Text Books:

1. P.K. Patra, S.K. Dash: **Mobile Computing**, Scitech Publications.
2. Rajkamal: **Mobile Computing**, Oxford University Press.
3. J. Schiller: **Mobile Communication**, Pearson Education

Reference Books:

1. Burkhardt: **Pervasive Computing**, Pearson Education.
2. Hansmann, Merk: **Principles of Mobile Computing**, 2nd Edition, Springer.
3. P. Stavronlakis: **Third Generation Mobile Telecommunication Systems**, Springer.
4. Sandeep Singhal: **The Wireless Application Protocol**, Pearson Education.

PCS7J005 Software Project Management 3-0-0

PURPOSE: This course on Software Project Management highlights Software Project planning and management.

INSTRUCTIONAL OBJECTIVES:

1. Software Process and Metrics
2. Project Planning and Risk Management
3. Software Quality Assurance and Software Configuration Management

UNIT I - BASIC CONCEPTS (9 hours)

Product Process and project—Definition—Product life Cycle: Prototype Development Phase, Alpha Phase, Beta Phase, Production &Maintenance Phase—Project Life Cycle Models: Water fall Model, Prototype Model, RAD & Spiral Model—Process Models.

UNIT II-UMBRELLA ACTIVITIES (9 hours)

Metrics—Software Configuration Management: Process and activities, Configuration audit, Metrics in SCM, Tools & automation –Software Quality Assurance: Quality Control & Quality Assurance, Tools, Measures of SQA Success–Risk Management: Risk Management Cycle, Risk Identification, Quantification, Monitoring, Mitigation, Metrics in Risk Management.

UNIT III - PROJECT MANAGEMENT PROCESS AND ACTIVITIES (9 hours)

In-Stream activities - Project initiation: activities, Outputs, Quality Records, completion criteria –Project Planning and Tracking: Components, activities specific to Project tracking—Project Closure: Effective closure Process issues, Metrics for Project Closure.

UNIT IV–ENGINEERING ACTIVITIES IN PROJECT LIFE CYCLE (9 hours)

Software requirement Gathering: Inputs and start criteria, Dimensions, steps, Output & Quality records, Skill sets, Challenges, Metrics for Requirement Phase – Estimation : Phases of Estimation, Methodology, Models for size estimation, Challenges, Metrics for Estimation Process —Design and Development Phases-Project Management in Testing & Maintenance Phase.

EMERGING TRENDS IN PROJECT MANAGEMENT (9 hours)

Globalization Issues in Project management : Evolution, Challenges, Models – Impact of the internet on Project Management: Effect of internet on Project Management, managing project for internet, Project management activities – People Focused Process Models: People centric models, P-CMM, other people focussed Models.

TEXT BOOKS

1. Ramesh Gopalaswamy, "*Managing and global Software Projects"*, Tata McGraw Hill.Tenth Reprint 2011.**(Revised)**

REFERENCES

1. Roger S.Pressman, *"Software Engineering - A Practitioner's Approach"*, 7th Edition McGraw Hill, 2010.**(Revised).**
2. Humphery Watts, *"Managing the Software Process"*, Addision Wesley, 1989.**(Revised).**
2. Wheelwright and Clark: "*Revolutionizing product development"*, The Free Press, 1993

PCS7J006 Social Networks 3-0-0

Module I INTRODUCTION

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

Module II MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

Module III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - Multi-Relational characterization of dynamic social network communities.

Module IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES

Understanding and predicting human behaviour for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

Module V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS

Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

TEXT BOOKS:

1. Peter Mika, "Social Networks and the Semantic Web", , First Edition, Springer 2007.
2. BorkoFurht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.

REFERENCES:

1. GuandongXu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
2. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
4. John G. Breslin, Alexandre Passant and Stefan Decker, "The Social Semantic Web", Springer,2009.

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· *Able to understand the application areas of IOT*
· *Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks*
· *Able to understand building blocks of Internet of Things and characteristics.*

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On-Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

PCS7D001 Computational Numbers Theory (HONOR SUBJECT)4-0-0

Module I

Algorithms for integer arithmetic: Divisibility, gcd, modular arithmetic, modular exponentiation, Montgomery arithmetic, congruence, Chinese remainder theorem, Hensel lifting, orders and primitive roots, quadratic residues, integer and modular square roots, prime number theorem, continued fractions and rational approximations.

Module II

Representation of finite fields: Prime and extension fields, representation of extension fields, polynomial basis, primitive elements, normal basis, optimal normal basis, irreducible polynomials.

Algorithms for polynomials: Root-finding and factorization, Lenstra-Lenstra-Lovasz algorithm, polynomials over finite fields.

Module III

Elliptic curves: The elliptic curve group, elliptic curves over finite fields, Schoof's point counting algorithm.

Primality testing algorithms: Fermat test, Miller-Rabin test, Solovay-Strassen test, AKS test.

Integer factoring algorithms: Trial division, Pollard rho method, p-1 method, CFRAC method, quadratic sieve method, elliptic curve method.

Module V

Computing discrete logarithms over finite fields: Baby-step-giant-step method, Pollard rho method, Pohlig-Hellman method, index calculus methods, linear sieve method, Coppersmith's algorithm.

Applications: Algebraic coding theory, cryptography.

References

1. V. Shoup, A computational introduction to number theory and algebra, Cambridge University Press.
2. M. Mignotte, Mathematics for computer algebra, Springer-Verlag.
3. I. Niven, H. S. Zuckerman and H. L. Montgomery, An introduction to the theory of numbers, John Wiley.
4. J. von zur Gathen and J. Gerhard, Modern computer algebra, Cambridge University Press.
5. R. Lidl and H. Niederreiter, Introduction to finite fields and their applications, Cambridge University Press.
6. A. J. Menezes, editor, Applications of finite fields, Kluwer Academic Publishers.
7. J. H. Silverman and J. Tate, Rational points on elliptic curves, Springer International Edition.
8. D. R. Hankerson, A. J. Menezes and S. A. Vanstone, Guide to elliptic curve cryptography, Springer-Verlag.
9. A. Das and C. E. Veni Madhavan, Public-key cryptography: Theory and practice, Pearson Education Asia.
10. H. Cohen, A course in computational algebraic number theory, Springer-Verlag.

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PEI7J001/ PEI7J002/ PEI7J003	Microwave & Antenna Engineering/ Microcontroller & its Application/ Satellite Communication	3-0-0	3	100	50
PEI7J004/ PEI7J005/ PEI7J006	VLSI Design/ MEMS/ Renewable Energy Sources	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PEI7N201	Seminar	0-0-1	2	-	100
PEI7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PEI7D001	Advanced Process Control	4-0-0	4	100	50
Minors					
PEI7G002	Microcontroller & its Application	4-0-0	4	100	50

PEI7J001 MICROWAVE AND ANTENNA ENGINEERING (3-0-0)

University Level(80%)

MODULE I (14 Hrs)

Transmission lines: The lumped element circuit model for a transmission line, wave propagation, field analysis of two wire and coaxial transmission lines, characteristic impedance, terminated transmission line, reflection coefficient, voltage standing wave ratio, scattering matrix, signal flow graph, Smith chart, transmission line problem solutions with Smith chart, single stub and double stub matching
Rectangular and cylindrical waveguide: wave propagation, modes in waveguides, power flow , attenuation due to conductor and dielectric losses

MODULE II (12 Hrs)

Microwave Devices and components
Reflex klystron: velocity modulation, electronic admittance, output power and frequency
Magnetron: Principle of operation, rotating field, ð mode of operation, frequency of oscillation, the ordinary (O-type) TWT-principle of operation as an amplifier

MODULE III (12 Hrs)

Antenna and parameters: Radiation pattern, beam solid angle, directivity, gain, input impedance, polarization, bandwidth, reciprocity, equivalence of radiation and receive patterns, equivalence of impedances, effective aperture, vector effective length, short dipole, radiation resistance and directivity, half-wave dipole, monopole, small loop antenna

TEXT BOOKS:

1. *David M.Pozar, " Microwave Engineering", Wiley, 4th Edn., 2013*
2. *A.R. Harish and M.Sachidananda, " Antennas and Wave Propagation", Oxford University Press 2007*

REFERENCE BOOK:

1. *Sushrut Das, " Microwave Engineering", Oxford University Press 2014*

PEI7J002 MICROCONTROLLERS & ITS APPLICATIONS (3-0-0)

BPUT Level(80%)

Module-I:(12 hrs)

Microcontrollers and Embedded processors, Microcontroller's Architecture, Pin diagram of 8051 and basic features like Timing diagram, 8051 data types and directives, PSW register, Register bank and stack. Memory organization. Addressing modes, Arithemetic, logic instructions and their classification, Assembly language programming, Difference among various microcontrollers 8031, 8051and 8052, 8051,89c51,89s52,89s52.

Module- 2: (15 Hours)

Input/ Output Port Programming: Introduction to Port programming as Input Port and Output Port (Assembly Language Programming)
Timer Port Programming: Introduction to timers, Programming 8051 timers, Counter programming. Programming timers 0 and 1 in 8051
Serial Port Programming : Serial Communication -Hardware Description- Logical Level Converter- MAX232 ,Implementation with Real time application -Parallel communication - Parallel port basics -Pin details- Interfacing with Microcontroller-PC to MC communication. Serial port programming
Interrupts Programming : Definition for Interrupt -Interrupt types -Handling interrupts - Polling sequences-Interrupt sequences-External interrupts-Internal interrupts-Programming for interrupt based applications-Problems at interrupts-Debugging
ADC and DAC: - Basic principle , Their pin diagram; ADC(0804/0808/0809), DAC-0800 -

Module-3: (13 hours)

Applications:

Peripheral Devices Interfacing: Different peripheral device -Difference types of display units -7 Segments & its types, Principle of Operation-Common Anode mode-Common Cathode mode, 16x2 LCD -Applications- Hardware interfaces-Interfacing Circuits for LCD & LED, Switch: types of switch, Programming Seven Segment Display, LCD, LED, Switch with 8051 Microcontroller.
Keyboard Interfacing: Applications using keyboard interfacing with 8051 Microcontroller, Introduction to 8255 and 8255 interfacing with 8051.
Motor Interfacing: Motors used for Robotics controls -Stepper Motor & Stepper driver circuit -Stepper motor Bidirectional controlling of DC motor -Method to change polarity-Sample programs -Different sensors- Applications.

Text Book:

1. *The 8051 Microcontroller and Embedded Systems using assembly and C by M.A. Mazidi, J.G. Mazidi, Pearson.*
2. *8051 Microcontrollers- MCS 51 Family its Variants, Satish Shah, Oxford University Press*
3. *Microcontrollers [Theory and applications] by Ajay V Deshmukh; Mc Graw Hill publication.*

Reference Books :

1. *Microprocessors and Microcontrollers Architecture, Programming and system Design by Krishna kant; PHI .*
2. *Microprocessors and Microcontrollers by NagoorKani, 2nd edition, McGraw Hill Publication.*

PEI7J003 SATELLITE COMMUNICATION 3-0-0

University level: 80%

Module – I (12 Hours)

Introduction to state of satellite communication: Orbital mechanics and parameters, look angle determination, Launches and Lunch vehicle, Orbital effects in communication system performance. Attitude and orbit control system(AOCS), TT&C , Description of spacecraft System – Transponders,
Equipment reliability and space qualification.
Satellite Link Design: Basics of transmission theory, system noise temperature and G/T ratio, Uplink and Downlink design, design of satellite links for specified (C/N) performance.

Module – II(10 Hours)

Analog telephone and television transmission: Energy dispersal, digital transmission Multiple Access: Multiplexing techniques for satellite links, Comprehensive study on FDMA, TDMA and CDMA. Spread Spectrum Transmission and Reception. Estimating Channel requirements, SPADE, Random access

Module – III (12 Hours)

Earth station Technology: Earth station design, Design of large antennas – Cassegrain antennas, optimizing gain of large antenna, antenna temperature, feed system for large cassegrain antennas,
Design of small earth station antennas: Front fed paraboloid reflector antennas, offset fed antennas, beam steering, Global Beam Antenna, equipment for earth station.

Text Books:

1. *Satellite Communication by T. Pratt, C. Bostian. 2nd Edition, John Wiley Co.*

Reference Books:

1. *Digital Communication with Satellite and Fiber Optic Application, HarlodKolimbins, PHI*
2. *Satellite Communication by Robert M. Gagliardi, CBS Publisher*
3. *R N Mutagi, Satelite Communication, Oxford University Press*

PEI7J004 VLSI DESIGN 3-0-0

80% University Level:

Module – I **2+2+4+3= 11 Hours**

Introduction: Historical Perspective, VLSI Design Methodologies, VLSI Design Flow,Design Hierarchy, Concept of Regularity, Modularity and Locality,

Fabrication of MOSFETs: Introduction, Fabrication Processes Flow – Basic Concepts,The CMOS n-Well Process, Layout Design Rules, Stick Diagrams, Full-Customs MaskLayout Design.

MOS Transistor: The Metal Oxide Semiconductor (MOS) Structure, The MOS System under External Bias, Structure and Operation of MOS Transistor (MOSFET), MOSFET Current-Voltage Characteristics, MOSFET Scaling and Small-Geometry Effects, MOSFET Capacitance.

MOS Inverters – Static Characteristics: Introduction, Resistive-Load Inverters, Inverters with n-Type MOSFET Load, CMOS Inverter.

(Chapter 1 to 5 of Text Book 1 and for Stick Diagram Text Book 2)

Module – II **4+3+4= 11 Hours**

MOS Inverters – Switching Characteristics and Interconnect Effects: Introduction, Delay-Time Definitions, Calculation of Delay-Times, Inverter Design with Delay Constraints, , Switching Power Dissipation of CMOS Inverters.

Combinational MOS Logic Circuits: Introduction, MOS Logic Circuits with Depletion NMOS Loads, CMOS Logic Circuits, Complex Logic Circuits, CMOS Transmission Gates (Pass Gates).

Sequential MOS Logic Circuits: Introduction, Behaviour of Bistable Elements, SR Latch Circuits, Clocked Latch and Flip-Flop Circuits, CMOS D-Latch and Edge-Triggered Flip Flop.

(Chapter 6 to 8 of Text Book 1)

Module – III **4+4+2= 10 Hours**

Dynamic Logic Circuits: Introduction, Basic Principles ofPass TransistorCircuits,Voltage Bootstrapping, Synchronous Dynamic Circuit Techniques, Dynamic CMOS Circuit Techniques, High Performance Dynamic CMOS Circuits.

Semiconductor Memories: Introduction,Dynamic Random Access Memory (DRAM),StaticRandom Access Memory(SRAM), Non-volatileMemory, Flash Memory.

Design for Testability: Introduction,Fault Types and Models, Ad Hoc Testable.Design Techniques, Scan-Based Techniques, Built-In Self-Test (BIST) Techniques,

(Chapter ,9,10,11& 15 of Text Book

Text Books:

1. *Sung-Mo Kang and Yusuf Leblebici, CMOS Digital Integrated Circuits: Analysis and Design, 3rd Edn., Tata McGraw-Hill Publishing Company Limited, 2003.*
2. *K. Eshraghian and N.H.E. Weste, Principles of CMOS VLSI Design – a Systems Perspective, 2nd Edn., Addison Wesley, 1993.*
3. *Debaprasad Das, VLSI Design, Oxford University Press, New Delhi, 2010.*

Reference Books:

1. *Wayne Wolf, Modern VLSI Design System – on – Chip Design, 3rd Edn., PHI.*
2. *Jan M. Rabaey, AnanthaChandrakasan, Borivoje Nikolic, Digital Integrated Circuits – A Design Perspective, 2nd Edn., PHI.*
3. *John P. Uyemura, CMOS Logic Circuit Design, Springer (Kluwer Academic Publishers), 2001.*
4. *Ken Martin, Digital Integrated Circuit Design, Oxford University Press, 2000.*

PEI7J005 MICRO-ELECTRO-MECHANICAL SYSTEMS (MEMS) 3-0-0

Module-I (14 Lectures)

Overview of MEMS and Microsystems.(Chapter 1 of Text Book 1)
Micromachining Techniques:Silicon as material for micromachining, Photolithography, thin film deposition, doping,wet and dry etching, surface and bulk micromachining, Wafer bonding,LIGA packaging. (Chapter 3 and Section 8.2 of Text Book 1, Chapter 2 of Text Book 2)

Module II (10 lectures)

Microsystem Modeling and Design:Mechanics of deformable bodies, Energy method, Estimation of stiffness and damping for different micro-structures, Modeling of electromechanical systems, Pull-in voltage. (Section 4.1 to 4.3 and 6.2.2 of Text Book 1, Section 3.4 of Text Book 2)

Module III (15 Lectures)

MEMS Applications:Mechanical sensors and actuators: Piezoresistive pressure sensors, MEMS capacitive accelerometer, Gyroscopes, (Section 8.3 of Text Book 1 and Section 5.3 and 5.11 of Text Book 2)
Optical:Micro-lens, Micro-mirror, Optical switch(Section 7.5 to 7.7 of Text Book 2) Radio frequency MEMS:Inductor, Varactor, Filter, Resonator. (Section 9.3 to 9.7 of Text Book 2)
Microfluidics:Capillary action, Micropumping, Electrowetting, Lab-on-a-chip. (Section 10.1 to 10.8 of Text Book 2)

Text Books:

1. G.K. Ananthsuresh, K.J. Vinoy, S. Gopalakrishnan, K.N. Bhat and V.K. Atre: Micro and Smart Systems, Wiley India, New Delhi, 2010.
2. N.P. Mahalik: MEMS, Tata McGraw-Hill, New Delhi, 2007.

Reference Book:

1. *T. Hsu: MEMS and Microsystems: Design and Manufacture, Tata McGraw-Hill, New Delhi, 2002.*
2. *Gabriel M.Rebeiz: RF MEMS Theory,design&Technology,Wiley India Education,2010.*

PEI7J006 RENEWABLE ENERGY SYSTEMS 3-0-0

Module I **[15 Hours]**

University Portion (80%): (13 Hours)

Introduction: Conventional energy Sources and its Impacts, Non conventional energy– seasonal variations and availability, Renewable energy – sources and features, Distributed energy systems and dispersed generation (DG) (Textbook-1, Chapter-1.10, 1.13, 1.14)

Solar Energy: Solar processes and spectral composition of solar radiation. Solar Thermal system- Solar collectors, Types and performance characteristics, Applications-Solar water heating systems (active & passive) , Solar space heating & cooling systems , Solar desalination systems, Solar cooker. Solar photovoltaic system-Operating principle, Photovoltaic cell concepts, Cell, module, array, Losses in Solar Cell, Effects of Shadowing-Partial and Complete Shadowing, Series and parallel connections, Cell mismatching, Maximum power point tracking, Applications-Battery charging, Pumping, Lighting, Peltier cooling. Modeling of PV cell. (Textbook-1, Chapter- 4.1, 4.2, 4.5, 4.10, 4.11, 5, 6)

Module II **[10 Hours]**

University Portion (80%): (8 Hours)

Wind Energy: Wind energy, Wind energy conversion; Wind power density, efficiency limit for wind energy conversion, types of converters, aerodynamics of wind rotors, power ~ speed and torque ~ speed characteristics of wind turbines, wind turbine control systems; conversion to electrical power: induction and synchronous generators, grid connected and self excited induction generator operation, constant voltage and constant frequency generation with power electronic control, single and double output systems, reactive power compensation, Characteristics of wind power plant, Concept of DFIG. (Textbook-2, Chapter-1.2, 1.4, 1.5, 1.6, 1.7, 1.8, 1.10, 1.11, 1.12, 3, 5)

Module III[9 Hours]

University Portion (80%):(9 Hours)

Biomass Power: Principles of biomass conversion, Combustion and fermentation, Anaerobic digestion, Types of biogas digester, Wood gassifier, Pyrolysis, Applications. Bio gas, Wood stoves, Bio diesel, Combustion engine, Application. (Textbook-1, Chapter-8)

Module IV **[6 Hours]**

University Portion (80%): (4 Hours)

Hybrid Systems: Need for Hybrid Systems, Range and type of Hybrid systems, Case studies of Diesel-PV, Wind-PV, Microhydel-PV, Biomass-Diesel systems, electric and hybrid electric vehicles. (Textbook-2, Chapter-7)

Text Books:

1. *B.H.Khan, Non-Conventional Energy Resources, Tata McGrawHill, 2009*
2. *S. N. Bhadra, D. Kastha, S. Banerjee, Wind Electrical Systems, Oxford Univ. Press, New Delhi, 2005.*
3. *Renewable Energy- Power for a Sustainable Future, Godfrey Boyle, Oxford University Press*

Reference Books:

1. *S. A. Abbasi, N. Abbasi, Renewable Energy Sources and Their Environmental Impact, Prentice HallofIndia,NewDelhi,2006*

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:

1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:

1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, TataMcGrawHillPublishingCompanyLtd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

PEI7D001 ADVANCED PROCESS CONTROL 4-0-0

(Honors)

University Level: 80%

MODULE – I (10 Hours)

Basics of process control scheme:
Introduction to Feedback control:Concept of feedback control,Types of feedback controllers, measuring sensors,Transmission lines. Ch-13 of text book-1
Adaptive and Interferential control systems: Adaptive control, Interferential control. (Ch-22 of text book-1)

MODULE – II (12 Hours)

Advance control in process: Cascade control, selective control, Split-Range control. (Ch-20 of text book-1)
Synthesis of Alternative control configurations for Multiple-Input, Multiple-Output processes: Design questions for MIMO control systems, Degree of freedom and the number of controller and manipulated variables, Generation of alternative loop configurations, Extension to systems with interacting units.(Ch-23 of text book-1)

MODULE – III (13 Hours)

Computer based control:
SCADA system: SCADA systems , Definition of SCADA, Basic elements of SCADA systems-Field data interface devices, Communications network , Central host computer, operator workstations and software components, SCADA architecture: Monolithic SCADA systems, distributed SCADA systems, Networked SCADA systems.).CH-10 of text book-2.
Data Acquisition systems: Data Acquisition systems with basic Architecture, Basic data Acquisition systems, data logger. Various elements /subsystems of DAS: Sensors and transmitter, cables and wiring, signal conditioning, hardware elements of DAS, software elements of DAS, multi channel DAS. CH-8 of text book-2.
Computer-Based controller: H/W configuration, multiple loop controllers, Data logging, Supervisory control, Direct control. ch-11 of text book-3

Text Book:

1. *George Stephanopoulos, Chemical process control, PHI Learning Private Limited, New Delhi, 2009.*
2. *K. Padma Raju and Y.J Ready., Instrumentation and control system, Tata McGraw Hill Education Private Limited, New Delhi.*
3. *Cotis D. Jonson.,Process control Instrumentation, 8th Edn., PHI.*

Reference Book:

1. *SurekhaBhanot.Process control principles and application,Oxforg University Press.*

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PEE7J001/ PEE7J002/ PEE7J003	Switch gear and ProtectiveDevices/ Biomedical Instrumentation/ Mobile Communication	3-0-0	3	100	50
PEE7J004/ PEE7J005/ PEE7J006	Communication Engineering / Digital Image Processing / Adaptive Signal Processing	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PEE7N201	Seminar	0-0-1	2	-	100
PEE7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PEE7D013/ PEE7D014	High Voltage Engineering/ Microwave Engineering	4-0-0	4	100	50
Minors					
PEE7G001	Power Station Engineering & Economy	4-0-0	4	100	50

PEE7J001 SWITCH GEAR AND PROTECTIVE DEVICES 3-0-0

Module- I **[10 Hours]**

University Portion (80%) : (8 Hours)

Introduction: Principle and need for protective schemes, Nature and causes of faults, Zones of protection, Primary and back-up protection, Basic principle of operation of protective system, Components of Protection System.

[Text Book 1 : CH 1.1, 1.2, 1.5, 1.6, 1.7, 1.8, 2.1, 2.2, 2.3]

Sequence Components and Fault Analysis:Sequence components (positive, negative and zero) and their significance, Average 3-phase power in terms of symmetrical components, sequence impedance, fault calculations, Single line to ground fault, Line to ground fault with Zf, Faults in Power systems, Concept of short circuit capacity of a Bus.[Ref. Book 1: CH 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, 13.10, 13.13]

Module- II **[10 Hours]**

University Portion (80%) : (8 Hours)

Operating Principles and Relay Construction: Relay design and construction, Relay classification, Types of Electromagnetic relays, Theory of Induction relay torque, General Equations of Comparators and Electromagnetic Relays, Over Current relays, Directional relays, Distance relays, Differential relays.

Feeder Protection:Over current, Distance and Pilot Protection.

Static Relays: (Comparators and different relays)

Amplitude comparator, Phase Comparator, Coincidence type phase comparator, Basic elements of a static relay, Over Current Relays, Differential Protection, Static distance Protection.

[Text Book 1: CH 3.1, 3.2, 3.3, 3.4, 4.2, 4.3, 4.4, 4.7, 4.8, 4.9, 5.2, 5.3, 5.4, 11.1, 11.2, 11.3, CH 12.1, 12.2, 12.3, 12.4]

Module- III **[10 Hours]**

University Portion (80%) : (8 Hours)

Apparatus Protection: Transformer Protection, Generator Protection, Motor Protection, Bus bar protection schemes. [Text Book 1: CH 6.2, 6.3, 6.4, 6.5]

Numerical relays: Block Diagram of Numerical Relay, Signal Sampling & Processing, Numerical Over-current protection, Numerical Transformer differential Protection, Numerical distance Protection of Transmission Line. [Text Book 2: CH 11.2, 11.3, 11.7, 11.8, 11.9]

Module- I V **[10 Hours]**

University Portion (80%) : (8 Hours)

Switchgears: Auto reclosing, Theory of Circuit interruption, Circuit constants in relation to Circuit breaking, Re-striking voltage transient, characteristics of Re-striking Voltage, Interaction between breaker and circuit, Current chopping.

Circuit Breakers: Types of circuit breakers (air blast, air break, oil, vacuum, SF6 , DC circuit breaker), advantages and testing of circuit breaker.[Text Book 1: CH 7.1, 7.2, 7.3, 7.4, CH 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 14.2,1 4.3, 14.4, 14.5, 14.6, 14.7, 15.2, 15.3, 15.5, 16.2, 16.3, 16.4, 18.2, 18.5, 18.6, 18.7, 18.8]

Text Books:

1. *Power System Protection and Switchgear – B.Ravindranath & M.Chander–New Age International Publishers (Second Edition).*
2. *Protection and Switchgear - B. Bhalja, R.P.Maheshwari, N.G. Chothani, OXFORD University Press.*
2. *Fundamentals of Power System Protection – Y.G.Paithankar and S.R.Bhide, PHI Publication. (Second Edition)*

Reference Books:

1. *Electrical Power System - C.L.Wadhwa New Age International Publishers. (Sixth Edition).*
2. *Power System Engineering - M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarti, Dhanpat Rai & Co. (P) Ltd.*
3. *Power System Protection and Switchgear - Badri Ram, Vishwakarma, Tata McGraw hill.*
4. *Switchgear and Protection – Sunil S Rao , Khanna Publishers, New Delhi.*
5. *Power System relaying by Horwitz, Phadke, Research Press.*

PEE7J003 MOBILE COMMUNICATION 3-0-0

MODULE-I An Overview of Wireless Systems: Introduction, First- and Second-Generation Cellular Systems, Cellular Communications from 1G to 3G, Wireless 4G Systems, Future Wireless Networks Radio Propagation and Propagation Path-Loss Models: Introduction, Free-space Attenuation, Attenuation over Reflecting Surfaces, Radio wave Propagation, Characteristics of Wireless Channel, Signal Fading Statistics, Propagation Path-loss Models, Cost 231 Model

MODULE-II Fundamentals of Cellular Communications: Introduction, Cellular Systems, Hexagonal Cell Geometry, Co-channel Interference Ratio, Cellular System Design in Worst-Case Scenario with an Omni directional Antenna, Co-channel Interference Reduction, Directional Antennas in Seven-Cell Reuse Pattern, Cell Splitting, Adjacent Channel Interference (ACI), Segmentation,

MODULE-III

Multiple Access Techniques: Introduction, Narrowband Channelized Systems,Comparisons of FDMA,TDMA and DS-CDMA, Comparison of DS-CDMA vs. TDMA System Capacity, Multicarrier DS-CDMA (MC-DS-CDMA) Modulation schemes: Introduction, Introduction to modulation, Phase Shift Keying, Quadrature Amplitude Modulation, M-ary Frequency Shift Keying, Synchronization,

MODULE-IV

Equalization Spread Spectrum(SS) and CDMA Systems: Introduction, Concept of Spread Spectrum, System Processing Gain, Requirements of Direct-Sequence Spread Spectrum, Frequency-Hopping Spread Spectrum Systems

Text Books: 1. Essential Reading: Selected portions from V K Garg, Wireless Communication and Netwrking; Morgan Kaufman Publishers India; 2008

Reference Book:

1. T S Rappaport, Wireless Communications, Pearson Education, India
2. W C Y Lee, Mobile Communation Engineering – Theory and Applications; TMH
3. T L Singhal, Wireless Communicaions, Tata McGraw Hill 2010

PEE7J005 DIGITAL IMAGE PROCESSING 3-0-0

MODULE-I

Fundamentals – Steps in digital image processing, sampling and quantization, relationship between pixels, imaging geometry

Image Transforms – Fourier Transform, Discrete Fourier Transform, Fast Fourier Transform, Discrete Cosine Transform, Walsh Transform, Hadamard Transform, Hotelling Transform.

MODULE-II

Image Enhancement – Point processing, spatial filtering (smoothing and sharpening filters), enhancement in frequency domain.

Filtering in the Frequency Domain: preliminary concepts, 2D DFT and its properties,basic filtering in the frequency domain, image smoothing and sharpening.

MODULE-III

Image Restoration and Reconstruction: Image restoration/degradation model, noisemodels, restoration in the presence of noise only, estimating the degradation function.

Color Image Processing: Color models, Color transformation.

MODULE-IV

Wavelets and Multi-resolution Processing: multiresolution expansions, wavelettransforms in one and two dimension.

Image Compression: Fundamentals, Some basic compression methods (Chapt: 8 ofText book 1)

Text books

1. Digital Image Processing, R.C. Gonzalez, R.E. Woods, Pearson Education , 3rd Edition, 2007
2. Digital Image Processing, S. Sridhar, Oxford University Press,2011
3. Digital Image Processing And Analysis, B. Chanda, Dutta D. Majumder ,PHI

Reference Books

1. Digital Image Processing using MATLAB, Rafael C. Gonzalez, Richard E. Woods Pearson Education, Inc., Seventh Edition, 2004.
2. Digital Image Processing, S. Sridhar, Oxford University Press,2011
3. Digital Image Processing, William K. Pratt, John Wiley, New York, 2002

PEE7J004 Communication Engineering 3-0-0

MODUE-I

INTRODUCTION: Elements of an Electrical Communication System, Communication Channels and their Characteristics, Mathematical Models for Communication Channels

MODULE-II

FREQUENCY DOMAIN ANALYSIS OF SIGNALS AND SYSTEMS: Fourier series, Fourier Transforms, Power and Energy, Sampling and Band limited signals, Band pass signals

MODULE-III

ANALOG SIGNAL TRANSMISSION AND RECEPTION: Introduction to modulation, Amplitude Modulation (AM), Angle Modulation, Radio and Television broadcasting

MODULE-IV

PULSE MODULATION SYSTEMS: Pulse amplitude modulation, Pulse Time Modulation .
PULSE CODE MODULATION: PCM system, Intersymbol interference, Eye patterns, Equalization, Companding, Time Division Multiplexing of PCM signals, Line codes, Bandwidth of PCM system, Noise in PCM systems, Delta Modulation (DM), Limitations of DM, Adaptive Delta Modulation, Noise in Delta Modulation, Comparison between PCM and DM, Delta or Differential PCM (DPCM), S-Ary System

Text Book:

1. John G.Proakis, M. Salehi, COMMUNICATION SYSTEMS ENGINEERING, 2nd ed. New Delhi, India: PHI Learning Private Limited, 2009.; Selected portion from Chapter 1,2 and 3 for module MODULE-I and MODULE-II of the course.
2. R.P Singh and S.D Sapre, COMMUNICATION SYSTEMS Analog & Digital, 2nd ed. New Delhi, India: Tata McGraw Hill Education Private Limited, 2009; Selected portions from Chapter 7 and 8 of the book for MODULE-III.

Reference Book:

1. Taub, Schilling, Saha, Taub's Principles of Communication Systems, TMH.
2. Modern Digital and Analog Communication Systems, by B.P. Lathi, Oxford

PEE7J006 ADAPTIVE SIGNAL PROCESSING 3-0-0

MODULE–I (10 Hours)

Introduction: Adaptive Systems – Definition and characteristics, General properties, Open and Closed Loop Adaptations, Applications.

The Adaptive Linear Combiner: Performance function, Gradient and Mean Square Error, Examples.

MODULE – II (14 Hours)

Theory of Adaptation with Stationary Signals: Properties of the Quadratic Performance Surface, Significance of eigen values, eigen vectors, correlation matrix.

Searching the Performance Surface: A simple gradient search algorithm, Stability and Rate of convergence, the learning curve.

MODULE-III (16 Hours)

Gradient Estimation and its effects on Adoption: The performance penalty, Variance of the gradient estimate, Misadjustment.

Adaptive Algorithms and Structures: The LMS Algorithm, Convergence, learning Curve, Performance analysis, Filtered X LMS algorithm,

MODULE-IV

Applications: Adaptive Modelling and System Identification using adaptive filter, Inverse Adaptive Modelling, Deconvolution, and equalization using adaptive filter.

Text Books

1. *Adaptive Signal Processing*, Bernard Widrow and Samuel D. Stearns, Pearson Education, 2nd impression, 2009.

Reference Books

1. *Adaptive Filter Theory*, Simon Haykin, Pearson Education, 4th Edn.

PEE7J002 BIOMEDICAL INSTRUMENTATION 3-0-0

University level: 80%

Module I (13 Hours)

Introduction to Bioengineering, Biochemical Engineering, Biomedical Engineering, Sources of Biomedical Signals, Basic medical Instrumentation system, Performance requirements of medical Instrumentation system, use of microprocessors in medical instruments, PC based medical Instruments, general constraints in design of medical Instrumentation system & Regulation of Medical devices.

Bioelectrical Signals & Electrodes: Origin of Bioelectric Signals, Electrocardiogram, Electroencephalogram, Electromyogram, Electrode-Tissue Interface, Polarization, Skin Contact Impedance, Motion Artifacts.

Module -II (14 Hours)

Electrodes for ECG: Limb Electrode, Floating Electrodes, Prejelled disposable Electrodes, Electrodes for EEG, Electrodes for EMG.

Physiological Transducers: Introduction to Transducers, Classification of Transducers, Performance characteristics of Transducers, Displacement, Position and flow and pressure Transducers.

Strain gauge pressure transducers, Thermocouples, Electrical Resistance Thermometer, The mister, Photovoltaic transducers, Photo emissive Cells & Biosensors or Biochemical sensor

Module –III (13 Hours)

Recording Systems: Basic Recording systems, General considerations for Signal conditioners, Preamplifiers, Differential Amplifier, Isolation Amplifier, Electrostatic and Electromagnetic Coupling to AC Signals, Proper Grounding (Common Impedance Coupling)

20% Course (Institute Level)

Transformation techniques in biomedical signals ie. Laplace transform, Z-transform, DFT, DTFT, STFT, Wavelet transform, Effects of noise in biomedical instruments- filtering in biomedical instruments.

Text Books:-

1. *Hand Book of Biomedical Instrumentation-2nd Ed by R.S.Khandpur, Tata McGraw Hill, 2003*
2. *Introduction to Biomedical Engineering by Michael M. Domach, Pearson Education Inc,-2004*

Reference Books:

1. *Introduction to Biomedical equipment technology, 4e. By JOSEPH.J.CAAR & JOHN M.BROWN (Pearson education publication)*
2. *Medical Instrumentation-application & design. 3e – By JOHN.G.WEBSTER John Wiley & sons publications*

PEE7D013 HIGH VOLTAGE ENGINEERING (HONORS) 4-0-0

Module-I **[8 Hours]**

University Portion (80%): (7 Hours)

Generation of high voltage, Generation of high direct current- voltage, Alternating Current-voltage, Impulse voltage and Impulse currents. [Text Book 1:6.1, 6.2,6.3]

Module-II **[12 Hours]**

University Portion (80%): (10 Hours)

Electrical breakdown in gas solid and liquid, Collision processes, Gaseous breakdown in uniform and non-uniform fields and corona. Ionisation process. Townsend's current growth equation. Townsend's criterion for breakdown. Determination of coefficients α and γ. Streamer's theory of breakdown in gases. Paschen's Law. Conduction and breakdown in pure and commercial liquid. Breakdown mechanism in solid and dielectric
[Text Book 1:2.2, 2.3, 2.4, 2.6, 2.7, 2.10, 2.11, 2.12, 3.4]

Module-III **[12 Hours]**

University Portion (80%): (10 Hours)

Study of over voltage in electrical power system and measurement of high voltage :
Causes of overvoltage and its effect on power system. Lightning and switching surges and temporary high voltage, protection against over voltage. Measurement of high voltage and high current. [Text Book 1:8.1,8.2]

Module-IV **[8 Hours]**

University Portion (80%): (7 Hours)

High voltage testing and insulation coordination
High voltage testing of electrical apparatus [Insulator, Bushing, Isolator, Circuit breaker, Transformer, Surge Arrester, Cable] [Text Book 1:10.1, 10.2, 10.3, 10.4, 10.5]

Text book:

1. *M.S Naidu and V. Kamaraju, 'High Voltage Engineering'. Tata McGraw Hill,6th Edition 2015.*

Reference book:

1. *:E. Kuffel and W. S Zaengel,' High voltage engineering Fundamentals', Pergamon Press Oxford, London, 1986*

PEE7D014 MICROWAVE ENGINEERING 4-0-0

(HONORS)

Module – I

Transmission lines: The Lumped -Element Circuit model for a Transmission line. Wave propagation. Field Analysis of two wire & Co-ax Transmission Lines. Terminated transmission line. Reflection coefficient, Scattering matrix, Signal flow graph. Transmission line problems Single Stub and Double Stub matching using Smith Chart. Rectangular and Cylindrical waveguide: Design & analysis to support various modes. Field solution for TE and TM modes, Field patterns of power flow through waveguide. Attenuation due to conductor and dielectric losses

Module – I I

Power Dividers and Couplers: Basic Properties, T -Junction Power Divider, Wilkinson Power divider, Waveguide Directional Couplers, Fixed and Precision Variable Attenuator, Ferrite Isolator. Rectangular Cavities Resonator, Resonant frequencies and of Cavity Supporting dominant mode only, Dielectric resonator. Strip line and micro strip.

Module – III

Microwave Filters: Periodic structures, design by image parameter method and insertion loss method , Filter transformations, Filter implementations, Coupled line filters.Reflex Klystron: Velocity Modulation. Electronic Admittance. Output Power and Frequency Multicavity Magnetron: Principle of Operation, Rotating Field. II-Mode of Operation, Frequency of Oscillation.

Module – I V The Ordinary type (O- Type) TWT - Principle of Operation as an amplifier. Microwave Transistor: modes of operation, transconductance, max operating frequency and microwave applications, Gunn Oscillator Principle and performance Simple Analysis Electron – field interaction. Microwave radiation hazards: Hazards of EM radiation, Radiation hazard limits, radiation protection

Text Books:

1. Microwave Engineering by D. M. Pozor, 2nd Edition, John Willy & Sons.

2. Microwave Device and Circuit, 3rd Edition, Sammuel Y, Liao, Perason

Reference Books:

1. Principles of Microwave Engineering, Reich, Oudong and Others.

2. Elements of Engineering Electromagnetics, 6th Edition, N. N. Rao, Pearson Education,

3. Electromagnetic Waves and Radiating Systems, 2nd Edition, E.C. Jordan and K.G. Balman, Pearson Education, New Delhi.

4. Engineering Electromagnetics, 7th Edition, William H. Hayt, Tata McGraw Hill Publishing Company Ltd., New Delhi

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I: Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing
Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PEL7J001/ PEL7J002/ PEL7J003	Control System Engineering II/ Advanced Power Electronics/ Digital Image Processing	3-0-0	3	100	50
PEL7J004/ PEL7J005/ PEL7J006/ PEL7J007	Mobile Communication/ Adaptive Signal Processing/ Mechatronics/ Switch Gear & Protective Devices	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PEL7N201	Seminar	0-0-1	2	-	100
PEL7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PEL7D014/ PEL7D015 PEL7D016	High Voltage Engineering/ Biomedical Instrumentation/ Microwave Engineering	4-0-0	4	100	50
Minors					
PEL7G001	Power Station Engineering. & Economy	4-0-0	4	100	50

PEL7J001 Control System Engineering II 3-0-0

Module I

Nonlinear Control Systems: Introduction to Nonlinear systems and their properties, Common Non-linearities, Describing functions, Phase plane method, Lyapounov's method for stability study, concept of Limit Cycle.

Optimal Control Theory: Introduction, Optimal control problems, Mathematical procedures for optimal control design: Calculus of variations, Pontryagin's optimum policy, Bang-Bang Control, Hamilton-Jacobi Principle.

Module II

z-Plane Analysis of Discrete-Time Control Systems: Introduction, Impulse sampling and data hold, Reconstructing original signal from sampled signals, concept of pulse transfer function, Realization of digital controllers.

Module III

Design of Discrete-time Control Systems: Introduction, Stability analysis of closed-loop systems in the z-plane, Transient and steady state response analysis, Design based on the rootlocus method, Design based on the frequency-response method.

Module IV

State-Space Analysis: Introduction, State-space representations of discrete-time systems, Solving discrete-time state-space equations, Pulse transfer function matrix, Discretization of continuous time state space equations, Lyapunov stability analysis, Controllability and Observability, Design via pole placement, State observer design.

Text Books / Reference Books

1. Slotine & Li, Applied Non-Linear Control, Englewood Cliffs, NJ: Prentice-Hall, (1991).
2. Bandyopadhyay, M.N., Control Engineering: Theory and Practice, Prentice-Hall of India Private Limited (2003).
3. Ogata, K., Discrete-time Control Systems, Pearson Education (2005).

PEL7J002 ADVANCED POWER ELECTRONICS 3-0-0

MODULE- I
[10 Hrs]
University Portion(80%): (8 Hrs)

1. **Switched Mode Power Supply:**

Isolated switched mode power supplies, Forward converter, Fly back converter, Half bridge converter, Full bridge converter, Push pull converter, Switched mode power supply with multiple outputs.

Text Book- 1- Ch- [14.2.1,14.2.2,14.2.3,14.2.4,14.2.5,14.2.6]

2. **Resonant Converters:**

Series Resonant Converters, Parallel Resonant Converters.

Text Book- 1- Ch- [8.2,8.4]
College/Institute Portion(20%): (2 Hrs)
Zero current switching, Zero voltage switching. [**Text Book-1- Ch-[8.8,8.9].** Or related advanced topics as decided by the concerned faculty teaching the subject.

MODULE- II
[10 Hrs]
University Portion(80%): (8 Hrs)

3. **Regulators:**

Boost regulator, Buck-boost regulator, Multi output Boost Converter, Diode rectifier fed boost converter, State space analysis of regulators.

Text Book- 1- Ch-[5.8.2,5.8.3,5.10,5.11,5.13]

4. **SMPS Control:**

Control requirements and technique, PWM controller, Isolation in the feed back loop, Power supplies with multiple output.

Text Book- 1- Ch- [14.3,14.5]
College/Institute Portion(20%): (2 Hrs)
Buck regulator, Cuk regulator. . **Text Book- 1- Ch-[5.8.1,5.8.4].** Or related advanced topics as decided by the concerned faculty teaching the subject.

MODULE- III
[10 Hrs]
University Portion(80%): (8 Hrs)

5. **Inverters:**

Voltage Fed Converters:

Pulse width modulation techniques, Sinusoidal PWM, Selected harmonic elimination PWM, Space vector PWM, Hysteresis band current control PWM, Sigma delta modulation. Three level inverters, Resonant inverters, Soft switched inverters

6. **Current Fed Converters:**

Load commuted inverters, Forced commutated inverters, Inverters with self commutated devices.

Text Book-3- Ch-[5.5, 5.6,5.7,5.8,5.9,6.3,6.4,6.7,6.7.2.2,6.8]

College/Institute Portion(20%): (2 Hrs)
Applications of these converters. Or related advanced topics as decided by the concerned faculty teaching the subject.

MODULE- IV

[10 Hrs]

University Portion(80%): (8 Hrs)

7. **AC voltage controllers:** AC voltage controllers with PWM Control, Matrix Converter.
8. **Application:** High Voltage DC Transmission, Interconnection of renewable energy sources and energy storage system to the utility grid, Active harmonic filter.

Book-1- Ch- 11.10,11.11

Book-2- Ch- 11.4, 17.2, 17.4

College/Institute Portion(20%): (2 Hrs)

Related advanced topics as decided by the concerned faculty teaching the subject.

Text Books:

1) *Power Electronics: Circuits, Devices and Applications by M H Rashid, 3rd Edition, Pearson.*
2) *Power Electronics: Converters , Applications and Design by Mohan, Undeland and Robbin, Wiley India Edition.*
3) *Modern Power Electronics and AC Drives by Bimal K Bose, Eastern Economy Edition, PHI.*

Reference Books:

1) *Switched Mode Power Supplies: Design and Construction by H W Whittington, B.W Flynn and D E Macpherson, 2nd Edition, Universities Press)*

PEL7J003 DIGITAL IMAGE PROCESSING 3-0-0

MODULE-I

Fundamentals – Steps in digital image processing, sampling and quantization, relationship between pixels, imaging geometry

Image Transforms – Fourier Transform, Discrete Fourier Transform, Fast Fourier Transform, Discrete Cosine Transform, Walsh Transform, Hadamard Transform, Hotelling Transform.

MODULE-II

Image Enhancement – Point processing, spatial filtering (smoothing and sharpening filters), enhancement in frequency domain.

Filtering in the Frequency Domain: preliminary concepts, 2D DFT and its properties,basic filtering in the frequency domain, image smoothing and sharpening.

MODULE-III

Image Restoration and Reconstruction: Image restoration/degradation model, noisemodels, restoration in the presence of noise only, estimating the degradation function.

Color Image Processing: Color models, Color transformation.

MODULE-IV

Wavelets and Multi-resolution Processing: multiresolution expansions, wavelettransforms in one and two dimension.

Image Compression: Fundamentals, Some basic compression methods (Chapt: 8 ofText book 1)

Text books

1. Digital Image Processing, R.C. Gonzalez, R.E. Woods, Pearson Education , 3rd Edition, 2007
2. Digital Image Processing, S. Sridhar, Oxford University Press,2011
3. Digital Image Processing And Analysis, B. Chanda, Dutta D. Majumder ,PHI

Reference Books

1. Digital Image Processing using MATLAB, Rafael C. Gonzalez, Richard E. Woods Pearson Education, Inc., Seventh Edition, 2004.
2. Digital Image Processing, S. Sridhar, Oxford University Press,2011
3. Digital Image Processing, William K. Pratt, John Wiley, New York, 2002

PEL7J004 MOBILE COMMUNICATION 3-0-0

MODULE-I An Overview of Wireless Systems: Introduction, First- and Second-Generation Cellular Systems, Cellular Communications from 1G to 3G, Wireless 4G Systems, Future Wireless Networks Radio Propagation and Propagation Path-Loss Models: Introduction, Free-space Attenuation, Attenuation over Reflecting Surfaces, Radio wave Propagation, Characteristics of Wireless Channel, Signal Fading Statistics, Propagation Path-loss Models, Cost 231 Model

MODULE-II Fundamentals of Cellular Communications: Introduction, Cellular Systems, Hexagonal Cell Geometry, Co-channel Interference Ratio, Cellular System Design in Worst-Case Scenario with an Omni directional Antenna, Co-channel Interference Reduction, Directional Antennas in Seven-Cell Reuse Pattern, Cell Splitting, Adjacent Channel Interference (ACI), Segmentation,

MODULE-III
Multiple Access Techniques: Introduction, Narrowband Channelized Systems,Comparisons of FDMA,TDMA and DS-CDMA, Comparison of DS-CDMA vs. TDMA System Capacity, Multicarrier DS-CDMA (MC-DS-CDMA) Modulation schemes: Introduction, Introduction to modulation, Phase Shift Keying, Quadrature Amplitude Modulation, M-ary Frequency Shift Keying, Synchronization,

MODULE-IV
Equalization Spread Spectrum(SS) and CDMA Systems: Introduction, Concept of Spread Spectrum, System Processing Gain, Requirements of Direct-Sequence Spread Spectrum, Frequency-Hopping Spread Spectrum Systems

Text Books: 1. Essential Reading: Selected portions from V K Garg, Wireless Communication and Netwrking; Morgan Kaufman Publishers India; 2008

Reference Book:
1. T S Rappaport, Wireless Communications, Pearson Education, India
2. W C Y Lee, Mobile Communation Engineering – Theory and Applications; TMH
3. T L Singhal, Wireless Communicaions, Tata McGraw Hill 2010

PEL7J005 ADAPTIVE SIGNAL PROCESSING 3-0-0

MODULE–I (10 Hours)

Introduction: Adaptive Systems – Definition and characteristics, General properties, Open and Closed Loop Adaptations, Applications.

The Adaptive Linear Combiner: Performance function, Gradient and Mean Square Error, Examples.

MODULE – II (14 Hours)

Theory of Adaptation with Stationary Signals: Properties of the Quadratic Performance Surface, Significance of eigen values, eigen vectors, correlation matrix.

Searching the Performance Surface: A simple gradient search algorithm, Stability and Rate of convergence, the learning curve.

MODULE-III (16 Hours)

Gradient Estimation and its effects on Adoption: The performance penalty, Variance of the gradient estimate, Misadjustment.

Adaptive Algorithms and Structures: The LMS Algorithm, Convergence, learning Curve, Performance analysis, Filtered X LMS algorithm,

MODULE-IV

Applications: Adaptive Modelling and System Identification using adaptive filter, Inverse Adaptive Modelling, Deconvolution, and equalization using adaptive filter.

Text Books

1. *Adaptive Signal Processing*, Bernard Widrow and Samuel D. Stearns, Pearson Education, 2nd impression, 2009.

Reference Books

1. *Adaptive Filter Theory*, Simon Haykin, Pearson Education, 4th Edn.

PEL7J006 MECHATRONICS 3-0-0

MODULE-I

Sensors and Transduceers:- Sensors and transducers, Performance terminology, Displacement, position and proximitry, Velocity and motion, Force, Fluid pressure, Liquidflow, Liquid level, Temperature, Light sensors, Selection of sensors, Inputting data by switches.Book-1: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.11, 2.12.

Signal conditioning:- Signal conditioning, The operational amplifier, Protection, Filtering, Pulse modulation.Book - 1: 3.1, 3.2, 3.3, 3.4, 3.5, 3.6.

Digital Signals:- Digital signals, Analogue and digital signals, digital-to-analogue and analogue-to-digital converters, Multiplexers, Data acquisition, Digital signal processing. Book - 1: 4.1, 4.2, 4.3, 4.4, 4.5, 4.6.

MODULE-II

Pneumatic and Hydraulic Actuation Systems:- Actuation systems, Pneumatic and hydraulic systems, Directional control valves, Pressure control valves, Cylinders, Servo and proportional control valves, process control valves, Rotary actuators.

Book - 1: 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.7, 7.8.

Mechanical Actuation Systems:- Mechanical systems, Types of motion, Kinematic chains, Cams, GTears, Belt and chain drives, bearings, Mechanical aspects of motor selection.Book - 1: 8.1,8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9.

MODULE-III

Electrical Actuation Systems:- Electrical systems, Mechanical switches, Solid-state switches, Solenoids, D.C. motors, A.C. motors, Stepper motors.

Book - 1: 9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7.

Basic System Models:- Mathematical models, Mechanical systembuilding blocks,Electrical system building blocks, Electrical system building blocks, Fluid system building blocks, Thermal system building blocks.

Book - 1: 10.1, 10.2, 10.3, 10.4, 10.5.

System Models:- Engineering systems, Rotational-translational systems, Electromechanical systems, Electromechanical systems, Linearity, Hydraulic-mechanical systems, Summary, Problems.

Book - 1: 11.1, 11.2, 11.3, 11.4, 11.5.

MODULE-IV

Closed-loop Controllers:- Continuous and discrete control processes, Terminology, Two-step mode, Proportional mode, Derivative control, Integral control, PID controller, Digital controllers, Control system performance, Controller tuning, Velocity control,Adaptivecontrol,Summary,Problems.

Book-1: 15.1, 15.2, 15.3, 15.4, 15.5, 15.6, 15.7, 15.8, 15.9, 15.10,15.11,15.12.

Programmable Logic Controllers:- Introduction to PLCs, Basic Structure of a PLC, Principles of Operation, PLCs versus Computers, Introduction to Internal Architecture and Hardware Components, PLC Programming, Analog *110,* Selecting a PLC for the Application, Application of PLCs for Control.

Book-2: 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, 13.9.

Text Books:

1.Mechatronics Electronic Control Systems in Mechanical and Electrical Engg. Pearson Publication, 4th Edition by William Bolton, 2010.

2.Mechatronics Integrated Mechanical Electronic Systems by K. P. Ramachandran, G. K. Vijayaraghavan, M. S. Balasundaram, Wiley India Edition, Printed on 2008.

Reference Books:

1Mechatronics integrated Technologies for Intelligent Machines by A. Smaili, F.Mrad,OxfordUniversityPress,Printedon2009..

2.Mechatronic Sources Book, Cengage Learning India Edition by Newton C Braga, 2ndEdition, 2010.

PEL7J007 SWITCH GEAR AND PROTECTIVE DEVICES 3-0-0

MODULE- I **[10 Hours]**

University Portion (80%) **[8 Hours]**

Introduction:

Principle and need for protective schemes, Nature and causes of faults, Zones of protection, Primary and back-up protection, Basic principle of operation of protective system, Components of Protection System.

[Text Book 1 : CH 1.1, 1.2, 1.5, 1.6, 1.7, 1.8, 2.1, 2.2, 2.3]

Sequence Components and Fault Analysis:

Sequence components (positive, negative and zero) and their significance, Average 3-phase power in terms of symmetrical components, sequence impedance, fault calculations, Single line to ground fault, Line to ground fault with Z_f, Faults in Power systems, Concept of short circuit capacity of a Bus.**[Ref. Book 1: CH 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.7, 13.8, 13.10, 13.13]**

College/Institute Portion (20%) **[2 Hours]**

Fault limiting Reactors and Fuses: Use of Reactors, Construction of Reactors, Types of Reactors, Methods of locating Reactors, Fuse element material, types of fuses, High voltage H.R,C. Fuses and its application, Selection of fuses, Advantages and Disadvantages of Fuse.

[Ref. Book 2: CH 2.1, 2.2, 2.3, 2.4, 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7] Or related advanced topics as decided by the concerned faculty teaching the subject.

MODULE- II **[10 Hours]**

University Portion (80%) **[8 Hours]**

Operating Principles and Relay Construction: Relay design and construction, Relay classification, Types of Electromagnetic relays, Theory of Induction relay torque, General Equations of Comparators and Electromagnetic Relays, Over Current relays, Directional relays, Distance relays, Differential relays.

Feeder Protection: Over current, Distance and Pilot Protection.

Static Relays:(Comparators and different relays)

Amplitude comparator, Phase Comparator, Coincidence type phase comparator, Basic elements of a static relay, Over Current Relays, Differential Protection, Static distance Protection.

[Text Book 1: CH 3.1, 3.2, 3.3, 3.4, 4.2, 4.3, 4.4, 4.7, 4.8, 4.9, 5.2, 5.3, 5.4, 11.1, 11.2, 11.3, CH 12.1, 12.2, 12.3, 12.4]

College/Institute Portion (20%) **[2 Hours]**

Power System Grounding: Ungrounded system, Grounded neutral system, Choice of the method of neutral grounding, Grounding Practice, Equipment Grounding (Earthing), Grounding at substations, Grounding of **[Ref. Book 2: CH 7.2, 7.5, 7.6, 7.7, 7.8, 7.9]** Or related advanced topics as decided by the concerned faculty teaching the subject.

Module- III **[10 Hours]**

University Portion (80%) **[8 Hours]**

Apparatus Protection: Transformer Protection, Generator Protection, Motor Protection, Bus bar protection schemes. **[Text Book 1: CH 6.2, 6.3, 6.4, 6.5]Numerical relays:** Block Diagram of Numerical Relay, Signal Sampling & Processing, Numerical Over-current protection, Numerical Transformer differential Protection, Numerical distance Protection of Transmission Line. **[Text Book 2: CH 11.2, 11.3, 11.7, 11.8, 11.9]**

College/Institute Portion (20%) **[2 Hours]**

Protection of Transmission Lines: (Over current and Carrier-aided Protection)
Over current Relay, Application of Definite Time OC Relay and IDMT Relay for protection of a distribution feeder, protection of a three phase feeder, Directional Over current Relay, Need for Carrier-aided Protection, Various options for a Carrier, Coupling and Trapping the carrier into the desired line section, Unit type Carrier-aided Directional comparison Relaying, Carrier-aided Distance schemes for Acceleration of Zone II, Phase comparison Relaying.**[Text Book 2 : CH 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6]** Or related advanced topics as decided by the concerned faculty teaching the subject.

Module- I V **[10 Hours]**
University Portion (80%) **[8 Hours]**
Switchgears: Auto reclosing, Theory of Circuit interruption, Circuit constants in relation to Circuit breaking, Re-striking voltage transient, characteristics of Re-striking Voltage, Interaction between breaker and circuit, Current chopping. **Circuit Breakers:** Types of circuit breakers (air blast, air break, oil, vacuum, SF_6 , DC circuit breaker), advantages and testing of circuit breaker.**[Text Book 1: CH 7.1, 7.2, 7.3, 7.4, CH 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 14.2,14.3, 14.4, 14.5, 14.6, 14.7, 15.2, 15.3, 15.5, 16.2, 16.3, 16.4, 18.2, 18.5, 18.6, 18.7, 18.8]**
College/Institute Portion (20%) **[2 Hours]**
Protection against Over voltage due to lightning: Mechanism of Lightning, Lightning stroke, Over voltage due to lightning, Protection against lightning, Different types of Arrester, Arrester Ratings, Arrester locations and effect of cables, Surge Absorber.**[Ref. Book 2: CH12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8]** Or related advanced topics as decided by the concerned faculty teaching the subject.

Text Books:
1. *Power System Protection and Switchgear – B.Ravindranath&M.Chander–New Age International Publishers (Second Edition).*
2. *Fundamentals of Power System Protection – Y.G.Paithankar and S.R.Bhide, PHI Publication. (Second Edition)*

Reference Books:
1. *Electrical Power System - C.L.Wadhwa New Age International Publishers. (Sixth Edition).*
2. *Power System Engineering - M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarti, Dhanpat Rai & Co. (P) Ltd.*
3. *Protection and Switchgear - B.Bhalja, R.P.Maheshwari, N.G. Chothani, OXFORD University Press.*
4. *Power System Protection and Switchgear - Badri Ram, Vishwakarma, Tata McGraw hill.*
5. *Switchgear and Protection – Sunil S Rao , Khanna Publishers, New Delhi.*
6. *Power System relaying by Horwitz, Phadke, Research Press.*

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On-Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, ―Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, ―Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, ―Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

Honor Subject:

PEL7D014 HIGH VOLTAGE ENGINEERING 4-0-0

Module-1 **8 hours**
University Portion (80%): **7 hours**
Generation of high voltage
Generation of high direct current- voltage, Alternating Current- voltage, Impulse voltage and Impulse currents. [**Text Book 1**:**6.1, 6.2,6.3]**
College/Institute Portion (20%): **1 hour**
Tripping and control of impulse generators [**Text Book 1**:**6.5**] Or related advanced topics as decided by the concerned faculty teaching the subject.

Module-2 **12 hours**
University Portion (80%): **10 hours**
Electrical breakdown in gas solid and liquid
Collision processes, Gaseous breakdown in uniform and non-uniform fields and corona. Ionisation process. Townsend's current growth equation. Townsend's criterion for breakdown. Determination of coefficients α and γ. Streamer's theory of breakdown in gases. Paschen's Law. Conduction and breakdown in pure and commercial liquid. Breakdown mechanism in solid and dielectric
[**Text Book 1:2.2, 2.3, 2.4, 2.6, 2.7, 2.10, 2.11, 2.12, 3.4]**
College/Institute Portion (20%): **2 hours**
Post-Breakdown Phenomenon and Application, Testing of transformer oil [**Text Book 1:2.13, 3.5]**Or related advanced topics as decided by the concerned faculty teaching the subject.

Module-3 **12 hours**
University Portion (80%): **10 hours**
Study of over voltage in electrical power system and measurement of high voltage
Causes of overvoltage and its effect on power system. Lightning and switching surges and temporary high voltage, protection against over voltage. Measurement of high voltage and high current.
[**Text Book 1:8.1,8.2]**
College/Institute Portion (20%): **2 hours**
Digital technique in high voltage measurement. .Cathode-Ray Oscillographs for Impulse Voltage and current Measurement [**Text Book 1:7.4]**Or related advanced topics as decided by the concerned faculty teaching the subject.

Module-4 **8 hours**
University Portion (80%): **7 hours**
High voltage testing and insulation coordination
High voltage testing of electrical apparatus [Insulator, Bushing, Isolator, Circuit breaker, Transformer, Surge Arrester, Cable] [**Text Book 1:10.1, 10.2, 10.3, 10.4, 10.5]**
College/Institute Portion (20%): **1 hour**
Radio Interference Measurement, Testing HVDC valves and equipment [**Text Book 1:10.6, 10.7]**Or related advanced topics as decided by the concerned faculty teaching the subject.

Text Book

1. *M.S Naidu and V. Kamaraju, 'High Voltage Engineering'. Tata McGraw Hill,6th Edition 2015.*

Reference Book

1. *E. Kuffel and W. S Zaengel,' High voltage engineering Fundamentals', Pergamon Press Oxford, London, 1986*

PEL7D015 BIOMEDICAL INSTRUMENTATION 4-0-0

University level: 80%

Module I (13 Hours)

Introduction to Bioengineering, Biochemical Engineering, Biomedical Engineering, Sources of Biomedical Signals, Basic medical Instrumentation system, Performance requirements of medical Instrumentation system, use of microprocessors in medical instruments, PC based medical Instruments, general constraints in design of medical Instrumentation system & Regulation of Medical devices.

Bioelectrical Signals & Electrodes: Origin of Bioelectric Signals, Electrocardiogram, Electroencephalogram, Electromyogram, Electrode-Tissue Interface, Polarization, Skin Contact Impedance, Motion Artifacts.

Module -II (14 Hours)

Electrodes for ECG: Limb Electrode, Floating Electrodes, Prejelled disposable Electrodes, Electrodes for EEG, Electrodes for EMG.

Physiological Transducers: Introduction to Transducers, Classification of Transducers, Performance characteristics of Transducers, Displacement, Position and flow and pressure Transducers.

Strain gauge pressure transducers, Thermocouples, Electrical Resistance Thermometer, The mister, Photovoltaic transducers, Photo emissive Cells & Biosensors or Biochemical sensor

Module –III (13 Hours)

Recording Systems: Basic Recording systems, General considerations for Signal conditioners, Preamplifiers, Differential Amplifier, Isolation Amplifier, Electrostatic and Electromagnetic Coupling to AC Signals, Proper Grounding (Common Impedance Coupling)

20% Course (Institute Level)

Transformation techniques in biomedical signals ie. Laplace transform, Z-transform, DFT, DTFT, STFT, Wavelet transform, Effects of noise in biomedical instruments-filtering in biomedical instruments.

Text Books:-

1. *Hand Book of Biomedical Instrumentation-2nd Ed by R.S.Khandpur, Tata McGraw Hill, 2003*
2. *Introduction to Biomedical Engineering by Michael M. Domach, Pearson Education Inc,-2004*

Reference Books:

1. *Introduction to Biomedical equipment technology, 4e. By JOSEPH.J.CAAR & JOHN M.BROWN (Pearson education publication)*
2. *Medical Instrumentation-application & design. 3e – By JOHN.G.WEBSTER John Wiley & sons publications*

PEL7D016 MICROWAVE ENGINEERING 4-0-0

Module – I

Transmission lines: The Lumped -Element Circuit model for a Transmission line. Wave propagation. Field Analysis of two wire & Co-ax Transmission Lines. Terminated transmission line. Reflection coefficient, Scattering matrix, Signal flow graph. Transmission line problems Single Stub and Double Stub matching using Smith Chart. Rectangular and Cylindrical waveguide: Design & analysis to support various modes. Field solution for TE and TM modes, Field patterns of power flow through waveguide. Attenuation due to conductor and dielectric losses

Module – I I

Power Dividers and Couplers: Basic Properties, T -Junction Power Divider, Wilkinson Power divider, Waveguide Directional Couplers, Fixed and Precision Variable Attenuator, Ferrite Isolator. Rectangular Cavities Resonator, Resonant frequencies and of Cavity Supporting dominant mode only, Dielectric resonator. Strip line and micro strip.

Module – III

Microwave Filters: Periodic structures, design by image parameter method and insertion loss method , Filter transformations, Filter implementations, Coupled line filters.Reflex Klystron: Velocity Modulation. Electronic Admittance. Output Power and Frequency Multicavity Magnetron: Principle of Operation, Rotating Field. II-Mode of Operation, Frequency of Oscillation.

Module – I V

The Ordinary type (O- Type) TWT - Principle of Operation as an amplifier. Microwave Transistor: modes of operation, transconductance, max operating frequency and microwave applications, Gunn Oscillator Principle and performance Simple Analysis Electron – field interaction. Microwave radiation hazards: Hazards of EM radiation, Radiation hazard limits, radiation protection

Text Books:

1. Microwave Engineering by D. M. Pozor, 2nd Edition, John Willy & Sons.

2. Microwave Device and Circuit, 3rd Edition, Sammuel Y, Liao, Perason

Reference Books:

1. Principles of Microwave Engineering, Reich, Oudong and Others.

2. Elements of Engineering Electromagnetics, 6th Edition, N. N. Rao, Pearson Education,

3. Electromagnetic Waves and Radiating Systems, 2nd Edition, E.C. Jordan and K.G. Balman, Pearson Education, New Delhi.

4. Engineering Electromagnetics, 7th Edition, William H. Hayt, Tata McGraw Hill Publishing Company Ltd., New Delhi

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PEN7J001/ PEN7J002/ PEN7J003	Environmental Biotechnology/ Urban & Rural Sanitation/ Environmental System Modelling	3-0-0	3	100	50
PEN7J004/ PEN7J005	Environmental Impact Assessment/Hydrology & Water Resource Engineering	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PEN7N201	Seminar	0-0-1	2	-	100
PEN7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PEN7D001	Environmental Management System & Auditing	4-0-0	4	100	50
Minors					
PEN7G002	Air & Noise Pollution	4-0-0	4	100	50

PEN7J001 ENVIRONMENTAL BIOTECHNOLOGY 3-0-0

Module I

Introduction to environmental biotechnology, Cell genetic material, Nucleic acid-based methods of analysis- Polymerase chain reaction, Recombinant DNA techniques- Cloning, metagenomics, Sequence analysis, Comparative genomics.

Module II

Bacterial genetic recombination, Recombinant DNA technology, Applications in Environmental Engineering. Bioremediation for Soil Environment- Biotechnologies for Ex-Situ Remediation of Soil, Biotechnologies for in-Situ Remediation of Soil, Phytoremediation Technology for Soil Decontamination.

Module III

Bioremediation for Water Environment- Ex-situ Decontamination of Groundwater, In-situ Bioremediation of Groundwater, Landfill Leachate, Industrial Wastewater Biotreatment Technologies, Biotreatment of Surface Waters. Bioremediation for Air Environment- Atmospheric Environment for Microorganisms, Microbial Degradation of Contaminants in Gas Phase, Biological Filtration Processes for Decontamination of Air Stream, Bioscrubbers.

Module IV

Biotreatment of Metals- Microbial Transformation of Metals, Biological Treatment Technologies for Metals Remediation, Bioaccumulation, Oxidation/Reduction Processes, Biological Methylation, Recovery of metals. Biological energy sources, Microbially mediated oil recovery.

Books & References:

1. B. E. Rittmann and P. L. McCarty, Environmental Biotechnology: Principles and Applications, 1st Edn.,McGraw-Hill Publishing Co., 2001.
2. B. Bhattacharya and R. Banerjee, Environmental Biotechnology, 1st Edn., Oxford University Press, 2008.
3. Prescott, L. M., Harley, 3. P., and Klein, D. A., Microbiology, Second Edition, Wm. C. Brown Publishers,Dubuque, Iowa, 1993.
4. R. W. Pickup and J. R. Saunders, Molecular Approaches to Environmental Microbiology, 1st Ed., PrenticeHall, 1996.

PEN7J002 URBAN AND RURAL SANITATION 3-0-0

OBJECTIVES:

- To expose the students the various aspects of urban and rural sanitation.

UNIT I

Principles of healthful housing

Control of environment – Engineering methods - Modes of transmission of diseases – Mosquitoes and Flies - Life cycle, important characteristics and control measures of carriers. Basic principles of healthful housing - heating - ventilation - lighting - air conditioning – noise control in residential buildings.

Plumbing and swimming pool sanitation

Scope of plumbing - definition of plumbing terms - general principles of good plumbing system – water seal - types of traps, siphonage – design of plumbing system for multistory buildings - plumbing codes and standards. Transmission of diseases in swimming pools - quality standards of pool water - design features of pools and their appurtenances

.

UNIT II

Refuse and food sanitation

Refuse characteristics in urban and rural areas - conditions and factors affecting collection, quantity and conveyance of solid waste - disposal methods - incineration - design of incinerators sanitary landfill - composting - waste recycling - biogas and gobar gas plants. Food borne and food caused diseases – food poisoning - food preservation – precautions in the design of kitchen - bactericidal treatment of kitchen utensils - Bacteriological contents of milk borne diseases - essential of milk sanitation - dairy barn sanitation - pasteurization methods - milk tests.

UNIT III

Urban and rural water supply system

Water supply arrangements in urban buildings - design of water supply systems for multistoried buildings - consideration in the development of water supply programmes for rural areas - health and economical aspects in the design and installation of rural water supply systems - methods of construction and development of different types of wells - sanitation of rural wells - pumps for rural wells - treatment methods for rural water supply.

UNIT IV

Rural sanitation

Layout of drainage systems in urban domestic areas - methods of disposal of night soil in rural areas - different privies - Twinpitpourflush toilets, VIP latrines - water carriage method of sewage disposal - cesspools and seepage pits - septic tank systems - oxidation ponds - aerated lagoons.

OUTCOMES:

The students completing the course will have the ability to

- describe basic principles of healthful housing, plumbing systems, rural water supply and sanitation
- plan appropriate water supply and sanitation systems for multistoried buildings and rural areas

TEXTBOOKS:

1. Salvato, "Environmental Sanitation", John Wiley & Sons, New York, 1982.
2. Ehler and Steel, “Municipal Rural Sanitation”, McGraw Hill Book Co.,New York, 1964.
3. Wagner E.G. and Lanoix J.N., “Water supply for rural areas and small communities”, World Health Organisation Publication, Geneva, 1958.

REFERENCES:

1. Babbit H.E and Donald J.J., Water supply Engineering, McGraw Hill Book Co., New York, 1962.

PEN7J003 ENVIRONMENTAL SYSTEM MODELING 3-0-0

Module -1
Definition, Classification, examples and models of environmental systems, Purpose of modeling, Problem in modeling.

Module – II
Introduction to air quality models, Air pollution meteorology, Atmospheric turbulence, Gaussian Plume model and modifications.

Module – III
Simulation of special meteorological and topographic conditions. Air Pollution control models.

Module – IV
Water quality and water resource management models. Dissolved oxygen and temperature in rivers solid waste generation models.

TEXT BOOKS : -

1. Principles of surface water quality modeling and control – R.V. Thomas and J.A. Muller – Harper int. Edn.

Reference Books :-

1. Fundamentals of air pollution – Richard W. Boubel, Donald L. Fox, D.Bruce Turner, Arthur C. Stera – Acdemic Press
2. Environmental Pollution – S.M. Khopkar

PEN7J004 ENVIRONMENTAL IMPACT ASSESSMENT 3-0-0

OBJECTIVES:

- To impart knowledge on Environmental management and Environmental Impact Assessment.

UNIT I

Introduction

Impact of development projects – Sustainable development- Need for Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA-Stages of EIA, Types of EIA

UNIT II

Methodologies

Methods of EIA – Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives

UNIT III

Prediction and assessment

Assessment of Impact on land, water, air, social & cultural activities and on flora & fauna- Mathematical models- Public participation

UNIT IV

Environmental management plan

Plan for mitigation of adverse impact on environment – Options for mitigation of impact on water, air, land and on flora & fauna - Addressing the issues related to the Project Affected People. Post project monitoring

Case studies

EIA for infrastructure projects – Dams – Highways – Multi-storey Buildings – Water Supply and Drainage Projects – Waste water treatment plants.

OUTCOMES:

The students completing the course will have ability to

- carry out scoping and screening of developmental projects for environmental and social assessments
- explain different methodologies for environmental impact prediction and assessment
- plan environmental impact assessments and environmental management plans
- evaluate environmental impact assessment reports

TEXTBOOKS:

1. Canter, R.L., "Environmental Impact Assessment", McGraw Hill Inc., New Delhi, 1996.
2. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.

REFERENCES:

1. John G. Rau and David C Hooten "Environmental Impact Analysis Handbook", McGraw Hill Book Company, 1990.
2. "Environmental Assessment Source book", Vol. I, II & III. The World Bank, Washington, D.C.,1991.

3. Judith Petts, “Handbook of Environmental Impact Assessment Vol. I & II”, Blackwell Science,1999.

PEN7J005 HYDROLOGY AND WATER RESOURCES ENGINEERING 3-0-0

OBJECTIVES:

- To introduce the student to the concept of hydrological aspects of water availability and requirements and should be able to quantify, control and regulate the water resources.

UNIT I

Precipitation and abstractions

Hydrological cycle- Meteorological measurements – Requirements, types and forms of precipitation - Rain gauges-Spatial analysis of rainfall data using Thiessen and Isohyetal methods-Interception - Evaporation. Horton‟s equation, pan evaporation measurements and evaporation suppression - Infiltration-Horton‟s equation - double ring infiltrometer, infiltration indices.

UNIT II

Runoff

Watershed, catchment and basin - Catchment characteristics - factors affecting runoff - Run off estimation using empirical - Strange‟s table and SCS methods – Stage discharge relationships- flow measurements- Hydrograph – Unit Hydrograph – IUH

UNIT III

Flood and drought

Natural Disasters-Flood Estimation- Frequency analysis- Flood control- Definitions of droughts- Meteorological, hydrological and agricultural droughts- IMD method-NDVI analysis- Drought Prone Area Programme (DPAP)

UNIT IV

Reservoirs

Classification of reservoirs, General principles of design, site selection, spillways, elevation – area - capacity - storage estimation, sedimentation - life of reservoirs – rule curve

Groundwater and management

Origin- Classification and types - properties of aquifers- governing equations – steady and unsteady flow - artificial recharge - RWH in rural and urban areas

OUTCOMES:

The students completing the course will have

- an understanding of the key drivers on water resources, hydrological processes and their integrated behaviour in catchments,

- ability to construct and apply a range of hydrological models to surface water and groundwater problems including Hydrograph, Flood/Drought management, artificial recharge
- ability to conduct Spatial analysis of rainfall data and design water storage reservoirs

TEXTBOOKS:

1. Subramanya .K. "Engineering Hydrology"- Tata McGraw Hill, 2010
2. Jayarami Reddy .P. "Hydrology", Tata McGraw Hill, 2008.
3. Linsley, R.K. and Franzini, J.B. "Water Resources Engineering", McGraw Hill International Book Company, 1995.

REFERENCES:

1. David Keith Todd. "Groundwater Hydrology", John Wiley & Sons, Inc. 2007
2. VenTe Chow, Maidment, D.R. and Mays, L.W. "Applied Hydrology", McGraw Hill International Book Company, 1998.
3. Raghunath .H.M., "Hydrology", Wiley Eastern Ltd., 1998.

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On-Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:098997370

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)

Fundamental and process of fabrication

The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)

Nano-Device and Components:

Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)

Quantum Electronics:

Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)

Bio-Device and application

Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)

Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

HONOR SUBJECT
PEN7D001
ENVIRONMENTAL MANAGEMENT SYSTEM AND AUDITING 4-0-0

Module I

Environmental Audit: Objectives, Types, Features, Planning and Organising Audits; Pre-visit data collection, Audit Protocol; Onsite Audit; Data Sampling - Inspections - Evaluation and Presentation; Exit Interview; Audit Report - Action Plan - Management of Audits.

Module II

Waste Management Contractor Audits; Life Cycle Approach (LCA). Introduction and Formulation of ISO Guidelines in Environmental Management Systems; ISO 14000 Series, Principles; Accreditation Process, Environmental Auditor Criteria, Benefits of EMS; Aspect-Impact Analysis, Continual Improvement.

Module III

Environmental Performance, Environmental Policy, Vision and Mission, Objective and Target, Environmental Management Planning, Implementing EMS, Plan-Do-Check-Act (PDCA), Quality Assurance(QA) and Quality Control (QC), Preventive and Corrective Action, Internal and External Audits, Documentation, Roles and Responsibilities, Management Reviews & Improvements.

Module IV

Legal and Regulatory Concerns; Integrating ISO 9000 & ISO 14000, BS 7750, EMAS. Preparation of ISO Manuals for Industry. Corporate Social Accountability: Requirements, Social Accountability (SA) 8000, Certification, Elements of Social Management System, Social policy, Planning, Implementation, Business Benefits, Corporate Social Responsibility (CSR), different Models.

Books and References :

1. Planning and Implementation of ISO14001, Environmental Management System-GirdharGyani&Amit Lunia Raj Publishiong House, Jaipur, 2000.
2. ISO 14001 Auditing Manual – Gayle Woodside and Patrick Aurrichio, McGraw-Hill.
3. “The ISO: 14000 Handbook” - Joseph Caseio (Ed), Published - CEEM Information Services. 2000
4. INSIDE ISO: 14000 – The Competitive Advantage of Environmental Management - Don Sayre, Vinity Books International, New Delhi, 2001.
5. A Guide to the Implementation of the ISO: 14000 Series on Environmental Management – Ritchie, I and Hayes W, Prentice Hall, New Jersey, 1998.

MINOR SUBJECT

PEN7G002 AIR AND NOISE POLLUTION 4-0-0

OBJECTIVES:

- To impart knowledge on the sources, effects and control techniques of air pollutants and noise pollution.

UNIT I

General

Atmosphere as a place of disposal of pollutants – Air Pollution – Definition - Air Pollution and Global Climate - Units of measurements of pollutants - Air quality criteria - emission standards - National ambient air quality standards - Air pollution indices - Air quality management in India.

Sources, classification and effects

Sources and classification of air pollutants - Man made - Natural sources - Type of air pollutants - Pollution due to automobiles - Analysis of air pollutants - Chemical, Instrumental and biological methods. Air pollution and its effects on human beings, plants and animals - Economic effects of air pollution - Effect of air pollution on meteorological conditions - Changes on the Meso scale, Micro scale and Macro scale.

UNIT II

Sampling, meteorology and air quality modelling

Sampling and measurement of particulate and gaseous pollutants - Ambient air sampling - Stack sampling. Environmental factors - Meteorology - temperature lapse rate and stability – Adiabatic lapse rate - Wind Rose - Inversion – Wind velocity and turbulence - Plume behaviour - Dispersion of air pollutants- Air Quality Modeling.

UNIT III

Air pollution control measures

Control - Source correction methods - Control equipments - Particulate control methods – Bag house filter - Settling chamber - cyclone separators - inertial devices - Electrostatic precipitator - scrubbers - Control of gaseous emissions - Absorption - Absorption equipments - adsorption and combustion devices (Theory and working of equipments only).

UNIT IV

Noise pollution and its control

Sources of noise – Units and Measurements of Noise - Characterization of Noise from Construction, Mining, Transportation and Industrial Activities, Airport Noise – General Control Measures – Effects of noise pollution – auditory effects, non-auditory effects. Noise Menace– Prevention and Control of Noise Pollution – Control of noise at source, control of transmission, protection of exposed person - Control of other types of Noise Sound Absorbent

OUTCOMES:

The students completing the course will have

- an understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management

- ability to identify, formulate and solve air and noise pollution problems
- ability to design stacks and particulate air pollution control devices to meet applicable laws.

TEXTBOOKS:

1. C. S. Rao, “Environmental Pollution Control Engineering”, Wiley Eastern Limited, 2000. 2. M. N. Rao, H. V. N. Rao, Air pollution, Tata McGraw Hill Pvt Ltd, New Delhi, 1993
2. Dr. Y. Anjaneyulu, “Air Pollution and Control Technologies”, Allied publishers Pvt. Ltd., 2002.

REFERENCES:

1. Noel De Nevers, "Air pollution control Engineering", McGraw Hill International Edition, McGraw Hill Inc, New Delhi, 2000.
2. Air Pollution act, India, 1981
3. Peterson and E.Gross Jr., “Hand Book of Noise Measurement”, 5th Edition, 1963
4. Mukherjee, "Environmental Pollution and Health Hazards", causes and effects, 1986
5. Antony Milne, “Noise Pollution: Impact and Counter Measures”, David & Charles PLC, 1979.
6. Kenneth wark, Cecil F.Warner, “Air Pollution its Origin and Control”, Harper and Row Publishers, New York, 1981.

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PET7J001/ PET7J002/ PET7J003/ PET7J004/ PET7J005/ PET7J006	Wireless Communication Systems/Satellite Communication Systems/Digital Image Processing/Adaptive Signal Processing/Advanced Control Systems/Embedded System Design	3-0-0	3	100	50
PET7J007/ PET7J008/ PET7J009/ PET7J010	Wireless Sensor Networks/Optical Communication Networking/System Design Using Integrated Circuits/CMOS based Design	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PET7N201	Seminar	0-0-1	2	-	100
PET7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PET7D001	Telecommunication Network and Optimization	4-0-0	4	100	50
Minors					
PET7G002	VLSI Design	4-0-0	4	100	50

PET7J001 WIRELESS COMMUNICATION SYSTEMS 3-0-0

MODULE-I

History of wireless communication: Concept of mobile and personal communication, wireless cellular platform, the design fundamentals of cellular networks, frequency reuse, spectrum capacity enhancement techniques, co-channel and adjacent channel interference, location management, handoff management; Concept of mobile IP for mobility management issues.

MODULE-II

Propagation Models for Wireless Networks: Two-ray ground reflection model, a micro-cell propagation model, a macro-cell propagation model, shadowing model, large scale path loss and shadowing, multi path effects in mobile communication, linear time variant channel model; Concept of coherent bandwidth, Coherent time, Doppler Shift - Effect of velocity of the mobile, models for multi path reception, mobile communication antennas.

MODULE-III

Multiple access techniques in wireless communications: frequency division multiple access technology (FDMA), time division multiple access (TDMA), space division multiple access (SDMA), code division multiple access (CDMA); spectral efficiency of different wireless access technologies, spectral efficiency in FDMA system, spectral efficiency in TDMA system, spectral efficiency for DS-CDMA system.

MODULE-IV

Second Generation Mobile Networks-GSM: Architecture and protocols, access technology, call set up procedure, 2.5 G networks; evolution to GPRS, concept of data communication on GPRS, session management and PDP Context, data transfer through GPRS network and routing.

ADDITIONAL MODULE (Terminal Examination-Internal)

Evolution of modern mobile wireless communication systems: Personal area networks (PAN), Public wide-area wireless networks, wireless Local Area Networks; Brief introduction to 3G – The universal mobile telecommunication system (UMTS) Basic idea of satellite mobile communication systems.

Text Books

1. Wireless Communications- Principles and Practice, T S Rappaport, Pearson Education India, Second Edition 2003
2. Wireless Communication and Networks, Upen Dalal, Oxford university Press, First Edition, 2015.
3. Wireless Communication and Networks 3G and Beyond, Iti Saha Misra, Tata McGraw Hill Education Pvt. Ltd, Second Edition, 2009.
4. Mobile Communication Engineering – Theory and Applications W C Y Lee, TMH Publication, Second Edition, 2008.

Reference Books

1. Fundamentals of Wireless communication , David Tse and Pramod Viswanath, Cambridge University Press, 2005
2. Wireless Communication, Andrea Goldsmith, Cambridge University Press, 2005

PET7J003 DIGITAL IMAGE PROCESSING 3-0-0

MODULE-I

Fundamentals – Steps in digital image processing, sampling and quantization, relationship between pixels, imaging geometry

Image Transforms – Fourier Transform, Discrete Fourier Transform, Fast Fourier Transform, Discrete Cosine Transform, Walsh Transform, Hadamard Transform, Hotelling Transform.

MODULE-II

Image Enhancement – Point processing, spatial filtering (smoothing and sharpening filters), enhancement in frequency domain.

Filtering in the Frequency Domain: preliminary concepts, 2D DFT and its properties, basic filtering in the frequency domain, image smoothing and sharpening.

MODULE-III

Image Restoration and Reconstruction: Image restoration/degradation model, noise models, restoration in the presence of noise only, estimating the degradation function.

Color Image Processing: Color models, Color transformation.

MODULE-IV

Wavelets and Multi-resolution Processing: multiresolution expansions, wavelet transforms in one and two dimension.

Image Compression: Fundamentals, Some basic compression methods (Chapt: 8 of Text book 1)

ADDITIONAL MODULE (Terminal Examination-Internal)

Morphological Image Processing: Erosion and Dilation, opening and closing.

Text books

1) Digital Image Processing, R.C. Gonzalez, R.E. Woods, Pearson Education , 3rd Edition, 2007
2) Digital Image Processing, S. Sridhar, Oxford University Press,2011
3) Digital Image Processing And Analysis, B. Chanda, Dutta D. Majumder ,PHI

Reference Books

1) Digital Image Processing using MATLAB, Rafael C. Gonzalez, Richard E. Woods Pearson Education, Inc., Seventh Edition, 2004.
2) Digital Image Processing, William K. Pratt, John Wiley, New York, 2002

PET7J002 SATELLITE COMMUNICATION SYSTEMS 3-0-0

MODULE-I (12 Hours)

Introduction to satellite communication: Orbital mechanics and parameters look angle determination, Launches and Lunch vehicle, Orbital effects in communication system performance. Attitude and orbit control system (AOCS), TT&C, Description of spacecraft System ; Transponders,

Satellite Link Design: Basics of transmission theory, system noise temperature and G/T ratio, Uplink and Downlink design, design of satellite links for specified (C/N) performance.

MODULE–II (10 Hours)

Analog telephone and television transmission: Energy dispersal, digital transmission

Multiple Accesses: Multiplexing techniques for satellite links, Comprehensive study on FDMA, TDMA and CDMA; Spread Spectrum Transmission and Reception; Estimating Channel requirements, SPADE, Random access

MODULE-III (12 Hours)

5. Propagation on satellite: Earth paths and influence on link design; Quantifying attenuation and depolarization, hydrometric & non hydrometric effects, ionosphere effects, rain and ice effects.

Satellite Antennas: Types of antenna and relationships; Basic Antennas Theory – linear, rectangular & circular aperture; Gain, pointing loss,

MODULE-IV

Earth station Technology: Earth station design; Design of large antennas – Cassegrain antennas, optimizing gain of large antenna, antenna temperature, feed system for large cassegrain antennas,

Design of small earth station antennas: Front fed paraboloid reflector antennas, offset fed antennas, beam steering, Global Beam Antenna, equipment for earth station.

ADDITIONAL MODULE (Terminal Examination-Internal)

Equipment reliability and space qualification.

Application of Satellite communication: Network distribution and direct broad casting TV, fundamentals of mobile communication satellite

Text Books

1) Satellite Communication, T. Pratt, C. Bostian, John Wiley Co, 2nd Edition.
2) Satellite Communication, Principles & Applications, R.N.Mutagi, Oxford University Press, 1st Edition, 2016

Reference Books

1) Digital Communication with Satellite and Fiber Optic Application, HarlodKolimbins, PHI
2) Satellite Communication, Robert M. Gagliardi, CBS Publishers
3) Satellitte Communication Systems, Richharia. BSP BOOKS PVT LTD.
4) Satellitte Communication Engg., MichealKolawole, BSP BOOKS PVT LTD

PET7J004 ADAPTIVE SIGNAL PROCESSING 3-0-0

MODULE–I (10 Hours)
Introduction: Adaptive Systems – Definition and characteristics, General properties, Open and Closed Loop Adaptations, Applications.

The Adaptive Linear Combiner: Performance function, Gradient and Mean Square Error, Examples.

MODULE – II (14 Hours)
Theory of Adaptation with Stationary Signals: Properties of the Quadratic Performance Surface, Significance of eigen values, eigen vectors, correlation matrix.

Searching the Performance Surface: A simple gradient search algorithm, Stability and Rate of convergence, the learning curve.

MODULE-III (16 Hours)
Gradient Estimation and its effects on Adoption: The performance penalty, Variance of the gradient estimate, Misadjustment.

Adaptive Algorithms and Structures: The LMS Algorithm, Convergence, learning Curve, Performance analysis, Filtered X LMS algorithm,

MODULE-IV
Applications: Adaptive Modelling and System Identification using adaptive filter, Inverse Adaptive Modelling, Deconvolution, and equalization using adaptive filter.

ADDITIONAL MODULE (Terminal Examination-Internal)
Adaptive Control Systems using Filtered X LMS Algorithm, Adaptive Noise Cancellation using Adaptive filter

Text Books

1. *Adaptive Signal Processing*, Bernard Widrow and Samuel D. Stearns, Pearson Education, 2nd impression, 2009.

Reference Books

2. *Adaptive Filter Theory*, Simon Haykin, Pearson Education, 4th Edn.

PET7J005 ADVANCED CONTROL SYSTEMS 3-0-0

MODULE-I (15 Hours)

Discrete - Time Control Systems:

Introduction: Discrete Time Control Systems and Continuous Time Control Systems, Sampling Process.

Digital Control Systems: Sample and Hold, Analog to digital conversion, Digital to analog conversion.

The Z-transform: Discrete-Time Signals, The Z-transform, Z-transform of Elementary functions, Important properties and Theorems of the Z-transform. The inverse Z-transform, Z Transform method for solving Difference Equations.

Z-Plane Analysis of Discrete Time Control Systems:

Impulse sampling & Data Hold, Reconstruction of Original signals from sampled signals: Sampling theorem, folding, aliasing.

Pulse Transfer function: Starred Laplace Transform of the signal involving Both ordinary and starred Laplace Transforms; General procedures for obtaining pulse Transfer functions, Pulse Transfer function of open loop and closed loop systems.

Mapping between the s-plane and the z-plane, Stability analysis of closed loop systems in the z-plane: Stability analysis by use of the Bilinear Transformation and Routh stability critgion, Jury stability Test.

MODULE-II (15 Hours)

State Variable Analysis & Design:

Introduction: Concepts of State, State Variables and State Model (of continuous time systems): State Model of Linear Systems, State Model for Single-Input-Single-Output Linear Systems, Linearization of the State Equation.

State Models for Linear Continuous – Time Systems: State-Space Representation Using Physical Variables, State – space Representation Using Phase Variables, Phase variable formulations for transfer function with poles and zeros, State – space Representation using Canonical Variables, Derivation of Transfer Function for State Model.

Diagonalization: Eigen values and Eigen vectors, Generalized Eigen vectors.

MODULE -III (12 Hours)

Solution of State Equations: Properties of the State Transition Matrix, Computation of State Transition Matrix, Computation by Techniques Based on the Cayley-Hamilton Theorem, Sylvester's Expansion theorem.

Concepts of Controllability and Observability: Controllability, Observability, Effect of Pole-zero Cancellation in Transfer Function.

Pole Placement by State Feedback, **Observer Systems**. **State Variables and Linear Discrete – Time Systems:** State Models from Linear Difference Equations/z-transfer Functions, Solution of State Equations (Discrete Case), An Efficient Method of Discretization and Solution, Linear Transformation of State Vector (Discrete-Time Case), Derivation of z-Transfer Function from Discrete-Time State Model.

MODULE-IV

Nonlinear Systems:

Introduction: Behaviour of Non linear Systems, Investigation of nonlinear systems.

Common Physical Non Linearities: Saturation, Friction, Backlash, Relay, Multivariable Nonlinearity.

The Phase Plane Method:

Basic Concepts, Singular Points: Nodal Point, Saddle Point, Focus Point, Centre or Vortex Point

Stability of Non Linear Systems: Limit Cycles,

Construction of Phase Trajectories: Construction by Analytical Method, Construction by Graphical Methods.

The Describing Function Method:

Basic Concepts: Derivation of Describing Functions: Dead-zone and Saturation, Relay with Dead-zone and Hysteresis, Backlash.

Stability Analysis by Describing Function Method: Relay with Dead Zone, Relay with Hysteresis, Stability Analysis by Gain-phase Plots.

ADDITIONAL MODULE (Terminal Examination-Internal)

Jump Resonance. Liapunov's Stability Analysis:

Introduction, Liapunov's Stability Criterion: Basic Stability Theorem, Liapunov Functions, Instability.

Direct Method of Liapunov& the Linear System: Methods of constructing Liapunov functions for Non linear Systems.

Text Books

1. Discrete-Time Control System, K.Ogata, PHI ,2nd Edition, 2009.
2. Control Systems Engineering, I.J. Nagrath and M.Gopal, New Age International (P) Ltd. Publishers, 5th Edition, 2007/ 2009.

Reference books

1) Design of Feedback Control Systems, Stefani, Oxford University Press, Fourth Edition,2009.
2) Modern Control Systems, K.Ogata, PHI, 5th Edition,2010.
3) Modern Control Systems Richard C. Dorf. And Robert, H.Bishop, Pearson Education Inc. Publication, 11th Edition,2008.
4) Control Systems (Principles & Design), M.Gopal, Tata Mc. Graw Hill Publishing Company Ltd, 3rd Edition,2008.

5) Control Systems Engineering, Norman S.Nise, Wiley India (P) Ltd, 4th Edition,2008.

PET7J006 EMBEDDED SYSTEM DESIGN 3-0-0

MODULE – I (8 Hours)

Embedded System: Understanding the Basic Concepts:
Introduction to Embedded System: Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems.
The Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System Components, PCB and Passive Components.
Characteristics and Quality Attributes of Embedded System.
Hardware Software Co-Design and Program Modelling: Fundamental Issues in Hardware Software Co-Design.

MODULE – II (8 Hours)

Design and Development of Embedded Product:
Embedded Hardware Design and Development: Analog Electronic Components, Digital Electronic Components, VLSI and Integrated Circuit Design, Electronic Design Automation (EDA) Tools.
Embedded Firmware Design and Development: Embedded firmware Design Approaches, Embedded firmware Development Languages.

MODULE – III (8 Hours)

Real Time Operating System (RTOS) based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling: Putting them altogether, Task Communication, Task Synchronisation, Device Drivers, How to choose an RTOS.

MODULE – IV (8 Hours)

Design and Development of Embedded Systems:
Integration and Testing of Embedded Hardware and Firmware: Integration of Hardware & Firmware, Board Power up.
The Embedded System Development Environment: Integrated Development Environment (IDE), Types of files generated on cross-compilation, Disassembler/Decompiler, Simulators, Emulators & Debugging, Target Hardware Debugging.
Embedded Product Development Life Cycle (EDLC): Definition and Objectives of EDLC, Different Phases of EDLC, EDLC Approaches (Modelling the EDLC).

ADDITIONAL MODULE (Terminal Examination-Internal) (8 Hours)

Major Application Areas of Embedded Systems.
Embedded Systems: Application and Domain Specific: Washing Machine: Application Specific Embedded System, Automotive: Domain Specific Example for Embedded System; Computational Models in Embedded Design, Introduction to Unified Modelling Language (UML), Hardware Software Trade-offs; Programming in Embedded 'C'.
An Introduction to Embedded System Design with VxWorks and MicroC/OS-II (μCOS-II) RTOS: VxWorks, MicroC/OS-II (μCOS-II); Boundary Scan;
Product Enclosure Design & Development: Product Enclosure Design Tools, Product Enclosure Development Techniques.

Trends in the Embedded Industry: Processor Trends in Embedded System, Embedded OS Trends, Development Language Trends, Open standards, Frameworks and Alliances, Bottlenecks.

Text Book:

1) Introduction to Embedded Systems, Shibu K.V., TMH Private Limited, New Delhi, 2009.

Reference Book:

2) An Embedded Software Primer, David E. Simon, Addison Wesley, 1999.

3) The Art of Designing Embedded Systems, Jack Ganssle, Newnes, 2000

4) Embedded Microprocessor System Design, K. Short, Prentice Hall, 1998.

5) Embedded System Applications, C. Baron, J. Geffroy and G. Motet, Kluwer, 1997.

6) Embedded Systems – Architecture, Programming and Design, Raj Kamal, Tata McGraw Hill Publishing Company Limited, New Delhi, 12th reprint 2007.

7) Embedded system design. Modeling synthesis and verification, Daniel Gajski. BSP BOOKS PVT LTD.

PET7J007 WIRELESS SENSOR NETWORK 3-0-0

MODULE-I **(8 Hours)**

Sensor Network Concept: Introduction, Networked wireless sensor devices, Advantages of Sensor networks, Applications, Key design challenges.

Network deployment: Structured versus randomized deployment, Network topology, Connectivity, Connectivity using power control, Coverage metrics, Mobile deployment.

MODULE-II **(6 Hours)**

Localization and Tracking: Issues and approaches, Problem formulations: Sensing model, collaborative localization. Coarse-grained and Fine-grained node localization. Tracking multiple objects.

MODULE-III **(8 Hours)**

Wireless Communications: Link quality, shadowing and fading effects
Medium-access and sleep scheduling: Traditional MAC protocols, Energy efficiency in MAC protocols, Asynchronous sleep techniques, Sleep-scheduled techniques, and Contention-free protocols.

MODULE-IV **(6 Hours)**

Routing: Metric-based approaches, Multi-path routing, Lifetime-maximizing energy-aware routing techniques, Geographic routing.
Sensor network Databases: Data-centric routing, Data-gathering with compression,

ADDITIONAL MODULE (Terminal Examination Internal) **(8 Hours)**

State space decomposition; Synchronization: Issues and Traditional approaches, Fine-grained clock synchronization, and Coarse-grained data synchronization; Querying; Data-centric storage and retrieval; the database perspective on sensor networks; Security: Privacy issues, Attacks and countermeasures.

Text Books

1) Wireless Sensor Networks: An Information Processing Approach- by Feng Zhao, Leonidas Guibas , Morgan Kaufmann Series in Networking 2004.

References Books

1) Networking Wireless Sensors: Bhaskar Krismachari, Cambridge University Press
2) Wireless Sensor Networks: Edited by C.S Raghavendra, Krishna M, Sivalingam, TaiebZnati, Springer.
3) Wireless Sensor Networks: Technology, Protocols, and Applications: Kazem Sohraby, Daniel Minoli, TaiebZnati, Wiley Inter Science.

PET7J008 OPTICAL COMMUNICATION AND NETWORKING 3-0-0

MODULE-I **(9 Hours)**

Introduction: Introduction, Ray theory transmission,Total internal reflection-Acceptance angle,Numerical aperture; Skew rays; Electromagnetic mode theory of optical propagation: EM waves, modes in Planar guide, phase and group velocity; cylindrical fibers , SM fibers.

MODULE-II **(9 Hours)**

Transmission characteristics of optical fibers: Attenuation – Material absorption losses in silica glass fibers, Linear and Non linear Scattering losses, Fiber Bend losses; Mid band and far band infrared transmission; Intra and inter Modal Dispersion – Over all Fiber Dispersion; Polarization: non linear Phenomena; Optical fiber connectors, Fiber alignment and Joint Losses; Fiber Splices, Fiber connectors, Expanded Beam Connectors : Fiber Couplers.

MODULE-III **(9 Hours)**

Sources and detectors: Optical sources: Light Emitting Diodes, LED structures, surface and edge emitters, mono and hetero structures: internal; quantum efficiency; injection laser diode structures; comparison of LED and ILD Optical Detectors: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties; Comparison of performance; Photo detector noise :Noise sources , Signal to Noise ratio , Detector response time.

MODULE-IV **(9 Hours)**

Fiber optic receiver and measurements: Fundamental receiver operation, Pre amplifiers, Error sources: Receiver Configuration Probability of Error Quantum limit; Fiber Attenuation measurements, Dispersion measurements, Fiber Refractive index profile measurements, Fiber cut- off Wave length Measurements, Fiber Numerical Aperture Measurements, Fiber diameter measurements.

ADDITIONAL MODULE (Terminal Examination-Internal) **(9 Hours)**

Optical networks: Basic Networks, SONET / SDH, Broadcast and select WDM Networks; Wavelength Routed Networks; Nonlinear effects on Network performance, Performance of WDM + EDFA system, Solutions; Optical CDMA; Ultra High Capacity Networks.

Text Books

1. Optical Fiber Communication, John M. Senior, Pearson Education, Second Edition, 2007.
2. Optical Fiber Communication, Gerd Keiser, McGraw Hill, Third Edition, 2000.
3. Optical Network, Rajib Ramaswamy & Kumar Sivarajan,M.K. Publication,2nd edition.

Reference Books

1. Optical Communication System, J. Gower, Prentice Hall of India, 2001.
2. Optical Networks, Rajiv Rama swami, Elsevier ,Second Edition, , 2004. 3. Fiber-optic communication systems, Govind P. Agrawal, John Wiley & sons, third edition, , 2004.
3. Fiber Optics and Optoelectronics, R.P. Khare, Oxford University Press, 2007.
4. Optical Communication Network, Viswanath Mukherjee, McGraw Hill Publication,2000.

PET7J009 SYSTEM DESIGN USING INTEGRATED CIRCUITS 3-0-0

MODULE- I **(8 Hours)**

Linear IC- Operational amplifier: Introduction to linear ICs, Operational amplifier IC741, Block diagram and characteristics, DC and AC performance; Open loop configurations, Feedback configurations, Inverting, non inverting and differential amplifier, Summer, Subtractor, Integrator, Differentiator, Zero crossing detector, Schmitt trigger, Window detector; Astable and monostable multivibrators; V-I and I-V converters; Filter and its types, Instrumentation amplifier, Precision rectifiers, Logarithmic and antilog amplifiers; multiplier; Op amp voltage regulator, IC linear voltage regulator (series 7800 and 7900 ICs).

MODULE- II **(8 Hours)**

Other LICs and Data Converters: 555 timer, Block diagram and features, Astable multivibrator, applications, Square wave oscillator, Ramp generator, Triangular waveform generator and Voltage to frequency converter; Monostable multivibrator, applications, Frequency divider, PWM and PPM generators. XR2240 Programmable
Timer/Counter,Block diagram and operation, applications,Free running oscillator and frequency synthesizer; PLL565, Principle, Building blocks, applications, Frequency multiplication, Frequency translation, AM and FM detection. Data converters, DAC characteristics, Binary weighted DAC, R-2R DAC, Monolithic DAC-08, ADC characteristics, Flash ADC, Successive approximation ADC, dual slope integrating type ADC, Monolithic ADC AD670,Variable Voltage Regulators(LM317).

MODULE- III **(8 Hours)**

Digital Integrated Circuits: Digital IC characteristics, Digital IC families,RTL and DTL, HTL, I2L, TTL, ECL, MOS and CMOS logic circuits, Comparison of digital IC families.

MODULE- IV **(8 Hours)**

Design of sequential machines: Analysis and design of synchronous sequential machines, Mealey and Moore machines, State table, State diagram, State reduction and assignments, Analysis and design of asynchronous sequential logic, Race conditions, Design problems from specifications, Hazards in combinational and sequential circuits.

ADDITIONAL MODULE (Terminal Examination-Internal) **(8 Hours)**

Processor and control unit design: Registers, Register transfer logic, inter register transfer, bus transfer and memory transfer, Arithmetic logic and shift micro operations, Macro operations; Processor logic design, Processor organization, Bus organization, Processor unit employing a scratch pad memory, Accumulator, Design of ALU, Design of status register, Design of processor unit with control variables, Design of accumulator , Control logic design, Single flip flop/state method, Sequence register and decoder method, PLA control, Micro program control.

Text Books

1) Operational Amplifiers and Linear Integrated Circuits, Robert. F. Coughlin and Frederick F. Driscoll, PHI Learning Pvt. Ltd, Sixth Edition, 2008.
2) Digital Logic and Computer design, M. Morris Mano, PHI Learning Pvt. Ltd, 2008

Reference Books

1) Opamp and Linear Integrated Circuits, Ramakant A. Gayakwad, PHI Learning Pvt. Ltd, Fourth Edition, 2008.

2) Digital Design, M. Morris Mano and Michael D. Ciletti, PHI Learning Pvt. Ltd, Fourth Edition,2008.

PET7J010 CMOS BASED DESIGN 3-0-0

MODULE-I **(8 Hours)**

Introduction to MOS Device-MOS Transistor, MOS models;MOS Transistor under static conditions; threshold voltage; Resistive operation, saturation region,;channel length modulation; body effect; DC transfer characteristics; Tristate inverters, velocity saturation; Hot carrier effect, drain current Vs voltage charts, sub threshold conduction; MOS structure capacitance; CMOS logic, fabrication and layout, stick diagrams.

MODULE-II **(8 Hours)**

CMOS Processing-CMOS technologies, wafer formation photolithography channel formation, isolation, gate oxide, gate source, drain formation, contacts and metallization; layout design rules, design rule checking.

MODULE-III **(8 Hours)**

Circuit Characterization & Performance Estimation-Delay estimation; transistor sizing; power dissipation; Sheet resistance, area capacitance, design margin, reliability; Scaling models, scaling factor for device parameters, Advantages and Limitations of scaling.

MODULE-IV **(6 Hours)**

Design of Combinational Logic-Static CMOS design, complementary CMOS, static properties, complementary CMOS design, Power consumption in CMOS logic gates, dynamic or glitching transitions, Design to reduce switching activity; Radioed logic, DC VSL, pass transistor logic.

ADDITIONAL MODULE (Terminal Examination-Internal) (6 Hours)

Differential pass transistor logic;sizing of level restorer, sizing in pass transistor; Dynamic CMOS design; Domino logic, optimization of Domino logic; NPCMOS; Designing logic for reduced supply voltages.

Reference Books

1. CMOS VLSI DESIGN-Nail H.E. Weste & David Harris, Ayan Banerjee,Pearson Education,4th edition,2011
2. CMOS Digital integrated circuits , Sung-Mo-Kanga and Yusuf Leblebici,TataMc Graw Hill New Delhi -2003.
3. Modern VLSI Design,Wayne Wolf, Prentice Hall -2nd Edition, 1998.
4. CMOS VLSI Design: A Circuits and Systems Perspective, Nail H.E. Weste & David Money Harris,- Addison Wesley, 3rd edition,2005.

PCP7H007 IOT 3-0-0

Course description and objectives:

Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:

· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I

Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.

Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II

M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III

Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV

IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:

1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:

1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

HONOURS SPECIALIZATION:

PET7D001 TELECOMMUNICATION NETWORKS AND OPTIMIZATIONS 4-0-0

MODULE-I
Network architectures – topology and hierarchy – evolution – layered architecture; Network Design Issues – application of graph theory – simplex algorithm and linear programming – binary and mixed integer linear programming;

MODULE-II
Core Networks – Routing principles – Shortest path algorithm – minimum spanning tree problem – flow control – max flow min cut theory – min cost network flow program – load balancing and optimization – congestion control .

MODULE-III
Advanced routing – Steiner trees and multicast – centralized routing (PCE), software defined network – distributed routing on ad-hoc networks, power aware MANET - reliability and route optimization.

MODULE-IV
Access Networks – Data link layer and media access control technologies – wireless and optical access – resource scheduling and optimization – Bipartite graph and stable matching algorithms – case studies (10);

ADDITIONAL MODULE (Terminal Examination-Internal)
Access core interface – case studies (5).

Text Books

1) Network Optimization by V. K. Balakrishnan
2) Linear Network Optimization: Algorithms and Codes by D. Bertsekas
3) Mathematical Aspects of Network Routing Optimization by C. A. S. Oliveira, P. M. Pardalos

Reference Books

1) Network Flows: Theory, Algorithm and Application by R. K. Ahuja, C. L. Magnanti, James B.
2) Optimization Algorithm for Networks and Graphs – vol. 1 by J. R. Evans, E. Mineka
3) Integer Programming and Network Models – H. A. Eiselt, C. L. Sandblom
4) Interconnections - R. Perlman 8. Computer Networks A. S. Tanenbaum
5) Ken Martin, *Digital Integrated Circuit Design*, Oxford University Press, 2000.

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PFT7J001/ PFT7J002	Smart Textiles & Functional Garments/Technical Textiles & Protective Clothing	3-0-0	3	100	50
PFT7J003/ PFT7J004	Brand Design & Management/Process Control in Apparel Manufacturing & Quality Control	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PFT7N201	Seminar	0-0-1	2	-	100
PFT7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PFT7D001	Fashion Marketing & Merchandising	4-0-0	4	100	50
Minors					
PFT7G002	Fashion Styling & Promotion	4-0-0	4	100	50

PFT7J001 Smart Textiles & Functional Garments 3-0-0

MODULE –I

Concept of Smart Textiles. Detailed study (objectives, properties, fibres used & end uses) of the Smart Garments likeChameleonic Garments, Garment made from Shape memory and Phase Change material, Self Cleaning Fabrics, Wearable Electronics (Garments with sensors andcomputing devices).

MODULE –II

Study (objectives, properties, fibres used & end uses) of functional fabrics like thermal.protective fabrics,water proof & water breathable fabrics, high tenacity fabrics etc.Flame retardant & Fire fighters clothing.

MODULE –III

High performance Sportswear. Radiation Protective clothing from uv, x-ray, alpha ray, beta ray, gamma ray. Bullet proof and ballistic protective clothing. Defence clothing,Space suit. Garment for medical & hospital use, Antimicrobial textile wear, Pathogen resistantsurgical gown**,**Clothing for protection against chemicals &nuclear

Reference Books:

1. Industrial Textile by SabitAdanur

PFT7J002 TECHNICAL TEXTILES & PROTECTIVE CLOTHING 3-0-0

Module-I (15 hours)

Introduction: Definition and scope for technical textiles, present status and future of technical textile. Brief idea about technical fibres - Carbon fibres-Aramid and related fibres, Glass threads, composite material.

Filtration textiles: Definition of filtration parameters, theory of dust collection and solid liquid separation, filtration requirements, concept of pore size and particle size, role of fiber, fabric construction and finishing treatments.

Geotextiles: Brief idea about geo-synthetics and their uses, essential properties of geotextiles, geotextile testing and evaluation, application examples of geotextiles.

Module-II (15 hours)

Medical textiles: Classification of medical textiles. Medical Textiles: Surgical Textiles and Sutures. Cardio Vascular Textiles (Knitted cardiac biological valves). Dialytic Textiles, Hollow fibres as dialysis membrane, Hospital Textiles- operating and post operating clothing, disposable drapes. Textiles for sanitary applications.

Protective Clothing: Brief idea about different type of protective clothing, functional requirement of textiles in defence including ballistic protection materials and parachute cloth, temperature and flame retardant clothing, chemical protective clothing, water proof breathable fabrics.

Module-III (15 hours)

Sports and recreation textiles: Functional requirement of different types of product and their construction.

Automotive textiles: Brief idea about the important properties and requirements in automotive textiles, textiles components in tyre, tyrestructure and design.

Other uses of technical textile: Textiles in agriculture, electronics, power transmission belting, hoses, canvas covers and tarpaulins.

References:

1. "*Handbook of Technical Textiles*", Ed. A R Horrocks and S C Anand, Woodhead Publication Ltd., Cambridge (2000).
2. "*Engineering with Geosynthetics*", Ed. G V Rao and G V S Raju, Tata McGraw Hill Publishing Co. Ltd., New Delhi (1990).
3. "*Industrial Textile*", Ed., J Svedova, Elsevier, New York (1990).
4. "*Modern Textile Characterization Methods*", Ed. M Raheel, Marcel Dekker, Inc. (1996).
5. Mukhopadhyay S K and Partridge J F, "*Automotive Textiles*", Vol. 29, No. ½, The Textile Institute (1999).
6. SabitAdanur, "Wellington Sears Handbook of Industrial Textiles", Technomic publishing company Inc., USA, 1995
7. Pushpa, B., and Sengupta, A.K., "Industrial Application of Textiles for Filteration and Coated fabrics", Textile Progress Vol.14, 1992

PFT7J004 Process Control in Apparel Manufacturing & Quality control 3-0-0

Module-I

Application of process control approach in apparel manufacturing through estimation of labour productivity, m/c productivity, quality and cost control Quality control parameters from raw fabric to finished garment for monitoring Process. Raw material stage, In process, pattern to finishing, Final:- Assessment of fit while final inspection to be tested against size chart for specific garments.

Module-II

Quality parameters to be checked for finished garment to eliminate rejection- garment checking in 3 zones on basis of specification sheet. Quality parameters in trims- buttons, linings, interlinings, zippers and others Inspection, defects analysis and estimation of value loss both for fabric and Finished garment, classification of on 4-point system, 6-point system, 10-point System, major and minor defects, garments rejection. AQL, AOQL estimation.

Module-III

Evaluation of sewing process to assist process control in apparel manufacturing Evaluation of sewability, Evaluation of thread tension, Evaluation of damage on thread, fabric needle for control of sewing speed, needle heating, thread tension. Modern Fabric evaluation technique to support product development : KES instrument, FAST instrument and other subjective and objective evaluation methods for assessing product performances. HVI instrument. Knowledge on standard norms for various process and quality parameters. Statistical Quality Control (SQC)- acceptance sampling. Introduction to TQM, ISO, six sigma.

REFERENCE BOOKS:

l. Basic process and clothing construction: SHERIEDOONGALI
2. Managing productivity in apparel industry: Rajesh Bheda
3. Apparel manufacturing hand book: Jacob Solinger
4. Journals on Apparel Industry/Manufacturing
5. Apparel production: sewn product analysis: Glock and Kunz- Prentice Hall
6. Managing quality in apparel industry- Mehta P V and Bhardwaj ,Blackwell/ Om book service
7. An introduction to quality control for apparel industry- P Mehta

PFT7J003 BRAND DESIGN AND MANAGEMENT 3-0-0

Module I

BasicsUnderstandingofBrands–Definitions-BrandingConcepts, Brand name and logos, Criteria for choosing brand elements, Significance of Brands, DifferentTypesof Brands–Cobranding–Storebrands.

Module II

Strategic BrandManagementprocess, Buildingastrong brand, Brand positioningEstablishingBrandvalues, Brandvision,BrandElement,BrandingforGlobalMarkets, Competing withforeignbrands, BrandLoyaltyprogrammes, BrandPromotionMethods. Roleof Brandambassadors,OnlineBrandPromotions.

Module III

BrandAdoptionPractices–Differenttypeofbrandextension–Factorsinfluencingdecisionfor extension–Re-brandingand re-launching. MeasuringBrandPerformance– BrandEquityManagement. Store brand strategy, benefits for the customers and retailers, Roleof BrandManagers, Brandingchallenges&opportunities.

REFERENCE BOOKS:

1. Mathew,BrandManagement–Text&cases,MacMillan,2008.
2. Building Brand Value: Five Steps of Building Powerful Brands, M.G.Parameswaran, 2006, New Delhi: Tata McGraw Hill.
3. Brand Management, H. V. Verma, 2004, New Delhi: Excel Books.
4. Tyboustand Kotter,KelloggonBranding,Wiley,2008.
5. Strategic Brand Management Kevin Lane Keller, M.G. Rameswaram and Isaac Jacob, Pearson Education, Third Edition.

PFT7D001 **Fashion Marketing and Merchandising(Hons)** **4-0-0**

Module-I

Organization of the Apparel Business: Introduction to apparel industry - organization of the apparel industry types of exporters Business concepts applied to the apparel industry - International trade.

Marketing: Functional organization of an apparel firm. Responsibilities of a marketing division – marketing objectives and Strategies - Marketing research - Types of markets: Retails and wholesale strategies for merchandise distribution- retailers - sourcing flows and practices. Marketing plan. Labeling and licensing.

Module-II

Merchandising: Definition of merchandising - functions of merchandising division - Role and Responsibilities of a merchandiser - different types of buyers -Communications with the buyers – awareness of current market trends – product development - line planning, line presentation.

Sourcing: Need for sourcing - sourcing materials - manufacturing resources planning - principles of MRP .Overseas sourcing - sourcing strategies. Supply chain and demand chain analysis - Materials management for quick response - JIT technology.

Module-III

Documentation: Order confirmation, various types of export documents, Pre-shipment Post -shipment documentation, Terms of sale, payment, shipment etc.

Export incentives: Duty drawback, DEPB, I / E license - exchange control regulation - foreign exchange regulation acts - export management risk - export finance. WTO / GATT / MFA - Functions and objectives, successes and failures.

Reference Books:

1. Retailing Management: Text & Cases. 4th Edition (Tata McGraw-Hill) by Swapna Pradhan,
2. Fashion Marketing by Mike Easey
3. Visual Merchandising (Create Space Independent Publishing Platform) by J K Akhil
4. International marketing management - B.L. Bhattachary

PFT7G002 Fashion Styling & Promotion (Minor) 4-0-0

Module I

Introduction to fashion styling, disciplines of styling – fashion image construction, garment and prop sourcing, re-modification, recycling and customization.Fashion stylist, Types of fashion stylists – editorial, catalogue, wardrobe, event/live performance, celebrity, commercial, runway, corporate, personal shopping, merchandise styling.Skills required for successful fashion styling, Fashion styling Vs Image consulting

Module II

Introduction to fashion promotion, objectives of promotion, traditional approach to promotion, promotion tools – consumer, trade and businessFashion advertising, PR, celebrity endorsement and sponsorship, personal selling, visual merchandising and marketing Concept of fashion forecasting, trend analysis

Module III

Importance of media, media planning, media types and techniques– social media, print media, television, radio, direct mail, outdoor, InternetCommunication design, effectiveness of marketing communications, copy writing, catalogue design, advertising campaigns, editorials, brand image design.

Reference books:

1.The littledictionary of fashion by Christian Dior

2.Advanced style: Older & Wiser by Ari Seth Cohen

Secrets of Stylists by Sasha CharninMorroison

3.What to Wear, Where: The How-to Handbook for any style situation by Hillary Kerr

4.Fashion Marketing by Mike Easey

5.Principles of Marketing by Phillip Kotler and Gary Armstrong

PFT7N202 Minor Project 0-0-6

Portfolio development with creative skills by following design process and techniques (trend analysis, forecasting, mood board/inspiration/theme board, colour board, idea generation and conceptualization, illustration, product development).

Portfolio should be developed on any of the following:

Fashion design (apparel or clothing),

Textile design,

Fashion accessories (jewellery / bags / footwear etc),

Fashion Styling,

Fashion Photography,

Fashion Content Writing .

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· *Able to understand the application areas of IOT*
· *Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks*
· *Able to understand building blocks of Internet of Things and characteristics.*

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc GrawHillPublishingCompany Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PIT7J001/ PIT7J002/ PIT7J003	Cryptography & NetworkSecurity/Robotics/ VLSI Design	3-0-0	3	100	50
PIT7J004/ PIT7J005/ PIT7J006/ PIT7J007/ PIT7J008	Mobile Computing/Software Project Management/Social Networks/Usability Engineering/Service Oriented Architecture	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PIT7N201	Seminar	0-0-1	2	-	100
PIT7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PIT7D001	Computational Numbers Theory	4-0-0	4	100	50
Minors					
PIT7G002	Advance Operating System	4-0-0	4	100	50

*Those who taken the subject IOT in 5th semester are not allowed to avail in 7th Semester

PIT7J001 Cryptography & Network Security 3-0-0

OBJECTIVES: The student should be made to:

- Understand OSI security architecture and classical encryption techniques.
- Acquire fundamental knowledge on the concepts of finite fields and number theory.
- Understand various block cipher and stream cipher models.
- Describe the principles of public key cryptosystems, hash functions and digital signature.

Module I : INTRODUCTION & NUMBER THEORY [10 hours]
Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid‟s algorithm-Finite fields- Polynomial Arithmetic – Prime numbers-Fermat‟s and Euler‟s theorem-Testing for primality -The Chinese remainder theorem- Discrete logarithms.

Module II : BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY [10 hours]
Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key cryptosystems-The RSA algorithm-Key management – Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.

Module III : HASH FUNCTIONS AND DIGITAL SIGNATURES [10 hours]
Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC –MD5 – SHA – HMAC – CMAC – Digital signature and authentication protocols – DSS – EI Gamal – Schnorr.
SECURITY PRACTICE & SYSTEM SECURITY [8 hours]
Authentication applications – Kerberos – X.509 Authentication services – Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls – Firewall designs – SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.

Module IV : E-MAIL, IP & WEB SECURITY [9 hours]
E-mail Security: Security Services for E-mail-attacks possible through E-mail – establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IPSecurity: Overview of IPSec – IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: SSL/TLS Basic Protocol-computing the keys- client authentication-PKI as deployed by SSLAttacks fixed in v3- Exportability-Encoding-Secure Electronic Transaction (SET).
TOTAL: 45 PERIODS

OUTCOMES: Upon Completion of the course, the students should be able to:

- Compare various Cryptographic Techniques
- Design Secure applications
- Inject secure coding in the developed applications

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security, 6th Edition, Pearson Education, March 2013. (UNIT I,II,III,IV).

2. Charlie Kaufman, Radia Perlman and Mike Speciner, "Network Security", Prentice Hall of India, 2002. (UNIT V).

REFERENCES:

1. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2007.
2. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms and Protocols", Wiley Publications, 2003.
3. Charles Pfleeger, "Security in Computing", 4th Edition, Prentice Hall of India, 2006.
4. Ulysess Black, "Internet Security Protocols", Pearson Education Asia, 2000.
5. Charlie Kaufman and Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication in Public World", PHI 2002.
6. Bruce Schneier and Neils Ferguson, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
7. Douglas R Simson "Cryptography – Theory and practice", First Edition, CRC Press, 1995.
8. http://nptel.ac.in/.

PIT7J002 Robotics 3-0-0

Module I
Robot Anatomy Arm Geometry-Direct & Inverse Kinematics Problem. Arm Dynamics, D Alembert Equations of Motion, Synthesis of elements with movalulity constraints, manipulations-trajectory planning, joint interpolated trajectories. [15L]

Module II
Control of Robot Manipulation-computed torque technique sequencing & adaptive control, resolved motion control Moluie Robots. [6L]

Module III
Robot sensing-Range & Proximity & Higher-Level vision, illumination techniques, Imaging Geometry, Segmentation Recognition & Interpretation. [8L]

Module IV
Robot Programming Language Characteristics of Robot Level & Task Level languages. Robot intelligence-State Space search, Robot learning, Robot Task Planning, Knowledge Engineering.
[10L]

References:

1. K.S Fu R.C . CSG Lee-Robotics Control, Sensing, Vision & Intelligence, McGraw-Hill.
2. M.P. Groover, M.Weins, R.N. Nagel, N.C. Odrey –Industrial Robotics, McGraw Hill
3. Andrew C. Straugard-Robotics & AI,PHI
4. S. Sitharama Iyengar, Alberto Elefes-Autonomous Mobile Robots Control, Planning & Achitecture, IEEE Computer Society Press

PIT7J003 VLSI DESIGN 3-0-0

Objective: To cater the needs of students who want a comprehensive study of the principle and techniques of modern VLSI design and systems.

Module 1(12 hrs)
Process steps in IC fabrication: Silicon wafer preparation-Diffusion of impurities-physical mechanism-ion implantation- Annealing process- Oxidation process-lithography-Chemical Vapour Deposition -epitaxial growth –reactors- metallization-patterning-wire bonding -packaging

Module 2 (12 hrs)
Monolithic components: Isolation of components-junction isolation and dielectric isolation. Monolithic diodes- schottky diodes and transistors-buried layer-FET structures- JFET-MOSFET-PMOS and NMOS. Control of threshold voltage- silicon gate technology- monolithic resistors-resistor design-monolithic capacitors- design of capacitors- IC crossovers and vias.

Module 3 (12 hrs)
CMOS technology: CMOS structure-latch up in CMOS, CMOS circuits- combinational logic circuit-invertor- NAND-NOR-complex logic circuits, full adder circuit. CMOS transmission gate(TG)T-realization of Boolean functions using TG. Complementary Pass Transistor Logic (CPL)-CPL circuits: NAND, NOR-4 bit shifter. Basic principle of stick diagrams.

Module 4 (12hrs)
CMOS sequential logic circuits: SR flip flop, JK flip flop, D latch circuits. BiCMOS technology-structure-BiCMOS circuits: inverter, NAND, NOR-CMOS logic systems-scaling of MOS structures-scaling factors-effects of miniaturization.
Gallium Arsenide Technology: Crystal structure-doping process-channeling effect-MESFET fabrication-Comparison between Silicon and GaAs technologies. Introduction to PLA and FPGA

References:

1. N Weste and Eshrangian, “Principles of CMOS VLSI Design: A system perspective”, Addison Wesley
2. S M SZE, “VLSI Technology”, Mc Graw Hill
3. Douglass Pucknell, “Basic VLSI design”, Prentice Hall of India.
4. K R Botkar,” Integrated circuits”, Khanna Publishers
5. Jan M Rabaey, Anantha Chandrakasan and Borivoje Nikolic, “Digital Integrated Circuits- a Design perspective”, Prentice Hall.
6. S M Kang & Y Leblebici, “CMOS digital integrated circuits”, Mc Graw Hill.

PIT7J004 MOBILE COMPUTING 3-0-0

Module - I (10 Hours)

Introduction to Personal Communications Services (PCS): PCS Architecture, mobility management, Networks signalling, Global System for Mobile Communication (GSM) System overview: GSM Architecture, Mobility management, Network signalling. General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes, Mobile Data Communication; WLANs (Wireless LANs) IEEE 802.II standard, Mobile IP.

Module - II (12 Hours)

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark-up Languages (WML), Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies. Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision, Wideband Code Division Multiple Access (W-CDMA), and CDMA 2000

Module - III (10 Hours)

Global Mobile Satellite Systems; case studies of the IRIDIUM, ICO and GLOBALSTAR systems. Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols. Server-side programming in Java, Pervasive web application architecture, Device independent example application.

Module - IV (08 Hours)

Mobile Device Operating System, Commercial mobile operating systems, Software development kit, iOS, Android, Windows phones, M-Commerce, Mobile transaction system, related security issues, 4G technology, fundamental concepts of mobile cloud computing and different application instances.

Text Books:

1. P.K. Patra, S.K. Dash: **Mobile Computing**, Scitech Publications.
2. Rajkamal: **Mobile Computing**, Oxford University Press.
3. J. Schiller: **Mobile Communication**, Pearson Education

Reference Books:

1. Burkhardt: **Pervasive Computing**, Pearson Education.
2. Hansmann, Merk: **Principles of Mobile Computing**, 2nd Edition, Springer.
3. P. Stavronlakis: **Third Generation Mobile Telecommunication Systems**, Springer.
4. Sandeep Singhal: **The Wireless Application Protocol**, Pearson Education.

PIT7J005 Software Project Management 3-0-0

PURPOSE: This course on Software Project Management highlights Software Project planning and management.

INSTRUCTIONAL OBJECTIVES:

1. Software Process and Metrics
2. Project Planning and Risk Management
3. Software Quality Assurance and Software Configuration Management

UNIT I - BASIC CONCEPTS (9 hours)

Product Process and project—Definition—Product life Cycle: Prototype Development Phase, Alpha Phase, Beta Phase, Production &Maintenance Phase—Project Life Cycle Models: Water fall Model, Prototype Model, RAD & Spiral Model—Process Models.

UNIT II-UMBRELLA ACTIVITIES (9 hours)

Metrics—Software Configuration Management: Process and activities, Configuration audit, Metrics in SCM, Tools & automation –Software Quality Assurance: Quality Control & Quality Assurance, Tools, Measures of SQA Success–Risk Management: Risk Management Cycle, Risk Identification, Quantification, Monitoring, Mitigation, Metrics in Risk Management.

UNIT III - PROJECT MANAGEMENT PROCESS AND ACTIVITIES (9 hours)

In-Stream activities - Project initiation: activities, Outputs, Quality Records, completion criteria –Project Planning and Tracking: Components, activities specific to Project tracking—Project Closure: Effective closure Process issues, Metrics for Project Closure.

UNIT IV–ENGINEERING ACTIVITIES IN PROJECT LIFE CYCLE (9 hours)

Software requirement Gathering: Inputs and start criteria, Dimensions, steps, Output & Quality records, Skill sets, Challenges, Metrics for Requirement Phase – Estimation : Phases of Estimation, Methodology, Models for size estimation, Challenges, Metrics for Estimation Process —Design and Development Phases-Project Management in Testing & Maintenance Phase.

EMERGING TRENDS IN PROJECT MANAGEMENT (9 hours)

Globalization Issues in Project management : Evolution, Challenges, Models – Impact of the internet on Project Management: Effect of internet on Project Management, managing project for internet, Project management activities – People Focused Process Models: People centric models, P-CMM, other people focussed Models.

TEXT BOOKS

1. Ramesh Gopalaswamy, "*Managing and global Software Projects"*, Tata McGraw Hill.Tenth Reprint 2011.**(Revised)**

REFERENCES

1. Roger S.Pressman, *"Software Engineering - A Practitioner's Approach"*, 7th Edition McGraw Hill, 2010.**(Revised).**
2. Humphery Watts, *"Managing the Software Process"*, Addision Wesley, 1989.**(Revised).**
2. Wheelwright and Clark: "*Revolutionizing product development"*, The Free Press, 1993

PIT7J006 Social Networks 3-0-0

Module I INTRODUCTION

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network analysis: Electronic discussion networks, Blogs and online communities - Web-based networks - Applications of Social Network Analysis.

Module II MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modelling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data - Advanced representations.

Module III EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - Multi-Relational characterization of dynamic social network communities.

Module IV PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES

Understanding and predicting human behaviour for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

Module V VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS

Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

TEXT BOOKS:

1. Peter Mika, "Social Networks and the Semantic Web", , First Edition, Springer 2007.
2. BorkoFurht, "Handbook of Social Network Technologies and Applications", 1st Edition, Springer, 2010.

REFERENCES:

1. GuandongXu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.
2. Dion Goh and Schubert Foo, "Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively", IGI Global Snippet, 2008.
3. Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, "Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling", IGI Global Snippet, 2009.
4. John G. Breslin, Alexandre Passant and Stefan Decker, "The Social Semantic Web", Springer, 2009.

PIT7J007 Usability Engineering 3-0-0

Course Objectives:

- To introduce the need for human-computer-interaction study or human-centred software design.
- To explain usability engineering lifecycle for designing a user-friendly software.
- To familiarize information, interaction and GUI design process for enhancing user-experience.
- To develop usability evaluation skills for software testing.
- To explain industry standards for designing and evaluating use-interfaces.
- To make aware of the current trends in usability engineering.

Module I: HCI AND USABILITY

What is HCI design? Disciplines contributing to HCI, Psychology of everyday things, Importance of human factors in design, Need Satisfaction curve of technology, Levels of human computer interaction

What is Usability? benefits and cost savings, usability slogans, attributes of system acceptability, definition of usability, usability trade-Offs , categories of users and individual user differences, generations of user interfaces, scenario-based usability engineering case study - A Virtual Science Fair.

Module II: THE USABILITY ENGINEERING LIFECYCLE

User research and requirements analysis know the user, user-profile questionnaire, field-study methods, contextual inquiry and analysis, hierarchical task analysis, ethnography, cultural probe, affinity diagramming, persona, scenarios of use, use cases.Iterative Design - setting usability criteria or goals, participatory design (getting users involved), guidelines and heuristic evaluation, prototyping and scenarios , examples of problem scenarios, iterative design, interface evaluation, meta methods.

Usability Heuristics - simple and natural dialogue, speak the users' language, minimize user memory load, consistency, feedback, clearly marked exits, shortcuts, good error messages, prevent errors, help and documentation, heuristic evaluation.

Module III: INFORMATION DESIGN AND INTERACTION DESIGN

Information design - Information architecture concepts, stages of action in human-computer interaction, perceiving information, interpreting information, making sense of information.

Interaction Design - selecting system goal, planning action sequence, executing action sequence, case study of information and interaction design

User Interface Design - Goals of UID, User Interface Models , conceptual model and mock-ups of GUI, choosing prototyping alternatives - paper prototyping, rapid prototyping, storyboarding, wireframes, Cost/benefit of good interface design , Case Study.

Module IV: USABILITY EVALUATION

Developing usability specifications for evaluation - case study, criteria for user feedback techniques, formative and summative techniques of evaluation

Usability Inspections (testing without users) - heuristic evaluation, user-interface guideline reviews, cognitive walkthrough, model-based analysis

Usability Testing (testing with users) - developing usability or test specifications with case study , test goals and test plans , getting test users, choosing experimenters, ethical aspects of tests with human subjects, test tasks, stages of a test, performance measurement, thinking-aloud testing, usability laboratories, remote evaluation,

Methods beyond testing - observation, user satisfaction questionnaire (rating scale), interviews, system usability scale (SUS), focus groups, logging actual use, user feedback, choosing a methods.

Module V: USER-INTERFACE AND USABILITY STANDARDS

User benefits, vendor benefits, dangers of standards, principles of good UI design, national-international standards, internationalization - international GUI, guidelines for internationalization , localization and multilocale interfaces, UI standards - control standards, window standards, dialog box standards, message box standards, device interaction standards, feedback standards, developing style guides and toolkits , user documentation- manuals, tutorials, information in the interface.

RECENT ADVANCES AND TRENDS

Theoretical solutions, technological solutions, CAUSE tools, emerging paradigms of user interaction- collaborative systems, ubiquitous computing , intelligent user-interfaces, simulation and virtual reality , case study , usability issues in organizations- case studies, organizational roles and structures , ethics of usability, web analytics.

Text Books

1. Nielsen, J. (1994), "Usability Engineering", Elsevier.
2. Rosson, M. B., & Carroll, J. M. (2001), " Usability Engineering: Scenario-Based development of human-computer interaction", Elsevier.
3. Mayhew, D. (1999), "The Usability Engineering Lifecycle: A Practitioner's Handbook for user interface design", Morgan Kaufmann

Reference Books

1. Cooper A. et. al. (2007), " The Essentials of Interaction Design", Wiley
2. Cooper, A. (1995)," The Essentials of User Interface Design", IDG Books, New Delhi
3. Schneiderman, B. (2005), " Designing the User Interface", Pearson Education, New Delhi
4. Dix A. et. al.(1993), " Human - Computer Interaction", Prentice Hall, USA
5. Mandel, T. , " Elements of User Interface Design", John Wiley & Sons
6. Rogers et. al (2011), " Interaction Design", John Wiley & Sons
7. Norman, D. (1988), "The Design of Everyday Things", Basic Books.
8. Donna Spencer<, "A Practical Guide to Information Architecture"
9. Galitz, W. (2002), "The Essential Guide To User Interface Design", Wiley.

Course Outcomes:

At the end of this course, student should be able to:

- Justify the need to study human-computer-interaction or human-factors while designing software.
- Discuss the process of designing user-friendly software based on usability engineering guidelines.
- Apply interaction design and UI design process in enhancing user-experience of an application.
- Conduct usability evaluation of user-interfaces or software applications.
- Discuss industry standards for designing and evaluating user-interfaces.
- Discuss current trends in usability engineering

PIT7J008 Service Oriented Architecture 3-0-0

Module I: Object-oriented analysis and design, Object-Oriented Modelling, Object-Oriented Design Principles, Software Design Patterns

Module II: Software Architecture: UML architecture diagrams, Architectural Styles, Distributed System, Middleware, Enterprise Application Integration

Module III: Web Technologies, History of web based systems, Web Technologies XML/HTML/JSON, HTTP, Javascript.

Module IV: Web Service, Service Description, Web Service Description Language (WSDL), Service Invocation, Simple Object Access Protocol (SOAP), Service Publication and Discovery, Universal Description, Discovery and Integration (UDDI), Sample Implementation of Web Service.

Module V: Service coordination Protocols, Service Composition, Web Services Business Process Execution Language (WS-BPEL), Sample Implementation of Web Service Composition.

REST Architecture for SOA, Sample Implementation of REST Service, Sample Implementation of REST Service Composition.

Text Book:

1. Alonso, G., Casati, F., Kuno, H., & Machiraju, V. (2004) *Web Services: Concepts, architectures and applications* (94-97). New York: Springer Berlin Heidelberg.
2. Gamma, E., Helm, R., Johnson, R., & Vlissides, J. (1994). *Design Patterns: Elements of Reusable Object-Oriented Software*. Upper Saddle River, NJ: Addison-Wesley Professional.
3. Fowler, M. (1999). *Refactoring: Improving the Design of Existing Code*. Reading, Massachusetts: Addison-Wesley.

Reference Book:

1. Z Van der Linden, F. J., Schmid, K., & Rommes, E. (2007). *Software product lines in action: The best industrial practice in product line engineering*. Berlin, DE: Springer.
2. Baier, C., & Katoen, J. P. (2007). *Principles of model checking*. Cambridge, MA; Massachusetts Institute of Technology.

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On-Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

PIT7D001 Computational Numbers Theory (HONOR SUBJECT) 4-0-0

Module I

Algorithms for integer arithmetic: Divisibility, gcd, modular arithmetic, modular exponentiation, Montgomery arithmetic, congruence, Chinese remainder theorem, Hensel lifting, orders and primitive roots, quadratic residues, integer and modular square roots, prime number theorem, continued fractions and rational approximations.

Module II

Representation of finite fields: Prime and extension fields, representation of extension fields, polynomial basis, primitive elements, normal basis, optimal normal basis, irreducible polynomials.

Algorithms for polynomials: Root-finding and factorization, Lenstra-Lenstra-Lovasz algorithm, polynomials over finite fields.

Module III

Elliptic curves: The elliptic curve group, elliptic curves over finite fields, Schoof's point counting algorithm.

Primality testing algorithms: Fermat test, Miller-Rabin test, Solovay-Strassen test, AKS test.

Integer factoring algorithms: Trial division, Pollard rho method, p-1 method, CFRAC method, quadratic sieve method, elliptic curve method.

Module V

Computing discrete logarithms over finite fields: Baby-step-giant-step method, Pollard rho method, Pohlig-Hellman method, index calculus methods, linear sieve method, Coppersmith's algorithm.

Applications: Algebraic coding theory, cryptography.

References

1. V. Shoup, A computational introduction to number theory and algebra, Cambridge University Press.
2. M. Mignotte, Mathematics for computer algebra, Springer-Verlag.
3. I. Niven, H. S. Zuckerman and H. L. Montgomery, An introduction to the theory of numbers, John Wiley.
4. J. von zur Gathen and J. Gerhard, Modern computer algebra, Cambridge University Press.
5. R. Lidl and H. Niederreiter, Introduction to finite fields and their applications, Cambridge University Press.
6. A. J. Menezes, editor, Applications of finite fields, Kluwer Academic Publishers.
7. J. H. Silverman and J. Tate, Rational points on elliptic curves, Springer International Edition.
8. D. R. Hankerson, A. J. Menezes and S. A. Vanstone, Guide to elliptic curve cryptography, Springer-Verlag.
9. A. Das and C. E. Veni Madhavan, Public-key cryptography: Theory and practice, Pearson Education Asia.
10. H. Cohen, A course in computational algebraic number theory, Springer-Verlag.

PIT7G002 Advanced Operating System (MINOR SUBJECT) 4-0-0

Module I

Process Synchronization

Concepts of processes, Concurrent processes, Threads, Overview of different classical synchronization problems, Monitors, Communicating Sequential processes(CSP)

Process deadlocks

Introduction, causes of deadlocks, Deadlock handling strategies, Models of deadlock

Module II

Distributed operating system

Architectures, Issues in Distributed operating systems, Limitations of Distributed Systems, Lamport's logical clock, Global states, Chandy-Lampert's global state recording algorithm, Basic concepts of Distributed Mutual Exclusion, Lamport's Algorithm, Ricart - Agrawala Algorithm; Basic concepts of Distributed deadlock detection, Distributed File system, Architecture, Design issues, SUN Network File system Basic concepts of Distributed shared memory, Basic concepts of Distributed Scheduling, Load balancing, Load sharing

Module III

Distributed OS Implementation

Models, Naming, Process migration, Remote Procedure Calls.

Multiprocessor System

Motivation, Classification, Multiprocessor Interconnections, Types, Multiprocessor OS functions & requirements; Design & Implementation Issue; Introduction to parallel programming; Multiprocessor Synchronization.

Module IV

Performance, Coprocessors, RISC & data flow

Introduction, Necessity, Measures, Techniques, Bottlenecks & Saturation, Feedback loops, Coprocessors, RISC.

Analytic Modeling

Introductions, Queing Theory, Markov Process

Security & Protection

Security-threats & goals, Penetration attempts, Security Policies & mechanisms, Authentication, Protections & access control Formal models of protection, Cryptography, worms & viruses.

Books:

1) Operating Systems Concepts & design - Milan Milenkovic, TMH
2) Operating System - H.M. Deitel, Pearsons **.**
3) Advanced Concepts in operating Systems - Mukesh Singhal and Niranjan G. Shivaratri, TMH

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PME7J001/ PME7J002	Mechanical Vibration/ Tribology	3-0-0	3	100	50
PME7J003/ PME7J004	Robotics/Simulation, Modeling & Control	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PME7N201	Seminar	0-0-1	2	-	100
PME7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PME7D011/ PME7D012/ PME7D013	Computational Fluid Dynamics/ Finite Element Method / Automatic Control System	4-0-0	4	100	50
Minors					
PME7G001	Machine Dynamics and Design	4-0-0	4	100	50

*Those who taken the subject Marketing Management in 5th semester are not allowed to avail in 7th Semester

PME7J001 MECHANICAL VIBRATION 3-0-0

MODULE – I [12]

1. INTRODUCTION & IMPORTANCE OF MECHANICAL VIBRATION:
Brief history of Mechanical Vibration, Types of Vibration, Simple Harmonic Motion (S.H.M.), Principle of superposition applied to S.H.M., Beats, Fourier Analysis, Concept of degree of freedom for different vibrating systems.
2. UNDAMPED FREE VIBRATION OF SINGLE DEGREE FREEDOM SYSTEMS: Modeling of Vibrating Systems, Evaluation of natural frequency – differential equation, Energy & Rayleigh's methods, Equivalent systems.
3. DAMPED FREE VIBRATION OF SINGLE DEGREE FREEDOM SYSTEMS: Different types of damping, Equivalent viscous damping, structural damping, Evaluation of damping using free and forced Vibration technique, Concept of critical damping and its importance, study of vibration response of viscous damped systems for cases of under damping, critical damping and over damping, Logarithmic decrement.

MODULE – II [15]

4. FORCED VIBRATION OF SINGLE DEGREE FREEDOM SYSTEMS: Steady state solution with viscous damping due to harmonic force, reciprocating and rotating unbalance mass, vibration isolation and transmissibility due to harmonic force excitation and support motion. Vibration measuring instruments – vibrometer and accelerometer. Whirling of shaft with single disc and withour damping, Concept of critical speed and its effect on the rotating shaft.
5. UNDAMPED VIBRATION OF TWO DEGREE FREEDOM SYSTEMS: Free vibration of spring coupled and mass coupled systems, Longitudial, Torsional and transverse vibration of two degree freedom systems, influence coefficient technique, Un-damped vibration Absorber.

MODULE – III [13]

6. INTRODUCTION TO MULTI-DEGREE FREEDOM SYSTEMS: Normal mode vibration, Co-ordinate coupling-close coupled and far coupled systems, Orthogonality of mode shapes, Methods of matrix iteration, Holzer's method and Stodola method. Torsinal vibration of two, three and multi-rotor systems. Dunkerley's lower bound approximate method.
7. CONTINOUS SYSTEMS: Vibration of strings, longitudinal vibration of rods, torsional vibration of rods, transverse vibration of Euler-beams.

TEXT BOOKS:

1. Theory of vibration with Applications: W.T. Thomson and Marie Dillon Dahleh, Pearson Education 5th ed. 2007.

2. Introductory Course on theory and Practice of Mechanical Vibrations. J.S. Rao & K. Gupta, New Age International Publication, New Delhi, 2007.

REFERENCE BOOKS:

1. Mechanical Vibrations: S.S. Rao, Prarson Education Inc, 4th ed. 2003
2. Mechanical Vibrations: S. Graham Kelly, Schaum's outline series, Tata McGraw Hill, Special Indian ed., 2007
3. Mechanical Vibrations: V.P. Singh, Dhanpat Rai & company Pvt. Ltd. 3rd ed., 2006
4. Elements of vibration Analysis: Leonard Meirovitch, Tata McGraw Hill, Special Indian ed., 2007

PME7J002 TRIBOLOGY 3-0-0

(PROFESSIONAL ELECTIVE)

MODULE - I (12 HOURS)

Introduction : Lubricant and lubrication, Types of bearings, properties and testing of lubricants,
Basic equations: Generalized Reynolds equation, Flow and Shear Stress, Energy equation, Equation of state
Hydro dynamic lubrication :
Mechanism of pressure development and load carrying capacity, Plane-slider bearing, Idealized slider bearing with a pivoted shoe, Step bearing, Idealized journal bearing. – infinitely long journal bearing, Petroffs equation for a lightly loaded bearing, narrow bearing,

MODULE - II (11 HOURS)

Oil flow and thermal equilibrium - Heat balance of lubricants
Hydrostatic Bearing **:**
Principles, Component of hydrostatic lubrication , Hydrostatic circular thrust bearing , calculation of pressure, load carrying capacity, flow rate , power loss in bearing due to friction.

MODULE - III (12 HOURS)

Concept of gas lubricated bearing
Concept of Elastohydrodynamic lubrication, Design and selection of antifiction bearing
Friction and wear of metals :
Theories of friction, surface contaminants, Effect of sliding speed on friction, classification and mechanism of wear, Wear resistant materials.

TEXT BOOKS

1. Introduction to Tribology of Bearing , B.C .Majumdar , S. Chand & Co

REFERENCE BOOKS

1. Fundamentals of Tribiology , Basu S K., Sengupta A N., Ahuja B. B., , PHI 2006
2. Basic Lubrication theory, A. Cameron, John Wiley & sons
3. Lubrication Fundamentals, D.M.Pirro and A.A.Wessol, CRC Press
4. Theory and Practice of Lubrication for Engineers**,** Fuller, D., New York company 1998
5. Principles and Applications of Tribiology**,** Moore, Pergamaon press 1998
6. Tribiology in Industries**,** Srivastava S., S Chand and Company limited, Delhi 2002
7. Lubrication of bearings – Theoretical Principles and Design**,** Redzimovskay E I., Oxford press company 2000

PME7J003 ROBOTICS 3-0-0

MODULE – I

1. Fundamentals of Robotics: Evolution of robots and robotics, Definition of industrial robot, Laws of Robotics, Classification, Robot Anatomy, Work volume and work envelope, Human arm characteristics, Design and control issues, Manipulation and control, Resolution; accuracy and repeatability, Robot configuration, Economic and social issues, Present and future application.
2. Mathematical modeling of a robot: Mapping between frames, Description of objects in space, Transformation of vectors.

Direct Kinematic model: Mechanical Structure and notations, Description of links and joints, Kinematic modeling of the manipulator, Denavit-Hartenberg Notation, Kinematic relationship between adjacent links, Manipulator Transformation matrix.

MODULE – II

3. Inverse Kinematics: Manipulator workspace, Solvable of inverse kinematic model, Manipulator Jacobian, Jacobian inverse, Jacobian singularity, Static analysis.
4. Dynamic modeling: Lagrangian mechanics, 2D- Dynamic model, Lagrange-Euler formulation, Newton-Euler formulation.
5. Robot Sensors: Internal and external sensors, force sensors, Thermocouples, Performance characteristic of a robot.

MODULE – III

6. Robot Actuators: Hydraulic and pneumatic actuators, Electrical actuators, Brushless permanent magnet DC motor, Servomotor, Stepper motor, Micro actuator, Micro gripper, Micro motor, Drive selection.
7. Trajectory Planning: Definition and planning tasks, Joint space planning, Cartesian space planning.
8. Applications of Robotics: Capabilities of robots, Material handling, Machine loading and unloading, Robot assembly, Inspection, Welding, Obstacle avoidance.

TEXT BOOKS:

1. Robotics and Control**,** R.K. Mittal and I.J. Nagrath, Tata McGraw Hill
2. Introduction to Robotics: Mechanics and control, John J Craig, PHI
3. Robotics Technology and Flexible Automation, S.R.Deb and S. Deb, TMH

REFERENCE BOOKS:

1. Introduction to Robotics, S. K. Saha, Tata McGraw Hill
2. Robotics: Control, Sensing, Vision and Intelligence, K.S.Fu, R.C.Gonzalez and C.S.G.Lee, McGraw Hill
3. Robotics, Appuu Kuttan K.K., I.K. international
4. Robot Dynamics and Control, M.W.Spong and M. Vidyasagar , Wiley India.
5. Industrial Robotics Technology, programming and application, M.P.Groover, TMH.
6. Introduction to Robotics: Analysis, Systems, Applications, S.B.Niku, PHI
7. Robotics: Fundamental Concepts and Analysis, A. Ghosal, Oxford University Press
8. Fundamentals of Robotics: Analysis and Control, R. J. Schilling, PHI
9. Robotic Engineering: An Integrated Approach, R.D. KLAFTER, T. A. Chmielewski, and M. Negin, PHI
10. Robot Technology: Fundamentals: J. G. Keramas, Cengage Learning

PME7J004 SIMULATION, MODELING AND CONTROL 3-0-0

MODULE I 14 HOURS

Basic simulation modeling, Discrete event simulation, Simulation of queuing and Monte Carlo simulations.
inventory systems, Continuous, Discrete-continuous and Mon
Statistical models in simulation, Discrete and continuous distributions, Poisson process, Empirical distribution, Generation of pseudo random numbers, Analysis of simulation data, Parameter estimation, Goodness-of-fit tests, Multivariable time
series models.

MODULE II 12 HOURS

Overview of feedback control systems, Dynamics of mechanical systems, Differential equations and state variable form, Models of electromechanical, Heat-and fluid flow models, Linearization and scaling, Models from experimental data, Dynamic response using pole-zero locations, Time domain specifications, Classical 3-term controllers and its digital implementation, Stability analysis by Routh Criterion.

MODULES III 10 HOURS

Simulation of manufacturing and material handling systems, Goals and performance measures, Modeling downtime and failures, Trace driven models, Case studies.

TEXT BOOKS :

1. Discrete-Event system simulation by Jerry Banks, J.S. Carson, B.L. Nelson and D.M. Nicol (Pearson Publications).
2. Feedback control of dynamic systems by G.F. Franklin, J.D. Powell, A-Naeini, Pearson Publications.
3. Simulation modeling and analysis by A.M. Law, W.D. Kelton, Tata McGrawHill Publications.

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

HONOR SUBJECT

PME7D011 COMPUTATIONAL FLUID DYNAMICS 4-0-0

MODULE-I (10 HRS.)

1. Basics of Computational Fluid Dynamics (CFD)- Introduction to One dimensional computation: Finite difference methods (FDM)-Finite element method(FEM)-Finite volume method(FVM). Solution of Discretised Equations:
2. The tri-diagonal matrix algorithm (Thomas Algorithm for one dimensional case) The Finite Volume Method for Diffusion Problems-Introduction -Finite volume method for one-dimensional steady state diffusion -Worked examples: one-dimensional steady state diffusion

MODULE-II (12 HRS.)

1. The Finite Volume Method for Convection-Diffusion Problems – Introduction - Steady one-dimensional convection and diffusion –
2. The central differencing scheme - Assessment of the central differencing scheme for convection-diffusion problems - The upwind differencing scheme - Assessment of the upwind differencing scheme - The hybrid differencing scheme - Assessment of the hybrid differencing scheme - The power-law scheme - Higher order differencing schemes for convection-diffusion problems - Quadratic upwind differencing scheme: the QUICK scheme .

MODULE-III (08 HRS.)

1. The Finite Volume Method for Unsteady Flows - Introduction - One-dimensional unsteady heat conduction - Explicit scheme - Crank-Nicolson scheme - The fully implicit scheme - Illustrative examples

MODULE-IV (08 HRS)

1. Implicit method for two- and three-dimensional problems - Discretisation of transient convection-diffusion equation - Worked example of transient convection-diffusion using QUICK differencing.

TEXT BOOK

1. Versteeg, H. K. , Malalasekera W , An Introduction to Computational Fluid Dynamics-The Finite Volume Method, Longman Scientific & Technical.
2. Patenkar V. Subas, Numerical Heat Transfer & Fluid Flow, Taylor & Francis
3. Muralidhar, K. and Sundararajan, T., Computational Fluid Flow and Heat Transfer, Norosa Publishing House, N. Delhi.

REFERENCE BOOKS

1. Ozisik, M. N. , Finite Difference Method, CRC Press.
2. Anderson, D. A. Jr, Computational Fluid Mechanics and Heat Transfer, McGraw-Hill

HONOR SUBJECT

PME7D012 FINITE ELEMENT METHOD 4-0-0

MODULE – I (12 HOURS)

Review of 2-D and 3-D stress analyses, vibration, fluid flow and heat conduction problems. FEM fundamental concepts, Variational principles, Rayleigh Ritz and Galerkin Methods.
Finite Element Modeling of one dimensional problems.
Finite Element Analysis of 2-D and 3-D framed structures.

MODULE – II (12 HOURS)

FEM formulation of 2-D and 3-D stress analysis problems.
Axisymmetric solids subjected to axisymmetric loadings.
Two-dimensional isoparametric elements and numerical integration.

MODULE – III (12 HOURS)

FE modeling of basic vibration problems
Finite element modeling of fluid flow and heat conduction problems
Computer programs: preprocessing and post processing.
Exposure to commercial FE codes such as ANSYS, NASTRAN and IDEAS etc.

TEXT BOOKS

1. Finite Elements in Engineering, T.R.Chandraputla and A.D.Belegundu, PHI
2. The Finite Element Method – Its Basis & Fundamentals, Zienkiewicz, Taylor and Zhu, Elsevier, 6th Edn

REFERENCE

1. Introduction to Finite Element Method, C.Desai and J.F.Abel, CBS publishers
2. Introduction to Finite Element Method, J.N.Reddy, Tata McGraw Hill
3. Numerical Methods in Finite Element Analysis, K.J.Bathe and E.L.Wilson, PHI
4. Concepts & Applications of Finite Element Analysis,Cook, D.S.Malkus & M.E.Plesha, Wiley
5. The Finite Element Method in Engineering, S.S.Rao, Elsevier
6. A First Course in the Finite Element Method, D.L.Logan, Cengage Learning
7. Fundamentals of Finite Element Analysis, David V. Hutton, Tata McGraw Hill

HONOR SUBJECT

PME7D013 AUTOMATIC CONTROL SYSTEM 4-0-0

MODULE I (10 HOURS)

Introduction: Basic concept of control system, Open loop and Close loop control systems. Control System and components.

Laplace Transform: Laplace transformation, Laplace transforms theorems, inverse Laplace transform.Mathematical model of physical systems: modeling of fluid systems and thermal systems Liquid level systems, pneumatic systems, hydraulic systems, thermal systems. Feedback Characteristics of control systems, Types of feedback, effects of different feedbacks on control systems.

MODULE II (16 HOURS)

Time response analysis:

Standard input signals, Step, ramp, parabolic and impulse inputs. Time response of fist and second order systems to input signals. Time response specifications, Steady state error and error constants of different types of control systems.

Concept of stability , Necessary condition for stability, Routh's stability criterion, application of Routh's criterion for linear feed back system, relative stability.

Root-locus analysis : Root locus concepts, rules for construction of root loci, root contours, systems with transportation lead and lag.

MODULE III (16 HOURS)

Frequency response analysis : Bode diagrams, polar plots, Nyquist stability criterion, Stability analysis, relative stability in frequency domain.

Controllers: Proportional, derivative and integral control actions, PD, PI and PID controllers and their applications to feed back control systems.

Mathematical modeling of Dynamic systems in state space, state-space representation of mechanical and electrical systems. State equation and transfer functions, Characterisic equation , Eigenvalue and eigenvector of state matrix. Design of control systems in state space.

BOOKS

1. Modern Control Engineering, K, Ogata
2. Automatic Control system, B. C. Kuo
3. Control Systems Engineering, L. J. Nagrath, M. Gopal

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PMT7J001/ PMT7J002	Materials for Advanced Applications/Engineering Polymers	3-0-0	3	100	50
PMT7J003/ PMT7J004	Alternative Routes of Iron Making/Ferroalloys Technology	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PMT7N201	Seminar	0-0-1	2	-	100
PMT7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PMT7D011/ PMT7D012	Tribology of Materials / Computer Application in Metallurgical Engineering	4-0-0	4	100	50
Minors					
PMT7G001	Alternative Routes of Iron Making	4-0-0	4	100	50

PMT7J001 MATERIALS FOR ADVANCED APPLICATIONS 3-0-0

Module – I (14 hours)

Introduction: The urge for advancement in materials development and processing, Special and high temperature alloys: Ti alloys: physical and mechanical properties, thermo-mechanical treatment of Ti-alloys, Ti shape memory alloys, Fe based super alloys, Ni based alloys, Co based alloys, engineering applications at elevated temperatures, High Entropy Alloys.

Metallic Foams: Material Definition and Processing, Characterization of cellular metals, Material properties and applications.

Module – II (12 hours)

Carbon and alloy steels: high strength low alloy structural steels, medium-high carbon ferrite-pearlite steels, common alloy steels, Tool steels: classification, composition, structure, properties, heat treatment and uses of different types of tool steels, Special steels: heat resisting steels, Hadfield manganese steels, TRIP steels, maraging steels, dual phase steels.

Module –III (12 hours)

Composite Materials: Material definition and classifications, Advanced polymer composite, Ceramic composite, Metal matrix composite, Nanocomposite, Applications. Coatings and thin films: Definition, Classification of applications, Bio-Materials: Various types of biomaterials, Biopolymer, Bioceramics, Nanostructured bio-materials, Classes of materials used in medicine, Application of materials in medicine and dentistry, Various materials and coatings for implants.

Books for reference:

1. *Engineering Materials – properties and selection by K.G. Budinski and M.K. Budinski, PHI.*
2. *Intermetallic Compounds, Volume 1- 4, by J. H. Westbrook (Editor), R. L. Fleischer (Editor), Wiley.*
3. *Structure-Property Relations in Nonferrous Metals by Alan Russell, Kok Loong Lee, Wiley.*
4. *Physical Metallurgy Principles by R. E. Reed-Hill*
5. *Structure and Properties of Alloys by R. M. Brick, R. B. Gordon and A. Phillips*
6. *Introduction to Materials Science and Engineering by J. F. Shackelford.*
7. *Physical Metallurgy of Steels by W.C.Leslie, McGraw-Hill.*
8. *Introduction to Physical Metallurgy by S.H.Avener, McGraw-Hill.*
9. *Introduction to Material Science and Engineering by Callister, Wiley,Edited by B.D. Ratner, A.S. Hoffman, F.J. Sckoen, and J.E.L Emons, Biomaterials Science,*
10. *An Introduction to Materials in Medicine, Academic Press, Second edition, 2004.*

7th Semester

PMT7J002 ENGINEERING POLYMERS 3-0-0

Module I (14 hours)

Characteristics of Polymers Introduction to polymers structures and polymer technical merits; structures; Physical behaviour: Crystallization, Melting, Glass Transition Phenomena and mixing behavior; Factors affecting Melting and Glass Transition Temperatures. Mechanical Behaviour: Stress–Strain Behaviour, Macroscopic Deformation, Viscoelastic Deformation – viscoelasticity; Viscoelastic Relaxation Modulus; Viscoelastic Creep, Fracture of Polymers, Impact Strength, Fatigue, Tear Strength and Hardness. Mechanisms of Deformation And Strengthening Of Polymers : Deformation of Semicrystalline Polymers- Mechanism of Elastic Deformation, Mechanism of Plastic Deformation. Factors That Influence the Mechanical Properties of Semicrystalline Polymers- Molecular Weight, Degree of Crystallinity, Predeformation by Drawing, Heat Treating. Deformation of Elastomers, Vulcanization; Chemical behaviour.

Module II (14 hours)

Polymers in advanced engineering Polymer Matrix Composites (PMCs); Types, Manufacturing, Processing methods, Interfaces, Properties, Applications, Toughening Mechanisms, Matrix – Reinforcement Interface, Wettability, Interactions at Interface, Interfacial Bonding Types, Interfacial Strength Tests, The role of the interface. Conductive Polymers, Liquid crystal polymers, Industrial Polymer adhesive, Polymer in biomedical applications, Ultrahigh Molecular Weight Polymers, high performance polymers.

Module III (10 hours)

Synthesis and Processing of Polymers Polymerization: Addition polymerization, Condensation Polymerization Polymer Additives: Fillers, Plasticizers, Stabilizers, Colorants, Flame Retardants,

Forming Techniques for Plastics: Moulding – Compression and Transfer Moulding; Injection Moulding, Reaction and Reinforced Reaction Injection Moulding, Thermoforming, Extrusion, Blow Moulding, Casting. Fabrication of Elastomers. Fabrication of Fibers and Films: Spinning, Calendaring.

Books for reference:

1. *Introduction to Polymers by Young and Lovell, Nelson Thomes.*
2. *Materials Science and Engineering - An Introduction by William D. Callister, Jr., John Wiley & Sons.*
3. *Plastics: Materials and Processing by Brent A Strong, Prentice Hall Inc., USA. 1997.*
4. *An Introduction to Polymer Chemistry by Raymond Seymour, McGraw-Hill Book Co., New York, USA,1971.*
5. *Handbook of Plastics, Elastomers and Composites by Charles A Harper, McGraw-Hill Publishing Co., USA, 1997.*
6. *Principles of Polymer Engineering by McCrum N.G., Buckley C P. and Bucknall C.B., Oxford University Press, UK, 1992.*

7th Semester

PMT7J003 ALTERNATIVE ROUTES OF IRON MAKING 3-0-0

Module I (12 Hours)
Characteristics of raw materials and their preparation. Thermodynamics and Kinetics aspects.
Direct Reduction Processes:

Reduction of Iron bearing materials in shaft furnace, rotary kiln, retort and fluidized bed with special reference to reductant, energy consumption and operational problems.

Module II (14 Hours)
Commercially available processes: like SL/RN, ACCAR, Krup-CODIR, Kinglon Meter, MIDREX, HyL, Purofer, Iron Carbide, etc.
Uses of DRI in steel making, iron making and foundries; effect on DRI on EAF performance and product characteristics.

Module III (12 Hours)
Smelting Reduction Processes:
COREX, ROMELT, Fluidized bed reactors, Hismelt etc. Present status of alternative methods of iron making in India.

Books for reference:

1. *Alternative Routes to Iron Making by A.Sarangi and B.Sarangi, PHI-2016*
2. *Beyond the Blast Furnace by Amit Chatterjee.*
3. *Direct Reduction of Iron, Editiors: Jerome Feinman & Donald R.Mac Rae, Allied Publishers Ltd.*

PMT7J004 FERROALLOYS TECHNOLOGY 3-0-0

Module I (14 Hours)

Survey of Ferro-alloy industries in India and their future prospects. Physico-chemical principles of ferro-alloy making, principles of carbothermic and metallothermic reduction.

Ferro-alloy furnaces: Submerged arc furnaces, selection for transformer capacity, secondary voltage and current, furnace dimensions, size and spacing of electrodes, mechanical equipments, charging devices and dust collection system.

Electrodes used in ferro-alloy furnaces: graphitised and self baking electrodes, properties and uses.

Module II (12 Hours)

Production of ferro-manganese, ferrochrome, ferrosilicon and silico-calcium by carbothermy, production of FeCr, FeTi, FeB, FeNb, FeMo, and FeV by metallothermy. Recovery of vanadium from ores and production of FeV.

Module III (10 Hours)

Charge calculation in production of ferro-alloys. Use of plasma arc for production of ferro-alloys. Use of ferro-alloys in Iron and Steel industries (deoxidation and alloy making).

Books for reference:

1. *Production of Ferro-Alloys by Riss and Khodorovasky.*
2. *Production of Ferro-Alloys by V.P. Elyutin.*
3. *Electro-metallurgy of Steel and Ferro-Alloys, Vol. 2, by F.P.Edneral.*
4. *Ferro-Alloy Industries in India, Symposium NML, Jamshedpur, 1962.*
5. *Proc. Symp. of All India Seminar on Recent Trends in Ferro-Alloys Technology,*

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I:Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

PMT7D011 TRIBOLOGY OF ENGINEERING MATERIALS 4-0-0

(HONOURS)

Module I (12 Hours)

Background and importance of Tribology; A system approach to Tribology; Characterization of tribosurfaces; mechanics of solid contacts; Hertzian and non-hertzian contact. Contact pressure and deformation in non-
conformal contacts, friction in contacting rough surfaces, sliding and rolling friction, various laws and theory of friction and frictional heat generation; role of contact temperature.

Module II (12 Hours)

Different modes of wear; Wear and wear types; Mechanisms of wear - Adhesive, brasive, corrosive, erosion, fatigue, fretting, etc., Wear of metals and non-metals. Wear models - asperity contact, constant and variable wear rate, geometrical influence in wear models, wear damage. Wear in various mechanical components, wear controlling techniques. Tribological testing techniques and analysis of the worn surfaces.

Module III (12 Hours)

Different wear resistant materials; recent research results illustrating the performance of surface coatings, bulk materials and composite materials in tribological contacts. Lubrication; Importance and properties of lubricants.

Books for reference:

1. *K.C. Ludema, Friction, Wear, Lubrication - A Text book in Tribology, CRC press.*
2. *Jamal Takadoum, Materials and Surface Engineering in Tribology.*
3. *Hutchins, Tribology.*
4. *Bharat Bhusan, Principle and Application of Tribology.*
5. *Bharat Bhusan, Introduction to Tribology.*

PMT7D012 COMPUTER APPLICATION IN METALLURGICAL ENGINEERING (HONOURS) 4-0-0

Transport phenomena based modeling: Model formulation based on heat, mass and momentum transfer, governing equations and boundary conditions. Numerical solution of differential equations, process related numerical problems

Stress analysis. Mesoscopic Modeling: CA based modeling, Monte Carlo simulation, application to metallurgical processes. Classical molecular dynamics modeling and its application in materials. Optimization and control. Elements of modern Artificial Intelligence(AI) related techniques.
Introduction to genetic algorithm and Artificial Neural Nets.

Text Books:

1. *S. Yip (Ed.): Handbook of Materials Modeling, Spinger, 2005*
2. *Santosh K. Gupta: Numerical Methods for Engineers, New Age International (P) Limited, New Delhi, 1998.*

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PMI7J001/ PMI7J002	Clean Coal Technology/ Fuel Refractors & furnaces	3-0-0	3	100	50
PMI7J003	Process Control & Instrumentation	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PMI7N201	Seminar	0-0-1	2	-	100
PMI7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PMI7D001	Mining Methods and Unit Operation	4-0-0	4	100	50
Minors					
		4-0-0	4	100	50

PMI7J001 CLEAN COAL TECHNOLOGY (3-0-0)

Module-I **(12 hours)**

Introduction to clean coal technology: Modern precombustion coal cleaning methods including biological and chemical cleaning methods.

Module-II **(10 hours)**

Clean coal combustion technology: AFBC, Circulating Fluidized Bed Combustion, Slagging combustion. Pressurized Fluidized Bed Combustion. SOx and NOx control strategies during combustion.

Module-III **(10 hours)**

Post Combustion Technology for control of SOx, NOx and Particulate Matter Coal gasification combined cycle method. SPM and its control methods and equipment
UCG, CBM, CWM/COM

Module-IV **(08 hours)**

Integrated coal gasification combined cycle and coal combustion combine cycle methods.

REFERENCES:

1. Clean Coal Technologies for Power Generation by P. Jayarana Reddy, Taylor & Francis
2. Clean Coal (Renewable Energy Research, Development and Policies) by Klaes G. Douwe), Nova Science Publishers Inc

PMI7J002 FUEL, REFRACTORIES & FURNACES(3-0-0)

Module-I **(10 hours)**

Definition of Fuel; Types of Fuel; Conventional and Non-conventional Fuel; Types of Energy Resources; Potential of Energy Resources and their exploitation

Module-II **(08 hours)**

Types of solid fuels. Origin and formation of coal. Classification of Coal.

Module-III **(08 hours)**

Types of furnaces and classification, Industrial application of furnaces, design and construction aspects of furnaces. Chimney design, process efficiency.

Module-IV **(14 hours)**

Refractories : refractory material and characterization, types of Refractories and their application in boilers and furnace construction. Properties and testing methods of Refractories. Manufacture of fire basic bricks, acidic and neutral Refractories, refractory mortars, cements and monoliths, special refractory and ceramics. Role of refectories in energy conservation in furnaces.

TEXT BOOK:

1. Elements of Fuels, Furnaces and Refractories by O.P. Gupta, Khanna Publ., 1997

2. Fuels and refractories by Book by J. D. Gilchrist

PMI7J003 PROCESS CONTROL & INSTRUMENTATION (3-0-0)

MODULE-I (10 hours)

Introduction: Need for process control; justification in terms of overall technical and economic benefits. Fundamental Aspects: Recognition of dynamic nature of control operation; identification of controllable and non-controllable operating variables; need for obtaining quantitative relationships for describing the effect of controllable operating variables on process performance; defining control objectives; identification of process and plant constraints

MODULE-II (10 hours)

Basic Data Required for Control System Design: Ways of obtaining data for control system design; Nature and frequency of process disturbances; investigating basic properties of process response (impulse and step response).

MODULE-III (10 hours)

Types of Control Actions: Feed Forward and feedback control; construction of a feedback controller; proportional action, integral action and derivative action; tuning of feedback controllers; multiple input control; ratio control and cascade control. Control of Individual Unit Operations: Crushing, grinding and flotation circuits; control of thickener and other allied operations.

MODULE-IV (10 hours)

Instrumentation for measurement: On-line particle size distribution, Metallurgical gradeanalysis and coal analysis ; pulp density, pulp level, froth level, slurry flow rate, ball millload and other required measurements. Some Published Case Studies: Some examples taken from published papers on actual implementation of control systems in an operating plant and the control strategies used

REFERENCES:

1. Advanced Control and Supervision of Mineral Processing Plants, Edited by Daniel Sbárbaro and René del Villar, Springer
2. George Stephanopoulos: Chemical Process Control: An Introduction to Theory and Practice, PHI Learning

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:

1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:

1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I: Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making
Module – III:Organizing and Staffing
Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

Honours

PMI7D001 (Mining Methods and Unit Operation) (4-0-0)

MODULE-I **(10 hours)**

Surface Mining**:** Deposits amenable to surface mining; Box Cut: Objectives, types parameter and methods, Production benches- objectives, formation and bench parameters, Unit operations and associated equipments, Classification of surface mining systems.

MODULE-II **(10 hours)**

Underground Coal Mining**:** Deposits amenable to underground coal mining classification of underground coal mining methods, Board and Pillar methods – general description and applications and merits and demerits, selection of panel size, operation involved and associated equipment.

MODULE-III **(10 hours)**

Longwall methods-type and their general description, applicability, merits and demerits, selection of face length and panel length, operations involved and associated equipments, Methods for mining steeply inclined seams and thick seams, hydraulic mining.

MODULE-IV **(10 hours)**

Underground metal mining**:** Deposits amenable to underground metal mining, shape size & position of drifts and cross cuts, Raises and Winzes, classification of underground metal mining methods, Stoping methods – general description, applicability, operations involved and associated equipments for room and pillar mining, stope and piellar mining, shrinkage, stoping, sub-level stoping, cut and fill stoping, VCR methods, Sub-level caving and caving.

REFERENCES:

a) Elements of mining technology by D. J. Deshmukh

b) Coal Mining Practice by Statham

c) Principles and Practices of Modern Coal Mining by R. D. Singh

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PMN7J001/ PMN7J002	Mine Environmental Engineering and Rescue/Advanced Mine Ventilation and Environmental Engineering	3-0-0	3	100	50
PMN7J003/ PMN7J004	Mineral Economics/ Advanced Coal Mining	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PMN7N201	Seminar	0-0-1	2	-	100
PMN7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PMN7D011/ PMN7D012/ PMN7D013	Mine System Engineering/Advanced Underground Coal Mining//Mine Management	4-0-0	4	100	50
Minors					
		4-0-0	4	100	50

PMN7J001 Mine Environmental Engineering and Rescue 3-0-0

Module - I:

Mine gases: properties, physiological effects, occurrence, detection, and monitoring, Sampling and analysis of mine atmosphere

Module - II:

Spontaneous Heating: Causes, incubation period, detection, remedialmeasures. Mine Fires - Classification, causes, preventive measures, dealing with mine fires – direct and indirectmethods, reopening of scaled off areas.; Explosion: Fire-damp Explosion - Limits of inflammability of methane, causesof ignition, nature of fire damp explosion, propagation and prevention. Coal-dust Explosion - Index of inflammability,factors affecting explosibility of coal dust, causes and safeguards. Propagation of coal dust explosions, Investigation after an explosion

Module - III:

Rescue and recovery: Types of rescue equipment and their use, features of rescue stations and rescue rooms,first aid appliances, training of personnel, and organization of rescue and recovery workduring mine fires, explosion, inundation

Module - IV:

Mine Illumination: Its effects on safety, efficiency and health, Flame and electric safety lamps, theiruses and lamp-room – lay out and organization, standards of illumination in mines, lighting from the mains,photometric illumination survey, Miners' diseases

PMN7J002

Advanced Mine Ventilation and Environmental Engineering 3-0-0

Module - I:
Computation of thermodynamic properties of mine air; Basics of modes of heat transfer in mine roadways; Evaporation and consequent changes in mine air properties; Thermal properties of rocks; Fourier and Biot numbers; Calculation of heat flow and temperature rise in mine airways; Sources of heat and moisture transfer in Bord and Pillar/Longwall and other workings

Module - II:
Hardy Cross method of iterative analysis; Thermodynamic analysis of mine airflow in ventilation network without and with change in moisture content; Change in Darcy-Weisbach equation and square law due to variation of air density; Pseudo-pressure equation; Leakage and recirculation; Application of thermodynamic network analysis for complete mine ventilation circuit; Application of software for solving real life ventilation problems in coal and metal mines

Module - III:
Spontaneous Heating: Causes, incubation period, detection, remedialmeasures. Mine Fires - Classification, causes, preventive measures, dealing with mine fires – direct and indirectmethods, reopening of scaled off areas.; Explosion: Fire-damp Explosion - Limits of inflammability of methane, causesof ignition, nature of fire damp explosion, propagation and prevention. Coal-dust Explosion - Index of inflammability,factors affecting explosibility of coal dust, causes and safeguards. Propagation of coal dust explosions, Investigationafter an explosion

Module - IV:
Mine Illumination: Its effects on safety, efficiency and health, Flame and electric safety lamps, theiruses and lamp-room – lay out and organization, standards of illumination in mines, lighting from the mains,photometric illumination survey, Miners' diseases

PMN7J003 Mineral Economics 3-0-0

Module-I:
Overview of the mineral industry in India: characteristics and special problems related to mining, Domain of Mineral Economics, Mine productivity concepts, principles and calculations, Mine Organization. Special considerations for strategic minerals, Indian National Mineral policy

Module-II:
Concept of resource and reserve, Ore reserves: classification and estimation. Difference of tenor, grade and specifications of ore, Mineral sampling techniques and ore grade control. Sample salting and error in sampling, Concepts of strategic mineral

Module-III:
Mine Valuation - Different methods, Depreciation, Amortization and Redemption of capital, life and present value of a mine. Financial Management - Methods of framing and financing industrial enterprises, Memorandum and articles of association, shares, debentures, dividends and interest. Break even chart and inventory control

Module-IV:
Investment Decisions - discounted cash flow methods, non-discounted cash flow methods, advantages and disadvantages of them, Internal rate of return, Net PresentValue. Book Keeping, Preparation of Balance sheet, Profit and Loss Account

PMN7J004 Advanced Coal Mining 3-0-0

Module-I:
Extraction of thick seams: Problems and issues, recent experimental trials Chirimiri caving Method, Blasting GalleryMethod, Integral Caving method, Sublevel caving method

Module-II:
Hydraulic Mining, Shield Mining; Extraction underneathsurface features: Non-Effective width (NEW), Back filling methods, Wide stall mining.; Extraction of multiple seams:Problems and issues, recent experimental trials, Parting failures and control, design of workings

Module-III:
Extraction of lockedup pillars: Status of Bord and pillar mining in India, techniques of extraction and future requirements

Module-IV:
Support systems:Strata behavior at greater depths, problems of strata control in high horizontal stress fields, design of support system

PMN7D012 Advanced Underground Coal Mining 4-0-0

(HONOR SUBJECT)

Module - I:
Mining of thick seams: Concept of a thick seam; Problems of mining thick seams; Past experience of working thick seams by Bord & Pillar method in multi-sections; Longwall based multi-slice methods:-Inclined slicing, horizontal slicing and cross-slicing in ascending and descending sequence; Under winning methods:-sub-level caving, integral caving, blasting gallery method, descending shield method

Module - II:
Hydraulic Mining of Coal:Conditions suitable for hydraulic Mining of Coal, Hydraulic Mining Operation, Hydraulic breaking of coal, hydraulic transport and hydro hoisting; Layout of workings for hydraulic mining of moderately thick seams

Module - III:
Mining of thin seams: Problems in Mining thin seams; Equipment and methods for thin seam extraction.Highwall Mining: Introduction, Applicability and Method

Module - IV:
Underground Coal Gasification: Conditions suitable for Underground Coal Gasification; Basic principle and technology of underground coal gasification, Advantage and disadvantage of UCG: Scope of application of UCG in Indian conditions

PMN7D013 Mine Management 4-0-0 (HONOR SUBJECT)

Module - I:
Evolution of Management Theory - Principle of Scientific management, Elements of management functions, Planning, Organizing and Control, Levels of Management. Structure and design of organization for mining enterprises

Module - II:
Personnel Management - Selection, training and development of human resources, Job evaluation, job analysis, incentive and theories of motivation, Productivity, its concept and measurement, Leadership and Communication

Module - III:
Production Management - Determination of norms and standards of operations by work study, work measurements, production planning, Scheduling and control, Queuing theory, short and long term planning, Quality control, introduction to MIS, Material Management

Module - IV:
Industrial Psychology - Its relation with other branches of knowledge, studies ofphysical factors and their effect on man, Industrial relations, Human relations, trade unionmovements in India. Industrial Act and Laws - Industrial Dispute Act, Industrial Trade Union Act,Analysis of industrial disputes, Prevention and settlement of industrial disputes, Payment ofwages act, Workmen's compensation act, Contract labour laws

PMN7D011 Mine System Engineering 4-0-0 (HONOR SUBJECT)

Module - I:
Introduction to Systems Engineering:Concept of system, components and system environment; classification of systems; systems analysis; creative aspects of planning and design; factors influencing creativity; techniques for generating alternative ideas/solutions

Module - II:
Mathematical Programming Methods:Linear programming-definition/elements, assumptions and limitations of LPP; graphical solution; geometry and algebra of simplex method; interpretation of simplex table; application of linear programming for solution of mining problems related to production, blending, scheduling

Module - III:
Transportation and Assignment Problems:Mathematical modelling and solution algorithm; application to mining problems. Project Management with PERT & CPM: Network Models Assumptions of PERT and CPM; art of drawing network; redundancy and identification of redundant jobs; algorithm for calculation of critical path and identification of critical jobs; criticality index; statistics related to PERT; probability of completing a project by a due date; lowest cost schedule; case examples application to mining problems

Module - IV:
Decision Analysis:Decision problems; model formulation; decision analysis based on expected monetary value and utility value. Optimisation techniques and queueing theory. Simulation:Introduction and concept; scope and limitation; system type versus simulation technique; generating input data; Monte-Carlo simulation; deterministic and stochastic simulation of various systems in mines

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I: Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing
Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PPE7J001	Polymer Composite Technology	3-0-0	3	100	50
PPE7J002	Polymer Rheology	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PPE7N201	Seminar	0-0-1	2	-	100
PPE7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PPE7D003	Latex And Foam Technology	4-0-0	4	100	50
Minors					
PPE7G004	Statistical Quality Control Techniques	4-0-0	4	100	50

PPE7J001 POLYMER COMPOSITE TECHNOLOGY 3-0-0

Module -I

Introduction of composite material- comparison between composites and other materials-advantages and disadvantages. Principles of composite reinforcement- Effect of fibrous reinforcement on composite strength-Types of reinforcements- natural fibre, glass, carbon/graphite, aramid fibres, high strength and high modulus fibers.

Module -II

Thermosetting and thermoplastic materials for the composites and their selection for particular application-

Processing and production techniques-Hand-lay-up, Spray-up, Bag moldings, Filament winding and Pultrusion.

Module -III

Prepreg- manufacture and characterization. Sheet moulding and dough moulding compounds and their processing, Preform and resin transfer moldings. Hybrid and sand witch type composites.

Reference Books

1. *Astrom; B.T, Manufacture of Polymer Composites, Chapman and Hall, London (1997)*
2. *Bunsell; A. R. and J. Renard, Fundamentals of Fibre Reinforced Composite*
3. *Materials, Institute of Physics Publishing Ltd., Bristol (2005).*
4. *Hollaway; Leonard (Ed.), Handbook of Polymer Composites for Engineers, Woodhead Publishing Ltd., Cambridge (1994), Reprint (2007).*
5. *Miller; Edward, Introduction to Plastics and Composites, Marcel Dekker, Inc., New York (1996)*

PPE7J002 POLYMER RHEOLOGY 3-0-0

Module I

Viscoelastic behavior of Polymer solution and melts stress-strain curves for Polymers, creep of Polymeric material, elastic deformation, irrecoverable follow deformation.
Rubber like deformation, Time-temp superposition (WLF Equation) Models of viscollastity such as Maxwell and kelvin model. Types of viscosity, stress relaxation.

Module II

Introduction and Basic concept of Rheology, classification of fluids, Newtonian and non

Newtonian fluids, shear stress, shear strain and shear rate, shear modulus, bulk modulus, Zero shear viscosity,

Methods to determine shear viscosity by capillary viscometer, cone and plate viscometer, Cup and bob viscometer, Measurement of normal stresses. Theories of viscocities of dilute (De-bye Bueche theory) and conc. Solutions (Grasselley's entanglement theory)

Module III

Rheology of dilute and concentrated suspensions, effect of Rheology during Injection moulding and extrusion and blow moulding of polymers. Rheometers- Bubble inflation rheometers, compressional rheometer, stress relaxation instruments. Torque rheometer, rotational & sliding surface rheomete

Text Book:

1. *Ferry JD Viscoelastic Properties of Polymers, 3rd ed, John Wiley & Sons, New York(1980).*
2. *Han CD. Rheology in Polymer Processing, Academic Press, New York (1976)*
3. *Chang Dae Han, Rheology and Processing of Polymeric Materials Volume I &II, Oxford University Press, New York (2007)*
4. *Yamakawa H. Modern Theory of Polymer Solutions, Harper Row, New York (1971)*

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On-Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, ―Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, ―Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, ―Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

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1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I: Introduction
Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Rolesof a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing
Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling:
Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH

2. Principles and Practices of Management – Kaul, Vikas

3. Management, Robbins, Coulter &Vohra, Pearson.

4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

Honours

PPE7D003 LATEX AND FOAM TECHNOLOGY 4-0-0

Unit –I

Introduction to NR & Synthetic Lattices - Molecular and physical structure; vulcanized latex, Artificial dispersion, SBR, Nitrile, Neoprene, Thiokol, High styrene resin, PVAc, PVC, Acrylic, Carboxylated SBR & vinyl pyridine latex.

Unit – II

Compounding of Latex - Methods of manufacture and machineries, stabilization of dispersion. Micro and nano fillers, vulcanizing ingredients, Dispersing agents Stabilizing agents. Compounding for Neoprene latex.

Unit – III

Testing on Latex - Mechanical stability, pH, particle size of dispersion and size distribution, chemical stability, state of cure, DRC, TSC.

Foam technology - Urethane foam, Cold foam, integral skin foam, Semi rigid foam, Rigid PU foam etc. Foam testing, concepts of micro-cellular structure, closed and open cell structures. Industrial uses of latex and foam technologies.

Unit-IV

Manufacture of Latex Based Products - Latex thread, Dipped goods, casting spraying, spreading, adhesives, rubberized coir, rubberized hair, Micro-porous Ebonite, Can sealing, Latex cements, Latex foam, Latex laminated paper & boards, Latex coated fabrics & cords, , Neoprene latex coated paper, latex mixed with cement, Emulsion paints, Electro deposition of latex.

Reference Books:

1. *Latex Foam Rubber, E.W. Madge, , MacLaren and Sons Ltd., London, 1962.*
2. *Polymeric Foams and Foam Technology, 2nd Ed., Daniel Klempner and Vahid Sendijarevic (eds.), Hanser Gardner, 2004.*
3. *Basic Elastomer Technology, Edited by K.C. Baranwal and H.L. Stephens, Rubber Division, Published by American Chemical Society.*

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PPD7J001/ PPD7J002/ PPD7J003	Product Design & Development/ Industrial Hydraulics/ Surface Engineering	3-0-0	3	100	50
PPD7J004/ PPD7J005	Design of Experiment/ Design for Manufacturing &Assembly	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PPD7N201	Seminar	0-0-1	2	-	100
PPD7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PPD7D001/ PPD7D002	ADVANCED CAD/ Automation in Manufacturing	4-0-0	4	100	50
Minors					
PPD7G001	Non Traditional Machining and Forming	4-0-0	4	100	50

PPD7J001 PRODUCT DESIGN AND DEVELOPMENT 3-0-0

Module I (10 hours)

Introduction: Design theory, design materials, human factors in design, man-machine system, applied ergonomics, characteristics of successful product development, challenges to product development.

Development process and product planning: Generic development process, Concept development, product development process flows, product planning process, identify customer needs.

Module II (10 hours)

Product specifications and concept generation: Product specification, steps to establish the target specifications, Concept generation, five step concept generation method, concept selection, concept screening, concept testing, product architecture

Product design methods: Creative and rational, clarifying objectives - the objective tree method, establishing functions- the function analysis method, setting requirements – the performance specification method, determining characteristics – the QFD method, generating alternatives – morphological chart method, evaluating alternatives – the weighted objective method, improving details – the value engineering method and design strategies.

Module III (10 hours)

Design for manufacture: Estimating manufacturing cost, reducing component, assembly and support costs, design for assembly, design for disassembly, design for environment, design for graphics and packaging, effective prototyping – principle and planning

Module IV (10 hours)

Industrial design: Its need, impact and quality, industrial design process and its management, legal issues in product design, design resources, economics and management of product development.
Prototyping: Basics and principles of prototyping, prototyping technologies, planning for prototypes

Text Books:

1. K.T. Ulrich and S.D. Eppinger, “Product design and development”, Tata McGraw Hill

2. Chitale & Gupta, “Product Development”, Tata McGraw Hill

3. Monks, J. G., “Operations Management”, McGraw Hill, 1997.

4. George Dietor, A material and Processing approach, McGraw Hill

PPD7J002 INDUSTRIAL HYDRAULICS 3-0-0

Module-I (10 hours)

Introduction - Pascal's law - Advantages and Disadvantages of hydraulic systems - Requirements of hydraulic oil - Maintenance of hydraulic oils: Heat exchanges, Filters and Strainers etc. - Reservoir design criteria - Principle hydraulic jack - Pipes, Packing and Seals.

Module-II (10 hours)

Various types of pumps and motors like Gear type, Piston type ,(radial &axial),Vane type (intra vane etc.) - Selection criteria for a specific application like Injection molding machines, Extrusion, Blow molding etc. - Working principles and Performance.

Module-III (10 hours)

Types - Classification - Details of pressure control - Flow control; Methods of flow control, Meter in, Meter out, Bleed off, Flow control valves like pressure compensated and non pressure compensated in detail with applications. Directional control valves; One way (check valves) of various types inline, right angle, restriction, pilot operated etc., two way valves rotary type, spool type, operating controls, spool central conditions, deceleration valves. Pressure controls - relief valves of types simple and compound, venting and relief valves, unloading valves, sequence valves and its applications, counter balance valve, brake valve, pressure reducing valves like direct acting and pilot operated etc. Principles of operation - Application in molding machines

Module-IV (10 hours)

Types like weight loaded, spring loaded, gas charge with and without separator, piston type - with advantages and limitations and applications - intensifiers - its purpose, type like single acting and double acting, applications with various circuits. Introduction - Construction and its mechanism –Various types of valves like Mechanical , Electrohydraulic, single stage/two stage spool type, High performance servo valves with torque motors , Its application in industries

Books:

1. Industrial Hydraulics Manual 5th Ed. 2nd Printing Eaton Hydraulics Training Services (Vickers)

2. Industrial hydraulics John J. Pippenger, Tyler Gregory Hicks Gregg Division, McGraw-Hill, 1979

PPD7J003 SURFACE ENGINEERING 3-0-0

Module-I (10 hours)

Mechanisms of Wear and Metal Cleaning: Basic Mechanisms of wear-abrasive, adhesive wear, contact fatigue, Fretting corrosion, Testing of wear resistance, practical diagnosis of wear, general cleaning process for ferrous and non ferrous metals and alloys selection of cleaning processes, alkaline cleaning, emulsion cleaning, ultrasonic cleaning, pickling salt bath descaling, abrasive bath cleaning, polishing and buffing shot peening. [10]

Module-II (10 hours)

Thermal Spraying Processes and Electrodeposited Coatings: Thermal spraying materials, characteristics of thermal spray processes, Design for thermally sprayed coatings coating production, spray fused coatings, Principles of electroplating, Technology and control-electroplating systems, Properties and applications of electrodeposits, Non aqueous and electroless deposition, plasma coating. [10]

Module-III (10 hours)

Hot Dip Coating and Diffusion Coating: Principles, Surface preparation, Batchcoating and continuous coating process, Coating properties and application, Principles of cementation, Cladding-vacuum deposition, Sprayed metal coating, Structure of diffusion coatings, Chemical vapour deposition (CVD), Physical vapour deposition (PVD). [06] Non-Metallic Coating Oxide and Conversion Coatings: Plating coating, lacquers, rubbers and elastomers, viterous enamels, anodizing Chromating, application to aluminium, magnesium, tin, zinc, cadmium copper and silver, phosphating primers. [06]

Module-IV (10 hours)

Quality Assurance, Testing and Selection af Coatings: The quality plan, design, testing and inspection, thickness and porosity measurement, selection of coatings, industrial applications of engineering coatings. [08]

TEXT BOOK(S):

1. Engineering Coatings-design and application- S. Grainger, Jaico Publishing House.
2. Principles of Metals surface treatment and protection- D. R. Gabe, Pergamon.
3. REFERENCE(S):

1. Electroplating Handbooks- N.V.Parathasarathy, Prentice Hall.
2. Advances in surface treatment- Niku-Lavi, Pergamon.

PPD7J004 DESIGN OF EXPERIMENTS 3-0-0

Module I (10 hours)

Simple Comparative Experiments

Basic Statistical Concepts, Hypothesis Testing, Choice of Sample Size, the Paired Comparison Problem, Hypothesis testing, confidence intervals, choice of sample size , Interferences about the differences in means, randomized designs.

Experiments with a Single Factor: The Analysis of Variance

The analysis of variance, Analysis of the fixed effects model, Model Adequacy Checking, Single Factor Experiment, Application of a Designed Experiment, Discovering Dispersion Effects , practical interpretation of results. Sample computer output, Determining sample size.

Module II (10 hours)

Randomized Blocks, Latin Squares, and Related Designs

The randomized complete block design, The latin square design, The graeco – Latin square design, Balanced incomplete block designs, statistical analysis of the BIBD, Least squares of estimation of the parameters

Module III (10 hours)

Introduction to Factorial Designs

Basic definitions and principle, The advantage of factorials , The two factor factorial design, The general factorial design, Fitting response curves and surfaces, Blocking in a factorial design, The

2^k Factorial Design

The 2^2 design, The 2^3 Design, The general 2^k Design, A Single Replicate of the 2^k Design, Data Transformation in a Factorial Design, Duplicate Measurements on the Response, Credit Card Marketing.

Module IV (10 hours)

Two-Level Fractional Factorial Designs

The One–Half Fraction of the 2^k Design, The one quarter fraction of the 2^k design, The general

2^{k-p} fractional factorial design, Resolution III designs, Resolution IV and V Designs.

Three-Level and Mixed-Level Factorial and Fractional Factorial Designs

The 3^k Design, Confounding in the 3^k factorial design , The Spin Coating Experiment, An Experiment with Unusual Blocking Requirements

Text BOOKS

1. Design & Analysis of Experiments- D.C. Montgomery, John Wiley & Sons.
2. Design and Analysis of Experiments- J.Antony, Butterworth-Heinemann.

PPD7J005 DESIGN FOR MANUFACTURING & ASSEMBLY 3-0-0

Module-I (8 classes)

Introduction to DFMA: History of DFMA, Steps for applying DFMA during product design, Advantages and limitations of applying DFMA during product design, Introduction to Manufacturing Process: Classification of manufacturing process, Basic manufacturing processes, Mechanical properties of material: Tensile properties, Engineering stress-strain, True stress strain, Compression properties, Shear properties, Introduction to materials and material selection: Classification of engineering materials, Material selection for product design.

Module-II (10 classes)

Design for casting: Introduction to sand casting, Typical characteristics of a sand cast part, Design recommendation for sand casting, Investment casting: Introduction, Steps in investment casting, Design consideration of Investment casting, Typical characteristics and applications, Die casting: Introduction to die casting, Advantages, Disadvantages and Applications of the die casting process, Suitable material consideration, General design consideration, Specific design recommendation, Injection moulding: Introduction to injection moulding, Typical characteristics of injection moulded parts, Effect of shrinkage, Suitable materials, Design recommendations.

Module-III (14 classes)

Design for machining and welding: Introduction to machining, Recommended materials for machinability, Design recommendations, Design for tuning operation: Process description, Typical characteristics and applications, Suitable materials, Design recommendations, Design for milling operation: Process description, Characteristics and applications of parts produced on milling machines, Design recommendations for milling, Dimensional factors and tolerances, Parts produced by planning, shaping and slotting: Process description, Design recommendation planning, Design for broached parts: Process description, Typical characteristics of broached parts, Suitable materials for broaching, Design recommendations. Design for welding: Design recommendation for welding processes, Design for solder and brazed assembly: Process, Typical characteristics, Suitable materials, Detail design recommendations, Design for adhesively bonded assemblies: Introduction, Typical characteristics, Suitable materials, Design recommendations for adhesive joint.

Module-IV (8 classes)

Introduction to Assembly: The assembly process, Characteristics and applications, Example of common assembly, Economic significance of assembly, Design for Assembly: Introduction, Design consideration, Design for Fasteners: Introduction, Design recommendation for fasteners. Design for Assembly using CAD: Introduction, Assembly features, Definition of assembly feature attributes, Characterization of assembly feature, Examples of Assembly feature, Examples of assembly feature: Aircraft wing and automotive chassis assembly.

Text Books:

1. Product Design for Manufacture and Assembly by Geoffrey Boothroyd, Peter Dewhurst and Winston Knight, CRC press, Taylor & Francis, Florida, USA.
2. Design for Manufacturing and Assembly by O. Molloy, S. Tilley and E.A. Warman, Chapman &Hall, London, UK.

References Books:

1. Engineering Design - a materials and processing approach by G Dieter, McGraw Hill.
2. Materials and Processes in Manufacturing by E. P. DeGarmo, J. T. Black, R. A. Kohser, Wiley.
3. Design for Manufacturability Handbook by James G. Bralla, McGraw-Hill companies, New York, USA.
4. Fundamentals of modern manufacturing: materials, processes and systems by M. P. Groover, John Wiley & Sons.

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On-Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, ―Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, ―Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).
5. Nicholas A. Kotov, ―Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I: Introduction

Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH
2. Principles and Practices of Management – Kaul, Vikas
3. Management, Robbins, Coulter &Vohra, Pearson.
4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.
3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

PPD7D001 **ADVANCED CAD (HONORS)**

Module - I

Fundamentals of CAD: The design process, applications of computer for design, creating the Manufacturing, Database, The design workstation, Graphical Terminal, Operator input Devices, Plotters and other devices, the CPU secondary storage.

Module-II

Product Modeling- Definition of concepts, Fundamental issues, Role of Process chains and product models, Types of product models - model standardization efforts, Types of process chains.

Module - III

CAM – Introduction, Numerical Control and NC Part Programming: NC Coordinate system, NC motion control system, Economics of NC, Manual and Computer Aid Programming, the APT language, NC programming with interactive graphics

Module-IV

Design for manufacturability – Machining, Casting and metal forming, Optimum design, Design for assembly and disassembly, Probabilistic design concepts - FMEA - QFD - Taguchi Method for design of experiments -Design for product life cycle.

Intelligent Information Systems - Knowledge based product and process models, Applications of soft computing in product development process, advanced database design for integrated manufacturing, Use of STEP standards in CIM. Design for manufacturability - casting, forming, welding and machining.

Text Book(s):

1. Computer Aided design and Manufacture, Grover M.P.Simmers, E.W. Prentice Hall
2. Concurrent Engineering Fundamentals Vol II- Biren Prasad, Prentice Hall.
3. Product Design and Development- K.T.Ulrich&S.D.Eppinger, McGraw Hill.

Reference Book(s):

1. Concurrent Engineering- D.E.Carter, Addison Wesley.
2. Handbook of Product Design for Manufacturing- J.G.Bralla, McGraw Hill.

PPD7D002 Automation in Manufacturing

(HONORS)

Module-I **[10]**

Manufacturing: Classification, types and Principles. Manufacturing System- Components and classifications, Automation in manufacturing systems, principles and strategies, mathematical models, cost. Single station manufacturing cell. Automated flow line: Methods of work part transfer, transfer mechanical buffer storage control function, design and fabrication considerations.

Module-II **[12]**

Analysis of automated flow lines: General terminology and analysis of transfer line without and with buffer storage, partial automation, implementation of automated flow lines. Assembly system and line balancing: Assembly process and system assembly lines, Line balancing methods, ways of improving line balance, flexible assembly line.

Module-III **[10]**

Automated Material Handling: Types of Equipments, functions, analysis and design of material handling systems, conveyor systems, Automated Guided Vehicle Systems. Automated storage and Retrieval system.

Module –IV **[08]**

Group Technology: Part classification and coding. Computer aided process planning. Flexible Manufacturing System: Introduction and system components, FMS planning and control.

Text Book(s)

1. Modeling and Analysis of Manufacturing Systems-R.G. Askin & C.R. Standridge, John Wiley & sons.
2. Automation, Production Systems and Computer Integrated Manufacturing- M.P. Groover, PHI.

Reference Book(s)

1. Computer Control of Manufacturing Systems-Y. Coren, McGraw Hill.
2. CAD/CAM/CIM- Radhakrishnan & Subramanian, Wiley Fastern.

PPD7G001 Non Traditional Machining and Forming

(Minor)

Module-I **[10]**

Introduction: History, Classification, Comparison between Conventional and Non-Conventional Process.Ultrasonic Machining: Introduction, Equipments, Tool Materials and Tool size, Abrasive slurry, cutting tool system design, Effect of parameter- effect of amplitude, frequency and vibration, effect of abrasive grain diameter, effect of applied static load, effect of slurry, tool and work material. USM process characteristics: MRR, Tool wear, Accuracy, Surface finish. Application, Advantages and disadvantages.

Module-II **[12]**

Electro discharge Machining: Introduction, Machine, Mechanism of Material Removal, Dielectric fluid, spark generator, EDM tools, Electrode wear. Application, advantages, and limitations. Electrical Discharge Grinding, Wire EDM.

Electro Chemical Machining: Introduction, Machine. Elements of ECM process: Cathode tool, anode workpiece, source of DC power, Electrolyte. ECM process characteristics: Mechanism of Material Removal, Accuracy, Surface finish. Application, Advantages and disadvantages.

Module-III **[10]**

Plasma Arc Machining: Introduction, Equipment, non thermal generation of plasma, selection of gas, Mechanism of Material removal, PAM parameters, process characteristics. Applications, Advantages and disadvantages.

Laser Beam Machining: Introduction, Equipment, Mechanism of Material removal, LBM parameters, process characteristics. Applications, Advantages and disadvantages.

Module-IV **[08]**

Sheet Metal Forming: Conventional Processes- H.E.R.F. techniques, Super plastic forming techniques, principles and process parameters, Advantages, Limitations and Applications. Special Forming Processes: Rubber pad forming, Water hammer forming, and fine blanking.

Text Book(s)

1. Advanced Machining Processes- V.K. Jain, Allied Publishers.
2. Theory of Metal Forming Plasticity- R. Narayanasamy, Narosa Publishers.

Reference Book(s)

1. Modern Machining Process- P.C. Pandey & H.S. Shah, T.M.H.
2. Metal Forming: Fundamentals and Applications- T. Altan, American Society of metals.

SEVENTH SEMESTER					
Theory / Practical / Sessional					
Subject Code	Subject Name	Hours/ Week L/T	Credit Theory	University Marks	Internal Evaluation
PTX7J001/ PTX7J002/ PTX7J003	Clothing Science & Technology/Medical textiles /Textile Finishing & Clothing Care	3-0-0	3	100	50
PTX7J004/ PTX7J005/ PTX7J006	Textile Mill Organization, costing & Economics /Supply Chain Management in Textile Industry/Entrepreneurship in Textile	3-0-0	3	100	50
PCP7H007/ PCP7H008/ PCP7H009	Internet of Things (IOT)/ Nano Science & Bio Technology/ Intellectual Property Rights (IPR)	3-0-0	3	100	50
PCP7H010/ PCP7H011/ PCP7H012	Soft Computing/ Introduction to Management & Function/ Marketing Management	3-0-0	3	100	50
PTX7N201	Seminar	0-0-1	2	-	100
PTX7N202	Minor Project	0-0-2	4	-	200
TOTAL			18	900	
Honours					
PTX7D001	Industrial Engineering in Textile Industry	4-0-0	4	100	50
Minors					
PTX7G002	Quality Assurance in Textiles & Garment	4-0-0	4	100	50

PTX7J001 CLOTHING SCIENCE & TECHNOLOGY 3-0-0

Course Objectives

- To enable the students to understand specific characteristics of human clothing.
- To gain knowledge about the fabric handle and aesthetic properties of fabric required for human clothing.
- To understand the comfort characteristics of fabric for clothing purposes.
- To understand the physiological and field testing of clothing.

Course Outcomes

After successful completion of this course, the students will be able to :

- Describe thermal non thermal components of clothing comfort
- Explain the role of body components in maintaining body temperatures
- Recognize the Principles of heat transfer to and away human body
- Explain various aspects of thermal & skin sensational clothing comfort
- List the characteristics of cloth and made by a interchange properties of fibre

Course Content

Module-I

Introduction : Concept of selection of fabrics for clothing purpose – Types of fabric required for apparel use for different age group, occasions, purpose – Fabric properties and performance for apparel use.
Serviceability of Fabrics: Abrasion resistance - flat abrasion, flex abrasion, edge abrasion, Pilling - mechanism of pilling formation, anti-pilling techniques, Snagging, Strength - Tearing strength - Tensile strength - Bursting strength , seam strength and seam slippage,
Tailorability of fabrics:tailorability of woven and knitted garments – tailorability of leather garments – tailorability of fur garments

Module-II

Aesthetic properties: Drape, Crease and Wrinkle recovery - Lustre. Yarn unevenness: neps, thick place, thin place, periodic fault, Scroopiness, Colour- Colour fastness: to light, washing, perspiration, rubbing, dry cleaning
Dimensional Stability of Fabrics: Hygral expansion, Relaxation shrinkage, Swelling shrinkage, Felting shrinkage. Mechanism of fabric shrinkage- Relationship between Hygral Expansion, Relaxation shrinkage and extensibility - Knitting Process Parameters and fabric stability. Methods of measuring dimensional stability to dry cleaning and dry heat.
Fabric Hand : smoothness, fullness and stiffness, subjective hand judgment, objective evaluation of fabric hand and its applications.

Module-III

Clothing Comfort : Definition of comfort - Human clothing system - Physical, Physiological and psychological aspects of comfort – Tactile and pressure sensation aspects. Applications of clothing comfort research.
Thermal Comfort : Introduction. Thermal transfer processes – Dry heat transfer and Rapid heat transfer. Function of Textiles in enhancing thermal comfort. Comparison of thermal comfort properties for different textile structures.

Module-IV

FunctinalProperties : Elasticity: elastic recovery, residual strain; Thermal insulation ; Water repellence, water resistance and water proof; Wicking: vertical and horizontal transportation of liquid; Water absorbency; UV protection; Soil release
Safety : Toxicity - residual dye stuff and other finishing agent ; Flammability

Books Recommended :

1. Kothari, V K, —Testing and Quality Management —, CBS Book Publishers, New Delhi, 2000.
2. Li. Y, —The Science of Clothing Comfort‖, Textile Progress, Volume: 31, No. 1/2, Textile Institute, ISBN: 1870372247, 2001.
3. Saville B P, —Physical Testing of Textiles,‖ The Textile Institute, Woodhead publication limited, Cambridge, ISBN: 1855733676, 1999.
4. Billie J Collier and Helen H Epps,‖ Textile Testing and Analysis,‖Prentice- Hall Inc., New Jersey , ISBN 0134882148, 1999.
5. Lyman Fourt& Norman R.S. Hollies, —Clothing: Comfort & Functions‖, Marcel Dekker, Inc, Newyork, ISBN: 0-8247-1214-5.
6. G.Song, —Improving Comfort in Clothing‖, Woodhead Publication Ltd, ISBN: 1-84569-539-9.
7. A.Das, R.Alagirusamy, IIT Delhi, —Science in Clothing Comfort‖, Woodhead Publication Ltd, ISBN: 1-84569-789-8.

PTX7J002 MEDICAL TEXTILES 3-0-0

Course Objectives:

To impart knowledge on-

- Classification, Anti microbial fibrous materials and their applications, Market scenario of medical textile industry.
- Knowledge on bio polymers and tissue engineering.
- Wound dressing concepts.

Course Outcomes:

After successful completion of this course, the students will be able to

- Classify medical textiles and outline on medical textile industry
- Discuss on the concepts of biopolymers and their testing & applications in medical.
- Describe the concept of tissue engineering.
- Summariseimplantable, non-implantable and drug delivery systems, wound care and reusable medical textiles and smart medical textiles.
- Compare the differences and similarities between various medical textile products.

Course Content

Module-I

Medical textiles –– classification, current market scenario in international and national level – government initiatives; antimicrobial fibres and finishes; nano fibrous materials and films; super absorbent polymers; operating room garments; personal health care and hygiene products and their testing methods; applications of non-wovens in medicine; textiles in infection prevention control.

Module-II

Biopolymers: classification and their properties, requirements, and applications, testing methods; In vitro tests – direct contact, agar diffusion & elution methods – in vivo assessment of tissue compatibility.

Tissue engineering: properties and materials of scaffolds- relationship between textile architecture and cell behavior – applications of textile scaffolds in tissue engineering.

Module-III

Bandages-types, properties and applications; compression garments-types, properties and applications; sutures: types and properties; implantable textiles: hernia mesh – vascular prostheses – stents; Extra corporeal materials: Cartilage nerves – liver ligaments, kidney,

tendons, cornea; Drug delivery textiles: classification – mechanism various fabrication methods– characterization – applications.

Wound - types and healing mechanism- textile materials for wound dressing – bio active dressing – anti microbial textiles dressing – composite dressing –- testing of wound care materials; Wound compression textiles; Reusable medical textiles: types, advantages, physical properties and performance –– reusable processing methods.

Module-IV

Smart textiles – types, characteristics – smart textiles in wound care; applications of phase change and shape memory materials – monitoring pregnancy, children and cardio patients – mobile health monitoring ; electronics in medical textiles; Smart textiles in rehabilitation and applications; textile sensors for healthcare ;legal and ethical values involved in the medical textile materials.

Text Books

1. Rajendran.S, ―Advanced Textiles for Wound Care‖, Wood Head publishing in Textiles:
   Number 85, 2009.
2. Bartel.V.T, ―Handbook of medical textiles‖, Wood Head publishing, 2011.
3. Van Langenhove, ―Smart textiles for medicine and health care – materials, systems and applications‖, Wood Head publishing, 2007.
4. Ray smith, ―Biodegradable polymers for industrial application‖, CRC press, 2005.
5. Buddy D.Ratner and Allan S. Hoffman, ―Biomaterials science – An introduction to materials in medicine‖, Academic press, 1996.
6. Pourdegtimi..B, ―Vascular grafts: Textile structures and their performance‖, Textile progress, vol. 15, No. 3, the Textile Institute, 1986.
7. Cusick. GE and Teresa Hopkins, ―Absorbent incontinence products‖, the Textile
   Institute, 1990.
8. Kothari.V.K., ―Progress in textiles: Technology developments and applications‖, volume 3, IAFL Publications, 2008.

PTX7J003 TEXTILE FINISHING & CLOTHING CARE 3-0-0

Module-I (12 Hours)

1. Introduction: Consideration for finishing, various terms used in finishing, classification of finishing, types of finishing.

2. Finishing Chemicals: Stiffening agents, cross-linking agents, resins, softening agents, silicones, polymers, bleaching agents, optical brightening agents.

3. Finishing Machines: Padding mangle, calender, sanforizer, Stenter, Raising, Milling, Decatizer, Emerizer

Module-II(16 Hours)

4. Various Functional Finishes: Water repellent/proof, fire repellent, mildew/moth proof, soil release finish, anti static, miscellaneous finishes.

5. Special Finishes: Anti crease, Anti shrinkage, anti-microbial, UV resisting finish, softening, stiffening, raising, embossing, felting, non- felting new finishes**,** Biopolishing.

Module-III (12 Hours)

6. Finishing of Garments: Introduction to garment dyeing and printing - Flock printing, foam printing, transfer printing, wet transfer, film release, sublimation transfer printing - Preparations of logo and motifs for fixing on garments. Durable press finish - resin, wash and wear, acid wash, stone wash, bio-stoning, crinkled effect, softening, chemical and enzyme, denim and blast finishing and controlling factors. Brushing of garments.

Module-IV (12 Hours)

7. Spotting and Laundering of Garments: Identification of stains, characteristics and history, selection of spotting chemicals, factors for spotting, dry cleaning, washing machine equipments and processing conditions, pressing.

8. **Applications of enzymes in Textile Processing and finishing**: Types of enzymes and their uses in retting process of linen fibres, textile processing- biodesizing, bioscouring,biobleaching,wool processing, biostoning, biopolishing, textile after care

Books Recommended:

1. Whittall.N.S., "Laundering and dry cleaning", vol.8, Textile Progress, 1996.
2. Goldman.R.F., and LyleD.S "Performance of textiles" John Wiley and sons, New York, 1997
3. Ashelfrd, " Care of Clothes ", National Trust, 1997.
4. "Garment wet processing technical manual", AATCC/SDC, 1994.
5. Pradip V. Mehta, "An Introduction to quality control for the apparel industry", ASQC quality press, New York, 1992.
6. Biotechnology edited by H J Retim and G

PTX7J004 TEXTILE MILL ORGANIZATION, COSTING & ECONOMICS 3-0-0

Module-I (15 Hours)

1. **Location and Layout Planning :** Plant location and site selection, Factors affecting location, Plant layout, Different types of layouts, Principles of machinery lay-outs and different flow plans of material for spinning , weaving and process house. Calculation for balancing of different machines in a Textile mill

2. **Plant services**: Ventilation and lighting plan. Humidification systems used in Textile Mills, Developments in humidification systems, Utilization of steam and power, Power consumption - Energy consumption in textile machines, Measures to reduce power consumption.

3. **Material handling**: Importance of material handling, Methods and equipment employed-classification of material handling equipments, control of wastes.

4. **Store Routine** – Function of stores, procedure for material procurement, effective stores management, ABC analysis, basic inventory control; stock evaluation.

Module-II (10 Hours)

5. Human Resource Management: Organizational structure, patterns, communication. Selection, recruitment and training, Different categories of labour required in various section of spinning, weaving and processing departments, work load, work assignment, Calculation for work assignment, Idea of productivity calculations of spinning / weaving mill and factors affecting productivity.

Labour laws, labour welfare activities, methods of wage remuneration, wage determination process, job evaluation, payments by results, motivation, financial & non-financial incentives, disciplinary action – warning, showcause notice, suspension and dismissals, retrenchment & VRS

Module-III (10 Hours)

6. Maintenance Management: Maintenance systems - types of maintenance practices and concepts, planned & unplanned maintenance, corrective & design maintenance, routine and preventive maintenance, Work Study in maintenance and, planning of maintenance work, making schedules, recording of maintenance activities. Accidents and safety engineering, Fire prevention and protection

Module-IV (10 Hours)

7. Cost Accounting and Control : Introduction, costing - its importance & use, Elements of cost -Cost classification - Total cost analysis, Costing the products, Control and accounting of materials, labour and overhead.

8. Financial Management: Preparation of Balance sheet - Capital and running cost - profit and loss account, Break even analysis. Financial ratios - their analysis and interpretation

Books Recommended:

1. Dudeja V D, "Management of Textile Industry", Textile Trade Press, Ahmedabad (1981).
2. Ormerod A, "Textile Project Management", The Textile Institute, Manchester UK (1992).
3. Talukdar M K, Srirammulu P K and Ajgaokar D B, "Weaving – Machine, Mechanism and Management", Mahajan Publisher Private Ltd., Ahmedabad, India (1998).
4. Garde A R and Subramanian T A, "Process Control in Spinning", 3rd Ed., ATIRA Ahmedabad, (1987).
5. Higgins, "Handbook of Maintenance Management", Prentice Hall New York (1999).

PTX7J005 SUPPLY CHAIN MANAGEMENT IN TEXTILEINDUSTRY 3-0-0

Course Objectives:

- To provide an insight on the fundamentals of supply chain networks, tools and techniques.
- To train the students to new and recent developments in supply chains, e-business and information technology

Course Outcomes:

Upon completion of this course, the student shall have the :
Knowledge of the framework and scope of supply chain networks and functions.
Capacity to develop clear, concise and organized approach to operations management

Course Contents:

Module-I

Basic principles of supply chain management and logistics, supply chain models, supply chain forvolatile market; supply chain drivers and metrics in apparel industries; roll of supply chain in the textileand apparel industries' financial stability.

Module-II

Planning supply and demand in apparel production house, managing economies of scale, supplycycle and inventory levels; managing uncertainty in supply chain, safety pricing and inventory; makeVs buy decision, make Vs hire decision; geographical identification of suppliers, supplier evaluation,supplier selection, contract negotiations and finalization.

Module-III (15 Hours)

Distribution network and design for global textile and apparel products, models of distribution – facilitylocation and allocation of capacity, uncertainty on design and network optimization; the role oftransportation in supply chain, modes of transportation, characteristics of transportation, transportdesign options for global textile and apparel network, trade-off in transport design, risk management intransportation, transport decision in practice for textile and apparel industries.

Module-IV (15 Hours)

Coordination in supply chain- the bullwhip effect, forecasting, obstacles to coordination in supplychain; supply chain management for apparel retail stores, high fashion fad; supply chain in e-business.

Import - Export management, documentation, insurance, packing and foreign exchange; methods ofpayments – domestic, international, commercial terms; dispute handling modes and channels; supplychain and Information system; Customer relationship management.

Books Recommended:

- Janat Shah, "Supply Chain Management – Text and Cases", Pearson Education, 2009.
- David Simchi-Levi, Philip Kaminsky, Edith Simchi-Levi, "Designing and Managing the Supply
- Chain: Concepts, Strategies, and Cases", Tata McGraw-Hill, 2005.
- Sunil Chopra and Peter Meindl, "Supply Chain Management-Strategy Planning and Operation",
- PHI Learning / Pearson Education, 2007.

- Altekar Rahul V, "Supply Chain Management-Concept and Cases", PHI, 2005 Prentice Hall, NJ,2005.

PTX7J006 ENTREPRENEURSHIP IN TEXTILE 3-0-0

Module-I (10 Hours)

1. **Entrepreneurship:** Definition and significance of entrepreneurship. Entrepreneur: Their Characteristics, Role of an entrepreneur in Industrial development - innovations – Risk taking, Management of Business-Training & Development-Entrepreneur Development programme-Schemes etc.

2. **Basic Knowledge of Business Organisation**: Form of Business Organization – Types - Sole traders, partnership, Joint Hindu family, company, co-operatives. Meaning and definition of SSI, ancillary industry, importance of SSI, government policies for SSI, Basic criteria for final selection of a business opportunity, Amount of investment, Nature of technology. Input requirement for setting up SSI, Institutional support to SSI at State & National level. Organization and management of SSI

Module-II (15 Hours)

3. **Project Formulation** (special reference to textile): Identification of Business opportunities- Project ideas & Identification through Trade Fair, Exhibition, Selection of products - basis for selection, sources of information about products, Product design and development, market survey, identifying market tastes and requirement of prospective buyers.

4. **Mobilisation of Resources** : Materials, human resources, machines and methods, selection of equipment and other infrastructure; plant location-factors for selection of site, vicinity of production and marketing; location and layout of plant to suit local requirements. Finance – Self financing- loan from financing Institutions& Banks. Incentives & subsidies

Module-III (15 Hours)

5. **Financial Management**: Importance of financial management in context to small scale industry. Budgeting, investment for capital equipment, working capital, costing and other related economic aspects. Calculation regarding payback period and Break-even point,

Module-IV (15 Hours)

6. **Preparation of Project Report**: Preparation of project report in a accordance with guidelines laid down by government and controlling institutions regarding environment aspects, feasibility reports, production feasibility, quality feasibility, market feasibility and economic feasibility.

7. Marketing Product: Creating the Marketing Plan, Pricing for Profit, Creative Advertising and Promotion.

Books Recommended:

1. Entrepreneurial Development, P. Saravanavel
2. Business Organisation- Bhusan Y.K
3. Principle of Economics – M.C.Seth
4. Organisation and Management of Small Scale Industries-Vasanth Desai.
5. Developing New Entrepreneurs; Entrepreneurs Development Institute of India, Ahmedabad.

6. Starting and Managing the Small Business; Arthur M. Kuriloff, John M.Hemphill, Jr., and Dougless Cloud; McGraw Hill, 1993

PCP7H007 IOT 3-0-0

Course description and objectives:
Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design &develop IOT Devices.

Course Outcomes:
· Able to understand the application areas of IOT
· Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
· Able to understand building blocks of Internet of Things and characteristics.

Module I
Introduction & Concepts: Introduction to Internet of Things, Physical Design of IOT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels.
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Module II
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT and M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Module III
Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages

Module IV
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices.

TEXT BOOKS:
1. VijayMadisetti, Arshdeep Bahga," Internet of ThingsA Hands-On- Approach",2014, ISBN:978 0996025515

REFERENCE BOOKS:
1. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0
2. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN:0989973700

PCP7H008 Nano Science & Biotechnology 3-0-0

Module -1(6 Hours)
Fundamental and process of fabrication
The world of small dimensions, Nanoscale Properties (Electrical, Optical, Chemical, Mechanical), Nanoscale visualization techniques , Electron microscopy (TEM, SEM, Cryo-SEM), Scanning probe microscopy (AFM, STM), Diffraction techniques (XRD,synchrotron),Top-down and Bottom-Up approach , nanoparticles (synthesis,properties and applications).

Module-2 (12 Hours)
Nano-Device and Components:
Structure of carbon nanotube, Classification and physical properties of CNT, Graphene: structure, synthesis and properties, Nanophotonis (Photonic crystal in one, two and three dimensions), Quantum dot, quantum wire, Nanofluidics: nanopores and Nano capillaries, Debye length, Nanomechanics **(**elastic, thermal and kinetic material properties).

Module-3 (10 Hours)
Quantum Electronics:
Coulomb blockade in nano capacitors and quantum dot circuits. Single Electron Transistor (SET), Quantum information and computing, Sprintonics devices and its classifications, Structural and optical properties of nanomaterials, Molecular Electronics, NEMS, Optical and Magnetic computer.

Module -4 (10 Hours)
Bio-Device and application
Bio-nanostructures (nanofibers, nanotubes, nanocellulose), Biological nanomachines Ribosomes, Photosynthesis systems,Near-field Bioimaging, Nanoparticles for optical diagnosticsand Targeted Therapy,Protein nanotechnology, DNA nanotechnology, Nano robot and its application, Nanocapsule, Nanosomes, Medibots, Artifiial pancreas, Artificial Muscle,Nanoclinic for Gene delivery and photodynamic therapy Nanoparticle in cancer, Bionanomotors.

ADDITIONAL MODULE (Terminal Examination-Internal) (05 hr)
Nanotechnology safety and the environment,Impact of nanotechnology on society and industry, Biosensors (fabrication, functionalization, applications), Current research on nanotechnology.

Books:

1. Rishal Singh, S.M. Gupta,Introduction to nanotechnologyOxford university press,(2016).
2. Paras N. Prasad, Nanophotonics, John Wiley & Sons, (2016).
3. C. M. Niemeyer, C. A. Mirkin, —Nanobiotechnology: Concepts, Applications and Perspectives, Wiley – VCH, (2004).
2. 4 T. Pradeep, —Nano: The Essentials, McGraw – Hill education, (2007).
4. Challa, S.S.R. Kumar, Josef Hormes, CarolaLeuschaer, Nanofabrication Towards Biomedical Applications, Techniques, Tools, Applications and Impact, Wiley – VCH, (2005).

5. Nicholas A. Kotov, —Nanoparticle Assemblies and Superstructures, CRC, (2006).
6. David S Goodsell, "Bionanotechnology, John Wiley & Sons, (2004).

PCP7H009 IPR 3-0-0

Module I:

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

Trade Marks: Purpose and function of trade marks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

Module II:

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

Module III:

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade screte litigation.

Unfair competitiion: Misappropriation right of publicity, False advertising.

Module IV:

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international - trade mark law, copy right law, international patent law, international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.

PCP7H010 SOFT COMPUTING 3-0-0

MODULE – I (8 hours)
Basic tools of soft Computing: Fuzzy logic, Neural Networks and Evolutionary Computing, Approximations of Multivariate functions, Non – linear Error surface and optimization.

MODULE – II (8 hours)
Fuzzy Logic Systems: Basics of fuzzy logic theory, Crisp and fuzzy sets; Basic set operations; Fuzzy relations, Composition of Fuzzy relations, Fuzzy inference, Zadeh's compositional rule of inference; Defuzzificaiton ; Fuzzy logic control; Mamdani and Takagi and Sugeno architectures. Applications to pattern recognition.

MODULE—III (16 hrs)
Neural networks: Single layer networks, Perceptron; Activation functions; Adalinc- its training and capabilities, weights learning, Multilayer perceptrons; error back propagation, generalized delta rule; Radial basis function networks and least square training algorithm, Kohenen self – organizing map and learning vector quantization networks; Recurrent neural networks, Simulated annealing neural networks; Adaptive neuro-fuzzy information; systems (ANFIS),

MODULE—IV (08 hrs)
Evolutionary Computing: Genetic algorithms: Basic concepts, encoding, fitness function, reproduction. Differences of GA and traditional optimization methods. Basic genetic, basic evolutionary programming concepts Applications, hybrid evolutionary algorithms.

Text Books

1) F. O. Karry and C. de Silva, "Soft Computing and Intelligent Systems Design – Theory, Tools and Applications". Pearson Education. (Printed in India).

Reference Books

1) J. S. R. Jang. C. T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd., New Delhi.
2) Fredric M. Ham and Ivica Kostanic, "Principle of Neuro Computing for Science and Engineering", Tata McGraw Hill.
3) S. Haykins, "Neural networks: a comprehensive foundation". Pearson Education, India.
4) V. Keeman, "Learning and Soft computing", Pearson Education, India.
5) R. C. Eberhart and Y. Shi, "Computational Intelligence Concepts to Implementation". Morgan Kaufmann Publishers (Indian Reprint).

PCP7H011 INTRODUCTION TO MANAGEMENT AND FUNCTION 3-0-0

Module – I: Introduction to Management: Concept, Definition, Functions; Levels of Management, Skills and Roles of a Manager; Management Process, School of Management thoughts: Pre-Scientific, Classical, Behavioral and Modern; Types of business organizations, merits and demerits, Public Organizations.

Module – II:Planning

Nature & Elements of Planning, Planning Types, Steps, MBO, MBE, Planning Premises.Decision making process,Decision Makingunder Risk and Uncertainty, Participation in Decision making, Creativity in decision making

Module – III:Organizing and Staffing

Formal and Informal, Line and Staff Relationship, Centralization Vs. Decentralization, Basic issues in Organizing, Work Specialization, Chain of Command, Delegation, Span of Management, Principles of organizing; Organization Structure for Departmentalization.

Module – IV: Directing and Controlling: Process, Standards and Bench Marking; Control techniques, Factors influencing control effectiveness, Co-ordination-Principles of Co-ordination; Inter-Dependence.

Reference Books

1. Management Theory & Practice; SubbaRao P &HimaBindu, HPH
2. Principles and Practices of Management – Kaul, Vikas
3. Management, Robbins, Coulter &Vohra, Pearson.
4. Management: Text and Cases-VSP Rao, Excel Books

PCP7H012 MARKETING MANAGEMENT 3-0-0

Objective of the Course: The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I (10 hours)

Marketing Management: Concept, Process, Functions and relevance in the current context. Marketing Environment: Elements of micro and macro environment Competition Analysis: Factors contributing to competition, porter's five forces model, Identifying and analyzing competitors. Marketing Planning : Exploring Opportunity, Product –market selection, Marketing Planning Process. Market Research and Information Systems: Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research. Consumer Behavior: Factors influencing consumer behavior, consumer decision process. Organizational buying behavior.

Module II (10 hours)

Market Segmentation, Targeting and Positioning: Definition, Bases of segmenting consumer and Industrial markets. Target Market strategies: Market Positioning. Market Demand Forecasting: Key Terms, Forecasting Tools: Short term tools: Moving average and Exponential smoothing methods, Long-term forecasting Tools: Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques. Product Planning : Product Life Cycle, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Planned Obsolescence.

Module – III (10 hours)

Pricing Decision: Objectives and Factors influencing pricing, Pricing method and strategies. Integrated Marketing Communication(IMC)- Concept of IMC, the marketing communication process, Promotion Mix, elements of promotion mix, Direct marketing. Channels of Distributions: Types of intermediaries, functions of distribution channels, channel levels, Designing Distribution Channels, Physical Distribution, Supply Chain Management (Basic only). Trends in Marketing: Green Marketing, Customer Relationship Management, Emarketing, Rural Marketing and Service Marketing (concepts only)

Text Book:

1. Etzel , Walker ,Stanton and Pandit, Marketing, 14/e, Tata McGraw Hill.
2. Saxena, "Marketing Management" Tata McGraw Hill, 4/e.

Reference

1. Grewal, Levy, 'Marketing' Tata McGraw Hill, special Indian edition.
2. Karunakaran "Marketing Management", Himalaya Publishing House, 2010/e.

3. Kotler, Keller,Koshy and Jha, "Marketing Management", 13/e, Pearson Education.

PTX7D001 INDUSTRIAL ENGINEERINGIN TEXTILE INDUSTRY 4-0-0

(Honors)

Course Objectives

- To understand the work study and method study techniques.
- To get exposure about productivity terms and terminologies.
- To know about the application of work study in textile industry.

Course Outcomes

After successful completion of this course, the students should be able to

- Discuss industrial engineering techniques
- Analyze the garment breakdown sequence
- Prepare operation bulleting for different garments
- Calculate SAM for various garments
- Conduct time study experiment

Course Content

Module-I

Productivity in textile and apparel industry: units of productivity - total time to do a job – factors affecting productivity – work content and total time – reducing work content due to the product and process method – reducing ineffective time due to worker and supervision.

Work Study: definition, work-study and productivity - basic procedure of work-study – work study and the worker, supervisor and the management - working condition and the working environment.

Module-II

Method study: definition and objects of method study – basic procedure, selection of work, Recording, examining, development of method – Textile / Apparel factory lay out and movement of workers and material - string diagram – man type flow process chart – multiple activity chart – travel chart – principle of motion economy – classification to movements – two-handed process chart – micro motion study – SIMO chart – Define, installs and maintain improved method.

Work measurement: definition, purpose, procedure and uses – techniques of work measurement– work sampling: need and use time study – definition – basic time study equipment – time study forms – selecting the job, steps in making a time study – breaking the job into elements – sample size, timing card element – stop watch procedure - time

study rating – calculation of standard time – setting time standards for work with apparel production machineries.

Module-III

Industrial engineering term in textile and apparel industry-role of industrial engineering in textile industry- methodology- benefits- tools and techniques-pre production activities-capacitystudy- operator performance fall offs-work in progress- operation bulletin- line balancing- steps in line balancing –efficiency-cycle checks-balancing tools- scientific method of training – Ergonomics and its concept in textile industry

Module-IV

Application of work study technique in optimizing work load in stitching activity in garment industry –Line Balancing techniques – comparative study of different manufacturing systems used in the garment production - group system, batch system – industrial system – productivity calculation in Stitching activity.

Books Recommended:

1. Johnson Maurice —Introduction to Work Study||, International Labour Organization,
   Geneva, 2006.
2. JaccoSolinger —Apparel Manufacturing Hand Book||, Reinhold Co., 1998.
3. Juan CrloHiba —Improving working conditions and productivity in the garment industry|| International Labour Organization, Geneva, 1998.
4. V.RameshBabu — Industrial Engineering in Apparel Production|| Wood Head publishing
   India Ltd., ISBN 13:978-93-80308-17-3, 2012.
5. M.I.KHAN||IndustrialEngineering||New age international, 2007
6. Kjellzondin, —Maynard's Industrial Engineering Handbook||, 5th edition, Mcgraw Hill,
   2001.
7. Shethvijay, —Industrial engineering methods and practices||, penram international, publishing, India, 2005.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PAE8J001	Vibration & Elements of Aero elasticity	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PAE8N201	Seminar	0-0-3	2	100	
2	PSI	PAE8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PAE8J001 VIBRATIONS AND ELEMENTS OF AERO ELASTICITY

OBJECTIVE

To study the dynamic behaviour of different aircraft components and the interaction among the aerodynamic, elastic and inertia forces

UNIT I BASIC NOTIONS 8

Simple harmonic motion – Terminologies – Newton's Law – D' Alembert's principle – Energy Methods

UNIT II SINGLE DEGREE OF FREEDOM SYSTEMS 12

Free vibrations – Damped vibrations – Forced Vibrations, with and without damping – support excitation – Vibration measuring instruments.

UNIT III MULTI DEGREES OF FREEDOM SYSTEMS 10

Two degrees of freedom systems – Static and Dynamic couplings vibration absorber- Principal co- ordinates, Principal modes and orthogonal condition – Eigen value problems. Hamilton's principle- Lagrangean equation and application – Vibration of elastic bodies-Vibration of strings- Longitudinal, Lateral and Torsional vibrations.

UNIT IV APPROXIMATE METHODS 5

Rayleigh's and Holzer Methods to find natural frequencies.

UNIT V ELEMENTS OF AEROELASTICITY 10

Concepts – Coupling – Aero elastic instabilities and their prevention – Basic ideas on wing divergence, loss and reversal of aileron control – Flutter and its prevention.

TOTAL: 45 PERIODDS

TEXT BOOKS

1. Timoshenko S., "Vibration Problems in Engineering"– John Wiley and Sons, New York, 1993.
2. Fung Y.C., "An Introduction to the Theory of Aeroelasticity" – John Wiley & Sons, New York, 1995.

REFERENCES

1. Bisplinghoff R.L., Ashley H and Hoffman R.L., "Aeroelasticity" – Addision Wesley Publication, New York, 1983.
2. Tse. F.S., Morse, I.F., Hinkle, R.T., "Mechanical Vibrations", – Prentice Hall, New York, 1984.
3. Scanlan R.H. & Rosenbaum R., "Introduction to the study of Aircraft Vibration & Flutter", John Wiley and Sons. New York, 1982.
4. Tongue. B. H., "Principles of Vibration", Oxford University Press, 2000.

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

Module III

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Reference Book:

1.Entrepreneurship Development and Management, Vasant Desai, HPH
2.Entrepreneurship Management, Bholanath Dutta, Excel Books
3.Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

Module II

E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center) , Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

Module IV

ERP IMPLEMENTATION: Planning Evaluation and selection of ERP systems, Implementation life cycle - ERP implementation, Methodology, Data Migration, Success and Failure factors of ERP Implementation. Extended ERP systems and ERP add-ons -CRM, SCM, Manufacturing prospective, Business analytics .

Reference Book:

1. E- Commerce and Enterprise Resource Planning ; CSV Murthy, HPH
2. Enterprise Resource Planning- Concepts and Practices ; V K Garg and N K Venkatkrishna, PHI
3. Enterprise Resource Planning; Alexix Leon ; TMH

PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

Module – II

Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

Module- III

Consumer Protection Law: Consumers, Rights of Consumers, Redressal Machinery under the Act, Procedure of Complaint, Relief available to the consumers, Procedure of filing appeal, Powers of Redressal agencies, Unfair Trade Practices. Overview of Competition Act,

Module – IV

Company Law:Indian Companies Act 2013, Salient features and Classes of Company. Lifting of corporate veil, Procedure of Incorporation and Certificate of commencement of business, Memorandum and Articles of Association, Doctrine of ultra vires and Indoor Management, Management of Company: Qualification, Appointment of Directors, Company Meetings, Resolutions, Winding-up of Companies and their modes.

Reference Books

1. Business Regulatory Framework–Mohapatra and Patra, HPH
2. Business Law – N D Kapoor, S Chand
3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PAU8J001	Noise ,Vibration & Harshness	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PAU8N201	Seminar	0-0-3	2	100	
2	PSI	PAU8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PAU8J001 NOISE VIBRATION AND HARSHNESS

Module – I (14 hours)

FUNDAMENTALS OF ACOUSTICS AND NOISE, VIBRATION :
Theory Of Sound—Predictions And Measurement, Sound Sources, Sound Propagation In The Atmosphere, Sound Radiation From Structures And Their Response To Sound, General Introduction To Vibration, Vibration Of Simple Discrete And Continuous Systems, Random Vibration, Response Of Systems To Shock, Passive Damping

EFFECTS OF NOISE, BLAST, VIBRATION, AND SHOCK ON PEOPLE:

General Introduction To Noise And Vibration Effects On People And Hearing Conservation, Sleep Disturbance Due To Transportation Noise Exposure, Noise-Induced Annoyance, Effects Of Infrasound, Low-Frequency Noise, And Ultrasound On People, Auditory Hazards Of Impulse And Impact Noise, Effects Of Intense Noise On People And Hearing Loss, Effects Of Vibration On People, Effects Of Mechanical Shock On People, Rating Measures, Descriptors, Criteria, And Procedures For Determining Human Response to Noise.

Module – II (08 hours)

TRANSPORTATION NOISE AND VIBRATION—SOURCES, PREDICTION, AND CONTROL:
Introduction To Transportation Noise And Vibration Sources, Internal Combustion Engine Noise Prediction And Control—Diesel, Exhaust And Intake Noise And Acoustical Design Of Mufflers, Tire/Road Noise—Generation, Measurement, And Abatement, Aerodynamic Sound Sources In Vehicles—Prediction And Control, Transmission And Gearbox Noise And Vibration Prediction And Control, Brake Noise Prediction And Control.

Module – III (08 hours)

INTERIOR TRANSPORTATION NOISE AND VIBRATION SOURCES – PREDICTION AND CONTROL:
Introduction To Interior Transportation Noise And Vibration Sources, Automobile, Bus, And Truck Interior Noise And Vibration Prediction And Control, Noise And Vibration In Off-Road Vehicle Interiors- Prediction And Control,

Module – IV (10 hours)

NOISE AND VIBRATION TRANSDUCERS, ANALYSIS EQUIPMENT, SIGNAL PROCESSING, AND MEASURING TECHNIQUES:
General Introduction To Noise And Vibration Transducers, Measuring Equipment, Measurements, Signal Acquisition, And Processing, Acoustical Transducer Principles And Types Of Microphones, Vibration Transducer Principles And Types Of Vibration Transducers, Sound

Level Meters, Noise Dosimeters, Analyzers And Signal Generators, Equipment For Data Acquisition, Noise And Vibration Measurements, Determination Of Sound Power Level And Emission Sound Pressure Level, Sound Intensity Measurements, Noise And Vibration Data Analysis, Calibration Of Measurement Microphones, Calibration Of Shock And Vibration Transducers, Metrology And Traceability Of Vibration And Shock Measurements.

TEXT BOOKS:

1. Clarence W. De Silva , "Vibration Monitoring, Testing, And Instrumentation ",CRC Press, 2007

2. David A.Bies And Colin H.Hansen "Engineering Noise Control: Theory And Practice "Spon Press, London, 2009

REFERENCES:

1. Allan G. Piersol ,Thomas L. Paez "Harris' Shock And Vibration Handbook" , McGraw-Hill , New Delhi, 2010

2. Colin H Hansen "Understanding Active Noise Cancellation" , Spon Press , London 2003

3. Matthew Harrison "Vehicle Refinement: Controlling Noise And Vibration In Road Vehicles ", ElsevierButterworth-Heinemann,Burlington,2004

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

Module III

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Reference Book:

1.Entrepreneurship Development and Management, Vasant Desai, HPH
2.Entrepreneurship Management, Bholanath Dutta, Excel Books
3.Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

Module II

E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center) , Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

Module IV

ERP IMPLEMENTATION: Planning Evaluation and selection of ERP systems, Implementation life cycle - ERP implementation, Methodology, Data Migration, Success and Failure factors of ERP Implementation. Extended ERP systems and ERP add-ons -CRM, SCM, Manufacturing prospective, Business analytics .

Reference Book:

1. E- Commerce and Enterprise Resource Planning ; CSV Murthy, HPH
2. Enterprise Resource Planning- Concepts and Practices ; V K Garg and N K Venkatkrishna, PHI
3. Enterprise Resource Planning; Alexix Leon ; TMH

PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

Module – II

Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

Module- III

Consumer Protection Law: Consumers, Rights of Consumers, Redressal Machinery under the Act, Procedure of Complaint, Relief available to the consumers, Procedure of filing appeal, Powers of Redressal agencies, Unfair Trade Practices. Overview of Competition Act,

Module – IV

Company Law:Indian Companies Act 2013, Salient features and Classes of Company. Lifting of corporate veil, Procedure of Incorporation and Certificate of commencement of business, Memorandum and Articles of Association, Doctrine of ultra vires and Indoor Management, Management of Company: Qualification, Appointment of Directors, Company Meetings, Resolutions, Winding-up of Companies and their modes.

Reference Books

1. Business Regulatory Framework–Mohapatra and Patra, HPH
2. Business Law – N D Kapoor, S Chand
3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PBM8J001/ PBM8J002	Hospital Engineering And Management/Biostatistics	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PBM8N201	Seminar	0-0-3	2	100	
2	PSI	PBM8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PBM8J001 HOSPITAL ENGINEERING AND MANAGEMENT

Objectives : To make the students aware of the role and responsibilities of biomedical engineer in hospitals, especially in the management of medical equipments, management of electrical supply, maintenance of electrical safety, etc.

Module I (13 hours)

Hospital various departmental Planning & Design(Radiology Dept, Nuclear Medicine, ICU, Central Sterilisation and OTs). BME services in hospitals - Role & responsibilities. Setting up of BME dept in a Hospital (Requirements & facilities). Introduction to safety measures: Electrical, Fire, Gas, Radiation and surveillance systems. Hospital Accreditation Protocols - ISO standards, NABH, AERB and JCI certification.Insurance Procedures for Medical Equipments.

Module II (13 hours)

Biomedical equipment Procurement procedure - purchase & contract procedures (CMC and AMC), selection testing and calibration and installation, Training to medical staffs - operating instructions. Management of medical equipments, Planned preventive maintenance system, preventive maintenance & repair

Module III (13 hours)

Hospital electrical supply & power systems - Hospital electrical systems, general power & lighting systems, Hospital wiring systems. Electrical safety, isolated power supply, line isolation monitor, IPS in patient care areas, concept of Micro and Macro shock, Earthing schemes, Generator sets, UPS & voltage stabilizers. Causes of failures of electrical supply & ways to minimize them. SYLLABUS - B.Tech. Biomedical Engineering - 2014. Teaching scheme Credits

Module IV (13 hours)

Basics of Air conditioning and refrigeration.Air changes filtering & sterility – Concept of Clean Room with Air Handling Unit (AHU). Hospital gas supply systems-centralized supply of air, oxygen, nitrous oxide & vacuum. Theatre lighting.Operating Tables. Requirements of inter departmental computerization. DBMS in hospital, Computerized medical record evaluation, Database approach to laboratory computerization, Case study on a hospital DBMS, Concept of DICOM. Safe management of wastes from health-care activities.

Text Books :

1. B.M.Sakharkar, Principles of Hospital administration & planning, Medical Publisher (?) Ltd, New Delhi, 1998.

2. J.G. Webster & Albert M.Cook, Clinical engineering principles & practices, Prentice Hall, 1979.

3. Barry. N. Feinberg, Applied clinical engineering, Prentice hall, 1986.

4. J. D. Bronzinot Handbook of Biomedical Engineering Vol. l & II, C RC Press, 2000.

5. Yadin David, et a1; Clinical Engineering (Principles and Applications in Engineering), CRC Press, 2003.

PBM8J002 BIOSTATISTICS

Module-I:

Introduction and definition of Biostatistics; Concept of variables in biological systems. Collection, Classification, tabulation graphical and diagrammatic representation of numerical data; Measures of central tendency: Mean, Median and Mode and their relationship; Measures of dispersion: Range, Quartile deviation, Mean deviation, Standard deviation, Concept of standard error, Coefficient of variation, Skew ness and Kurtosis.

Module-II:

Probability: Random experiment, events, sample space, mutually exclusive events, independent and dependent events; Various definitions of probability, addition and multiplication theorems of probability, Random variables (discrete and continuous), Probability density functions and its properties; Probability distributions: normal, Binomial, Poisson and their application.

Module-III:

Concept of populations and sample. Simple random sampling without replacement. Definition of simple random sample; Designing of Experiments-Random block design and Split plot design; Correlation and Regression, linear and quadratic regression;

Module-IV:

Analysis of variance: One- way and two-way classifications with single observation per cell. Duncan's multiple range test; Tests of significance: Chi-square, student's t, z and f-distributions, their properties and uses.

Text Books:

1. Biostatistics: Rao KS, Himalaya Publishing House
2. Introduction to Biostatistics & Research Methods: Sundar Rao PSS & Richard J, PHI learning Pvt. Ltd.
3. Biostatistics: Arora and Mohan, Himalaya Publishing House

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

Module III

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Reference Book:

1.Entrepreneurship Development and Management, Vasant Desai, HPH
2.Entrepreneurship Management, Bholanath Dutta, Excel Books
3.Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

Module II

E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center) , Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

Module IV

ERP IMPLEMENTATION: Planning Evaluation and selection of ERP systems, Implementation life cycle - ERP implementation, Methodology, Data Migration, Success and Failure factors of ERP Implementation. Extended ERP systems and ERP add-ons -CRM, SCM, Manufacturing prospective, Business analytics .

Reference Book:

1. E- Commerce and Enterprise Resource Planning ; CSV Murthy, HPH
2. Enterprise Resource Planning- Concepts and Practices ; V K Garg and N K Venkatkrishna, PHI
3. Enterprise Resource Planning; Alexix Leon ; TMH

PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

Module – II

Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

Module- III

Consumer Protection Law: Consumers, Rights of Consumers, Redressal Machinery under the Act, Procedure of Complaint, Relief available to the consumers, Procedure of filing appeal, Powers of Redressal agencies, Unfair Trade Practices. Overview of Competition Act,

Module – IV

Company Law:Indian Companies Act 2013, Salient features and Classes of Company. Lifting of corporate veil, Procedure of Incorporation and Certificate of commencement of business, Memorandum and Articles of Association, Doctrine of ultra vires and Indoor Management, Management of Company: Qualification, Appointment of Directors, Company Meetings, Resolutions, Winding-up of Companies and their modes.

Reference Books

1. Business Regulatory Framework–Mohapatra and Patra, HPH
2. Business Law – N D Kapoor, S Chand
3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PBT8J201/ PBT8J202	Bio-NanoTechnology/Hospital Engineering And Management	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PBT8N201	Seminar	0-0-3	2	100	
2	PSI	PBT8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PBT8J201 BIONANOTECHNOLOGY

PURPOSE

This course deals with applications resulting from the combination of biotechnology and nanotechnology in the fields of medicine and environment

INSTRUCTIONAL OBJECTIVES To focus on principles of Bionanotechnology and its applications

UNIT 1

INTRODUCTION TO BIONANOTECHNOLOGY 9 From Biotechnology to Bionanotechnology-Bionanomachines in action-Modern Biomaterials –The Legacy of Evolution

UNIT 2

BIOMOLECULAR DESIGN AND BIOTECHNOLOGY 9 Recombinant DNA technology-Monoclonal antibodies-Biomolecular structure determination-Molecular Medicine

UNIT 3

FUNCTIONAL PRINCIPLES OF BIONANOTECHNOLOGY 9 Information –Driven Nanoassembly-Energetics-Chemical transformation-Regulation-Biomolecular MotorsBiomolecular sensing-Self-replication- Machine –Phase Bionanotechnology

UNIT 4

NANOMEDICINE 9 Anti-AIDS drugs-Immunotoxins as cell killers-Artificial blood- Cyclic peptides from nanotubes

UNIT 5

APPLICATIONS OF BIONANOTECHNOLOGY 9 Harnessing molecular Motors-DNA computers-Molecular design using Biological selection-Artificial life-Hybrid materials-Biosensors

Total hours :45

TEXT BOOK:

1. Bionanotechnology by David S.Goodsell, 2004, Wiley Publications.

PBT8J202 HOSPITAL ENGINEERING AND MANAGEMENT

Objectives : To make the students aware of the role and responsibilities of biomedical engineer in hospitals, especially in the management of medical equipments, management of electrical supply, maintenance of electrical safety, etc.

Module I (13 hours)

Hospital various departmental Planning & Design(Radiology Dept, Nuclear Medicine, ICU, Central Sterilisation and OTs). BME services in hospitals - Role & responsibilities. Setting up of BME dept in a Hospital (Requirements & facilities). Introduction to safety measures: Electrical, Fire, Gas, Radiation and surveillance systems. Hospital Accreditation Protocols - ISO standards, NABH, AERB and JCI certification.Insurance Procedures for Medical Equipments.

Module II (13 hours)

Biomedical equipment Procurement procedure - purchase & contract procedures (CMC and AMC), selection testing and calibration and installation, Training to medical staffs - operating instructions. Management of medical equipments, Planned preventive maintenance system, preventive maintenance & repair

Module III (13 hours)

Hospital electrical supply & power systems - Hospital electrical systems, general power & lighting systems, Hospital wiring systems. Electrical safety, isolated power supply, line isolation monitor, IPS in patient care areas, concept of Micro and Macro shock, Earthing schemes, Generator sets, UPS & voltage stabilizers. Causes of failures of electrical supply & ways to minimize them. SYLLABUS - B.Tech. Biomedical Engineering - 2014. Teaching scheme Credits

Module IV (13 hours)

Basics of Air conditioning and refrigeration.Air changes filtering & sterility – Concept of Clean Room with Air Handling Unit (AHU). Hospital gas supply systems-centralized supply of air, oxygen, nitrous oxide & vacuum. Theatre lighting.Operating Tables. Requirements of inter departmental computerization. DBMS in hospital, Computerized medical record evaluation, Database approach to laboratory computerization, Case study on a hospital DBMS, Concept of DICOM. Safe management of wastes from health-care activities.

Text Books :

1. B.M.Sakharkar, Principles of Hospital administration & planning, Medical Publisher (?) Ltd, New Delhi, 1998.

2. J.G. Webster & Albert M.Cook, Clinical engineering principles & practices, Prentice Hall, 1979.

3. Barry. N. Feinberg, Applied clinical engineering, Prentice hall, 1986.

4. J. D. Bronzinot Handbook of Biomedical Engineering Vol. l & II, C RC Press, 2000.

5. Yadin David, et a1; Clinical Engineering (Principles and Applications in Engineering), CRC Press, 2003.

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

Module III

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Reference Book:

1.Entrepreneurship Development and Management, Vasant Desai, HPH
2.Entrepreneurship Management, Bholanath Dutta, Excel Books
3.Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

Module II

E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center) , Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

Module IV

ERP IMPLEMENTATION: Planning Evaluation and selection of ERP systems, Implementation life cycle - ERP implementation, Methodology, Data Migration, Success and Failure factors of ERP Implementation. Extended ERP systems and ERP add-ons -CRM, SCM, Manufacturing prospective, Business analytics .

Reference Book:

1. E- Commerce and Enterprise Resource Planning ; CSV Murthy, HPH
2. Enterprise Resource Planning- Concepts and Practices ; V K Garg and N K Venkatkrishna, PHI
3. Enterprise Resource Planning; Alexix Leon ; TMH

PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

Module – II

Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

Module- III

Consumer Protection Law: Consumers, Rights of Consumers, Redressal Machinery under the Act, Procedure of Complaint, Relief available to the consumers, Procedure of filing appeal, Powers of Redressal agencies, Unfair Trade Practices. Overview of Competition Act,

Module – IV

Company Law:Indian Companies Act 2013, Salient features and Classes of Company. Lifting of corporate veil, Procedure of Incorporation and Certificate of commencement of business, Memorandum and Articles of Association, Doctrine of ultra vires and Indoor Management, Management of Company: Qualification, Appointment of Directors, Company Meetings, Resolutions, Winding-up of Companies and their modes.

Reference Books

1. Business Regulatory Framework–Mohapatra and Patra, HPH
2. Business Law – N D Kapoor, S Chand
3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PCE8J001/ PCE8J002	Mineral Processing/ Nano-Technology	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PCE8N201	Seminar	0-0-3	2	100	
2	PSI	PCE8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PCE8J001 MINERAL PROCESSING

Module I:
Introduction andscope of mineral processing in extractive metallurgy. Ores and mineralresources in India and worldwide for basic metals like iron, copper, aluminium, lead, and zinc. Physical and chemical characteristics of industrial minerals.
Liberation and its significance. Size reduction:Crushing laws and crushing and grindingequipments. Screening theory and equipments. Classifiers: mechanical and hydraulic.

Module II:
Gravity concentration methods: tabling, jigging, heavy media separation,hydrocyclones, and spiral concentrators. Flotation: theory and equipments. Magnetic separation: HGMS, WHIMS, and SC-HGMS. Electrostatic separation: ion-bombardment and triboelectrostatic separators. Sedimentation theory and equipments - Thickeners and clarifiers.

Module III:
Thermal methods in processing of ores: Roasting, sintering, calcination, pelletisation, and briquetting. Chemical and electrochemical methods in mineral processing: Leaching – acid and bacterial leaching, amalgamation and cyanidation.

Module IV:
Beneficiation flow sheets of coal and simple ores of copper, lead, zinc, and iron with reference to Indian deposits.

Reference Books:

1. Handbook of Mineral Dressing: Ores and Industrial Minerals by A F Taggart, John Wiley.
2. Principles of Mineral Dressing by AMGaudin, McGraw-Hill.
3. Perry's Chemical Engineers' Handbook, 8th ed. by D W Green and R H Perry, McGraw-Hill.
4. Mechanical Operations, 1st ed. by A K Swain, H Patra, and G K Roy, McGraw-Hill.
5. Extraction of Nonferrous Metals by HSRay, R Sridhar, and KPAbraham, East West Press.
6. Mineral Processing Technology, 7th ed. by B A Wills and T J Napier-Munn, Butterworth-Heinemann.

PCE8J002 NANO TECHNOLOGY

Module I:
Importance and emergence of nanotechnology, challenges, current and futureresearch. Size dependence of properties, crystal structure, energy bands, insulators,semiconductors and conductors, gaps of semiconductors, Fermi surfaces, localizedparticles.

Module II:
Laws of thermodynamics applied to nanoscale systems; activity and the equilibriumconstant; solutions; phase relations; heterogeneous equilibria; free-energycompositiondiagrams and their relation to phase transitions; phase diagrams.

Module III:
Polymer based nanocrystals, supramolecular structures, polypeptide nanowire, andprotein nanoparticles. Microelectromechanical systems (MEMS), Nanoelectromechanical systems (NEMS): fabrication and application, molecular andsupramolecular switches. Optical and vibrational spectroscopy, luminescence,quantum wells, wires and dots.

Module IV:
Metal nanoclusters, semiconductor nanoparticles, rare gas and molecular clusters:synthesis and properties, carbon molecules and clusters, applications of carbonnanotubes. Nanostructured materials: solid disordered nanostructures, naturalnanocrystals, zeolites, photonic crystals, nanostructured multilayers.

Text and Reference Books:

1. Introduction to Nanotechnology by C Poole and F Owens, Wiley.
2. Nanotechnology: A Gentle Introduction to the Next Big Idea by D Ratner and M Ratner, Pearson Education.
3. Nanotechnology: Understanding Small Systems, 3rd ed. by B Rogers, J Adams, and S Pennathur, CRC Press.
4. Nanotechnology: Principles and Practices, 3rd ed. by S K Kulkarni, Capital Publishing Co.

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

Module III

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

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1.Entrepreneurship Development and Management, Vasant Desai, HPH
2.Entrepreneurship Management, Bholanath Dutta, Excel Books
3.Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

Module II

E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center) , Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

Module IV

ERP IMPLEMENTATION: Planning Evaluation and selection of ERP systems, Implementation life cycle - ERP implementation, Methodology, Data Migration, Success and Failure factors of ERP Implementation. Extended ERP systems and ERP add-ons -CRM, SCM, Manufacturing prospective, Business analytics .

Reference Book:

1. E- Commerce and Enterprise Resource Planning ; CSV Murthy, HPH
2. Enterprise Resource Planning- Concepts and Practices ; V K Garg and N K Venkatkrishna, PHI
3. Enterprise Resource Planning; Alexix Leon ; TMH

PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

Module – II

Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

Module- III

Consumer Protection Law: Consumers, Rights of Consumers, Redressal Machinery under the Act, Procedure of Complaint, Relief available to the consumers, Procedure of filing appeal, Powers of Redressal agencies, Unfair Trade Practices. Overview of Competition Act,

Module – IV

Company Law:Indian Companies Act 2013, Salient features and Classes of Company. Lifting of corporate veil, Procedure of Incorporation and Certificate of commencement of business, Memorandum and Articles of Association, Doctrine of ultra vires and Indoor Management, Management of Company: Qualification, Appointment of Directors, Company Meetings, Resolutions, Winding-up of Companies and their modes.

Reference Books

1. Business Regulatory Framework–Mohapatra and Patra, HPH
2. Business Law – N D Kapoor, S Chand
3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PCI8J001/ PCI8J002/	Environmental Geotechnique/ Theory Of Elasticity And Plasticity	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PCI8N201	Seminar	0-0-3	2	100	
2	PSI	PCI8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PCI8J001 ENVIRONMENTAL GEOTECHNIQUE

Module- I

Introduction: Scope, importance, waste generation, subsurface contamination, Geosynthetics: Types, manufacturing functions, applications and economics.

Module- II

Forms of waste and their properties: Municipal waste, mineral waste, industrial waste, hazardous waste, index properties, strength, compressibility and permeability of municipal and mineral waste.

Module- III

Selection of waste disposal sites, factors affecting site selection, siting criteria and siting rating method, Landfills for municipal and hazardous waste: components of land fills, layouts, daily cells, base lining systems, stability of slopes, constructing aspects.

Module- IV

Ash ponds and mine tailing impoundments: slurry deposition of mine tailing and coal ash in impoundments, layouts, components, design of tailing dam/ash dykes, slope stability. Remediation: Principle of remediation: Planning, source control, soil gas extraction, soil washing, and bioremediation.

Reference books:

1. Geotechnology of waste management, I. S. Oweis and R. P. Khera, Butterwarths, London.
2. Engineering with geosynthetics, Ed. G. V. Rao and G.V.S.S. Raju, Tata McGraw Hill
3. Geotechnical practice for waste disposal, D. E. Daniel, Chapman and Hall, London.

PCI8J002 THEORY OF ELASTICITY AND PLASTICITY

Module- I

Plane stress and plane strain problems. General stress and strain equations (Equilibrium and compatibility equations).Two dimensional problems in rectangular coordinates.

Module- II

Stress and strain components, differential equation, equilibrium equations and compatibility equations in polar coordinate. Stress distribution for axisymmetric problems. Pure bending of curved bars, thick walled cylinder. Concentrated force at a point of straight boundary. Force acting on the end of a wedge. Concentrated force acting on a beam. Effect of circular holes on stress distributions in plates.

Module- III

Stress and strain in three dimensions: Principles stresses, maximum shearing stress, principal axes of strain. Stretching of prismatical bar by its own axis. Elementary problems of elasticity in three dimension.

Module- IV

Torsion of non-circular prismatic bars. Saint Venant's theory. Various analogies. Torsion of hollow and thin section. Application of energy methods.

Module- V

Introduction to the theory of plasticity., the yield criteria of metals, stress space representation of yield criteria. stress-strain relations plastic potential, flow rules and maximum work hypothesis. Two dimensional plastic flow problems. Incompressible two dimensional flow, stresses in plastic materials in condition of plane strain, equation of equilibrium the simplest slip-line fields.

Essential Reading

1. S P Timoshenko and J N Goodier, Theory of Elasticity, Mc Graw Hill
2. Hoffman and Sachs, Theory of plasticity

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

Module III

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Reference Book:

1.Entrepreneurship Development and Management, Vasant Desai, HPH
2.Entrepreneurship Management, Bholanath Dutta, Excel Books
3.Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

Module II

E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center) , Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

Module IV

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PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

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Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

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2. Business Law – N D Kapoor, S Chand
3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PCS8J001/ PCS8J002	Algorithm for Bioinformatics/ Expert Systems	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PCS8N201	Seminar	0-0-3	2	100	
2	PSI	PCS8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PCS8J001 ALGORITHMS FOR BIOINFORMATICS

UNIT I – [10 HOURS]

DYNAMIC PROGRAMMING ALGORITHMS (9 hours) Introduction to Algorithms, Dynamic Programming, Sequence Alignment: Edit distance, LCS. PAM and BLOSUM Scoring Matrices. Global alignments: Needleman Wunsch Algorithm, Local Alignments: Smith Waterman Algorithm, Gap Penalties.

UNIT II- [8 HOURS]

GRAPH ALGORITHMS (9 hours) Graph Algorithms, SBH and Eulerian Paths, De-novo Peptide Sequencing: Longest Paths and Space Efficient Alignment Algorithms. Fast LCS using Table Lookup.

UNIT III- [10 HOURS]

PATTERN MATCHING AND CLUSTERING (9 hours) Exact Pattern Matching: KMP Algorithm, Keyword Trees, Aho-Corasick Algorithm. Clustering Basics: Hierarchical Clustering, Multiple Sequence Alignment: CLUSTAL, Center-based Clustering, Clustering via Cliques.

UNIT IV- [12 HOURS]

EVOLUTIONARY TRESS AND PHYLOGENY (9 hours) Evolutionary Trees and Ultrametrics, Additive distance trees, Perfect Phylogeny Problem, Small Parsimony Problem, Nearest Neighbor Interchange. HIDDEN MARKOV MODELS, RANDOMIZED ALGORITHMS (9 hours) Hidden Markov Models: Basics, Forward and Backward (Viterbi) Algorithms, Randomized algorithms and their applications.

REFERENCES

1. Neil C. Jones and Pavel A. Pevzner, “An Introduction to Bioinformatics Algorithms”, MIT Press, 2005.

2. Gusfields D, “Algorithms on strings, trees and sequences: Computer Science and Computational Biology”, Cambridge University Press, 1997.

3. Steffen Schulze-Kremer, “Molecular Bioinformatics: Algorithms and Applications”, Walter de Gruyter, 1996.

4. Gary Benson, Roderic Page (Eds.), “Algorithms in Bioinformatics”, Springer International Edition, 2004.

5. Richard Durbin, Sean R. Eddy, Anders Krogh, Graeme Mitchison. “Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acid”, Cambridge University Press, 1999.

PCS8J002 EXPERT SYSTEMS

UNIT I – [10 HOURS]

The meaning of an expert system, problem domain and knowledge domain, the advantages of an expert system, general stages in the development of an expert system, general characteristics of an expert system, history and uses of expert systems today, rule-based expert systems, procedural and nonprocedural paradigms, characteristics of artificial neural systems. -The study of logic, difference between formal logic and informal logic, meaning of knowledge, how knowledge can be represented, semantic nets, how to translate semantic nets into PROLOG, limitations of semantic nets, schemas, frames and their limitations, how to use logic and set symbols to represent knowledge, the meaning of propositional and first order predicate logic, quantifiers, imitations of propositional and predicate logic.

UNIT II- [10 HOURS]

Trees, lattices, and graphs, state and problem spaces, AND-OR trees and goals, methods of inference, rules of inference, limitations of propositional logic, logic systems, resolution rule of inference, resolution systems, and deduction, shallow and causal reasoning, applying resolution to first-order predicate logic, forward and backward chaining, additional methods of reference, Meta knowledge, the Markov decision process.

UNIT III- [10 HOURS]

The meaning of uncertainty and theories devised to deal with it, types of errors attributed to uncertainty, errors associate, with induction, features of classical probability, experimental and subjective probabilities, compound and conditional probabilities, hypothetical reasoning and backward induction, temporal reasoning, Markov chains, odds of belief, sufficiency and necessity, role of uncertainty in inference chains, implications of combining evidence, role of inference nets in expert systems, how probabilities are propagated.

UNIT IV- [10 HOURS]

Sources of uncertainty in rules, methods of dealing with uncertainty, Dempster-Shafer theory, theory of uncertainty based on fuzzylogic, commercial applications of fuzzy logic. How to select an appropriate problem, the stages in the development of an expert system, types of errors to expect in the development stages, the role of the knowledge engineer in the building of expert systems, the expected life cycle of an expert system, how to do a life cycle model.

Textbook:

1. J. Giarratano and G. Riley, "Expert Systems -- Principles and Programming". 4th Edition, PWS Publishing Company, 2004.
2. Durkin, J., Expert systems Design and Development, Macmillan, 1994 2. Elias M. Awad, Building Expert Systems, West Publishing Company 1996

3. Peter Jackson, Introduction to Expert Systems, Addison Wesley Longman, 1999.ISBN 0-20187686-8.
4. Gonzalez and D. Dankel, "The Engineering of Knowledge-Based Systems'', Prentice Hall, 1994.
5. Nikolopoulos, "Expert Systems", Marcel Dekker Inc. 1997. ISBN 0 8247 9927 5

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

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Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

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1.Entrepreneurship Development and Management, Vasant Desai, HPH
2.Entrepreneurship Management, Bholanath Dutta, Excel Books
3.Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

Module II

E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center) , Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

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2. Enterprise Resource Planning- Concepts and Practices ; V K Garg and N K Venkatkrishna, PHI
3. Enterprise Resource Planning; Alexix Leon ; TMH

PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

Module – II

Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

Module- III

Consumer Protection Law: Consumers, Rights of Consumers, Redressal Machinery under the Act, Procedure of Complaint, Relief available to the consumers, Procedure of filing appeal, Powers of Redressal agencies, Unfair Trade Practices. Overview of Competition Act,

Module – IV

Company Law:Indian Companies Act 2013, Salient features and Classes of Company. Lifting of corporate veil, Procedure of Incorporation and Certificate of commencement of business, Memorandum and Articles of Association, Doctrine of ultra vires and Indoor Management, Management of Company: Qualification, Appointment of Directors, Company Meetings, Resolutions, Winding-up of Companies and their modes.

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2. Business Law – N D Kapoor, S Chand
3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	**PE**	PEI8J001/ PEI8J002	Digital Image Processing/ Embedded Systems	3-0-0	3	100	50
2	**OE**	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	**PSI**	PEI8N201	Seminar	0-0-3	2	100	
2	**PSI**	PEI8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PEI8J001 DIGITAL IMAGE PROCESSING

University level: 80%

Module: 1 (12 hours)

Introduction: Digital Image fundamentals: Image sensing and acquisition, Image sampling and quantization, relationship between pixels, Intensity transformations and spatial filtering, some basic intensity transformation functions, Histogram processing, spatial filters for smoothing and sharpening (Chapt: 2 & 3 of Text book 1)

Module: 2 (12 hours)

Filtering in the Frequency Domain: preliminary concepts, 2D DFT and its properties, basic filtering in the frequency domain, image smoothing and sharpening (Chapt: 4 of Text book 1)
Image Restoration and Reconstruction: Image restoration/degradation model, noise models, restoration in the presence of noise only, estimating the degradation function (Chapt: 5 of Text Book 1)

Module: 3 (12 hours)

Color Image Processing: color models, Color transformation (Chapt: 6 of Text book 1). Wavelets and Multi-resolution Processing: multiresolution expansions, wavelet transforms in one and two dimension (Chapt: 7 of Text book 1)

Module: 4 (12 hours)

Image Compression: Fundamentals, Error-free compression: variable length coding, LZW coding. Lossy compression: lossy predictive coding (Chapt: 8 of Text book 1)
Morphological Image Processing: Erosion and Dilation, opening and closing (Chapt: 9 of Text book 1)

Text Books:

1. R.C. Gonzalez, R.E. Woods, *Digital Image Processing*, 3rd Edition, Pearson Education
2. R C Gonzalez, Woods and Eddins, *Digital Image Processing using Matlab*, 2nd Edition, Tata McGraw Hill

Reference Books:

1. *S.Sridhar, Digital Image Processing, Oxford University Press, 2011*

PEI8J002 EMBEDDED SYSTEMS

University Level: 80%

MODULE – I 10 Hours

Embedded System: Understanding the Basic Concepts:
Introduction to Embedded System: Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification of Embedded Systems, Major Application Areas of Embedded Systems, Purpose of Embedded Systems, 'Smart' running shoes from Adidas – The Innovative bonding of Life Style with Embedded Technology.
The Typical Embedded System: Core of the Embedded System, Memory, Sensors and Actuators, Communication Interface, Embedded Firmware, Other System Components, PCB and Passive Components.

MODULE – II 12 Hours

Characteristics and Quality Attributes of Embedded System: Characteristics of Embedded System, Quality Attributes of Embedded System.
Embedded Systems – Application and Domain Specific: Washing Machine – Application Specific Embedded System, Automotive – Domain Specific Example for Embedded System.
Hardware Software Co-Design and Program Modeling: Fundamental Issues in Hardware Software Co-Design, Computational Models in Embedded Design, Introduction to Unified Modeling Language (UML), Hardware Software Trade-offs.

MODULE – III 12 Hours

Design and Development of Embedded Product:
Embedded Hardware Design and Development: Analog Electronic Components, Digital Electronic Components, VLSI and Integrated Circuit Design, Electronic Design Automation (EDA) Tools.
Embedded Firmware Design and Development: Embedded firmware Design Approaches, Embedded firmware Development Languages, Programming in Embedded 'C'.
Real Time Operating System (RTOS) based Embedded System Design: Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling, Threads, Processes and Scheduling: Putting them altogether, Task Communication, Task Synchronisation, Device Drivers, How to choose an RTOS.

MODULE – IV 14 Hours

Design and Development of Embedded Systems:
An Introduction to Embedded System Design with VxWorks and MicroC/OS-II (□COS-II) RTOS:

VxWorks, MicroC/OS-II (COS-II).
Integration and Testing of Embedded Hardware and Firmware: Integration of Hardware & Firmware, Board Power up.
The Embedded System Development Environment: Integrated Development Environment (IDE), Types of files generated on cross-compilation, Disassembler/Decompiler, Simulators, Emulators & Debugging, Target Hardware Debugging, Boundary Scan.
Product Enclosure Design & Development: Product Enclosure Design Tools, Product Enclosure Development Techniques

Text Book:

1. Shibu K.V., *Introduction to Embedded Systems*, Tata McGraw Hill Education Private Limited, New Delhi, 2009.

Reference Book:

2. *J.K.Peckol, Embedded Systems, A Contemporary Design Tool, Wiley Student edition,*
3. *Peter Marwedel, Embedded System Design,Springer, 2006 http://ls12-www.cs.uni- dortmund.de/~marwedel/kluwer-es-book/*
4. *Wayne Wolf, Computers as Components, Morgan Kaufmann,*
5. *2001 http://www.ee.princeton.edu/~wolf/embedded-book*
6. *Michael Barr, Programming Embedded Systems in C and C++, O'Reilly, 1999.*
7. *David E. Simon, An Embedded Software Primer, Addison Wesley, 1999.*
8. *Jack Ganssle, The Art of Designing Embedded Systems, Newnes, 2000.*
9. *K. Short, Embedded Microprocessor System Design, Prentice Hall, 1998.*
10. *C. Baron, J. Geffroy and G. Motet, Embedded System Applications, Kluwer, 1997.*
11. *Raj Kamal, Embedded Systems – Architecture, Programming and Design,*
12. *Tata McGraw Hill Publishing Company Limited, New Delhi*

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

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PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

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PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

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3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PET8J001/ PET8J002/ PET8J003/ PET8J004	Mobile Computing/ Biomedical Signal Processing/ Electronic Design Automation/ Database Management System	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PET8N201	Seminar	0-0-3	2	100	
2	PSI	PET8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PET8J001 MOBILE COMPUTING

MODULE – I **(10 Hours)**

Introduction to Personal Communications Services (PCS): PCS Architecture, mobility management, Networks signaling; Global System for Mobile Communication (GSM) System.

Overview: GSM Architecture, Mobility management, Network signaling; General Packet Radio Services (GPRS): GPRS Architecture, GPRS Network Nodes, Mobile Data Communication; WLANs (Wireless LANs) IEEE 802.II standard.

MODULE–II **(14 Hours)**

Wireless Application Protocol (WAP): The Mobile Internet standard, WAP Gateway and Protocols, wireless mark up Languages (WML).

Wireless Local Loop (WLL): Introduction to WLL Architecture, wireless Local Loop Technologies. Third Generation (3G) Mobile Services: Introduction to International Mobile Telecommunications 2000 (IMT 2000) Vision.

MODULE–III **(4 Hours)**

Global Mobile Satellite Systems; case studies of the IRIDIUM, ICO and GLOBALSTAR systems.

MODULE-IV **(8 Hours)**

Wireless Enterprise Networks: Introduction to Virtual Networks, Blue tooth technology, Blue tooth Protocols; Server-side programming in Java, Pervasive web application architecture, Device independent example application.

ADDITIONAL MODULE (Terminal Examination-Internal) (6 Hours)

Wideband Code Division Multiple Access (W-CDMA) and CDMA 2000; Mobile IP.

Text Books

1. Mobile Communication, J. Schiller, Pearson Education,2nd Edition,2003
2. Mobile Computing, Raj Kamal, Oxford University Press
3. Pervasive Computing, Burkhardt, Pearson Education,2002.
4. Mobile Computing, Talukder, TMH, 2nd Edition,2010.

Reference Books

1. Wireless Communication & Networking, Garg, Elsevier,1st Edition,2007.
2. Mobile Computing,P.K. Patra, S.K. Dash, Scitech Publications,2011
3. Principles of Mobile Computing, Hansmann, Merk, Springer, 2nd Edition,2003.
4. Third Generation Mobile Telecommunication Systems, P. Stavronlakis, Springer,1st Edition,2001.
5. The Wireless Application Protocol, Sandeep Singhal, Pearson Education,2000.

PET8J002 BIOMEDICAL SIGNAL PROCESSING

MODULE-I **(8 Hours)**

Introduction to Biomedical Signals: Tasks in Biomedical Signal Processing, Computer Aided Diagnosis, Examples of Biomedical signals: ECG, EEG, EMG etc., Review of linear systems, Fourier Transform and Time Frequency Analysis (Wavelet) of biomedical signals, Processing of Random & Stochastic signals, spectral estimation.

MODULE-II **(8 Hours)**

Cardio-logical Signal Processing: Pre-processing, QRS Detection Methods, Rhythm analysis, Arrhythmia Detection Algorithms, Automated ECG Analysis, ECG Pattern Recognition, Heart rate variability analysis.

MODULE-III **(8 Hours)**

Adaptive Noise Canceling: Principles of Adaptive Noise Canceling, Adaptive Noise Canceling with the LMS adaptation, Algorithm, Noise Canceling Method to Enhance ECG Monitoring, Fetal ECG Monitoring.

MODULE-IV **(8 Hours)**

Neurological Signal Processing: Modeling of EEG Signals, Detection of spikes and spindles, Detection of Alpha, Beta and Gamma Waves, Auto Regressive (A.R.) modeling of seizure EEG, Sleep Stage analysis, Inverse Filtering.

ADDITIONAL MODULE (Terminal Examination-Internal) **(6 Hours)**

Properties and effects of noise in biomedical instruments;Filtering in biomedical instruments; Least squares and polynomial modeling;

Reference Books

1. Biomedical Signal Processing: Principles and techniques, D.C.Reddy, Tata McGraw Hill, New Delhi, 2005.
2. Biomedical Signal Processing, Willis J Tompkins, Prentice Hall, 1993
3. Biomedical Signal Analysis, R. Rangayan, Wiley, 2002.
4. Biomedical Signal Processing & Signal Modeling, Eugene N. Bruce, Wiley, 2001.
5. Biomedical Signal and Image Processing, K. Najarian and R. Splinter, The CRC Press, Second Edition.

PET8J003 ELECTRONIC DESIGN AUTOMATION

MODULE-I

MOSFET small signal model, MOSFET parasitic capacitance value and modification in model. Scaling of MOS structure; SPICE level -1, level-2 and level 3 model; BSIM and CSIM models; Comparison between models. Layout generation, Design checking rules, Lamda, beta rule, routing: auto routing,

MODULE-II

Advance programming using VHDL. Component level programming. Library files, type\ declaration and usage, parameter types and overloading, types and type related issues, predefined and user-defined attributes, package declaration and usage.

MODULE-III

Introduction to CADENCE, Use of CADENCE, Basic modeling using CADENCE, Layout generation using CADENCE. Introduction to low power IC design using CAD tools,

MODULE-IV

Delta delay modeling, insertion and transport delay. Use of signal drivers. Multiple processes

ADDITIONAL MODULE (Terminal Examination-Internal)

Device floor planning basics, Case study of a low power OPAMP design and layout generation.

Text book

1. Electronics Design Automation: Synthesis, verification & Test (System on Silicon)- Laung-Terng Wang, Morgan Kaufmann,2009
2. Essential Electronics design Automation (EDA)- Mark D.Birnbaum, Prentice Hall,2004

PET8J004 DATABASE MANAGEMENT SYSTEM

MODULE-I

Introduction - Evolution of database systems, overview of database management systems.
Entity-relationship model - Basic Concepts, Constraints, Keys, Design Issues, Entity-Relationship Diagrams, The Unified Modeling Language (UML), Class Diagrams.

MODULE-II

Relational Model - Structures of relational databases, integrity constraints; Logical database design – ER to relational, relational algebra, relational calculus, functional dependencies, multi-valued dependencies, normal forms, Decompositions into normalized relations.

MODULE-III

SQL – Simple queries, queries with more than one relation, sub queries, full relation operations, Database modifications, View definitions.

MODULE-IV

Issues in Physical Database Design – physical data storage, raid disk organization technique; file structures – sequential file organization, indices, b-trees, hash tables.

ADDITIONAL MODULE (Terminal Examination-Internal)

Details of Relational Algebra – Basic operators, extended operators, constraints.

Text Books

1. Data Base Management System Raghu Ramakrishnan, McGraw-Hill , 3rd edition,2002 .
2. Reading in Data Base Systems, Joseph M. Hellerstein, The MIT Press,4th Edition,2005.

Reference Books

1. Database system concepts, Abraham Silberschatz, Henry F Korth and Sudharshan S McGraw Hill Publishin Company Limited,1St Edition,2004.
2. Database Management System - Post, Gerald V ,Tata McGraw-Hill, 2004.
3. Fundamentals of Database Syste,Elmasri,R.A.,Navathe,Shyam B.Narosa Publishing House,2nd Edition ,1997.
4. An introduction to Database Systems - Bipin C Desai Galgotia Publication ,4th Edition, 2005

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

Module III

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Reference Book:

1.Entrepreneurship Development and Management, Vasant Desai, HPH
2.Entrepreneurship Management, Bholanath Dutta, Excel Books
3.Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

Module II

E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center) , Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

Module IV

ERP IMPLEMENTATION: Planning Evaluation and selection of ERP systems, Implementation life cycle - ERP implementation, Methodology, Data Migration, Success and Failure factors of ERP Implementation. Extended ERP systems and ERP add-ons -CRM, SCM, Manufacturing prospective, Business analytics .

Reference Book:

1. E- Commerce and Enterprise Resource Planning ; CSV Murthy, HPH
2. Enterprise Resource Planning- Concepts and Practices ; V K Garg and N K Venkatkrishna, PHI
3. Enterprise Resource Planning; Alexix Leon ; TMH

PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

Module – II

Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

Module- III

Consumer Protection Law: Consumers, Rights of Consumers, Redressal Machinery under the Act, Procedure of Complaint, Relief available to the consumers, Procedure of filing appeal, Powers of Redressal agencies, Unfair Trade Practices. Overview of Competition Act,

Module – IV

Company Law:Indian Companies Act 2013, Salient features and Classes of Company. Lifting of corporate veil, Procedure of Incorporation and Certificate of commencement of business, Memorandum and Articles of Association, Doctrine of ultra vires and Indoor Management, Management of Company: Qualification, Appointment of Directors, Company Meetings, Resolutions, Winding-up of Companies and their modes.

Reference Books

1. Business Regulatory Framework–Mohapatra and Patra, HPH
2. Business Law – N D Kapoor, S Chand
3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

B.Tech (Electrical Engineering) Syllabus for Admission Batch 2015-16, 8th Semester

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PEE8J001/ PEE8J002	Smart Grid/ PLC & SCADA	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PEE8N201	Seminar	0-0-3	2	100	
2	PSI	PEE8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PEE8J001 SMART GRID

Module-I:

Evolution of Electric Power Grid, introduction to smart Grid, Concept, definitions, architecture and functions of Smart Grid. Need of Smart Grid. Difference between conventional & smart grid. Opportunities & Challenges of Smart Grid,

Introduction to Smart Meters, Real Time Pricing, Smart Appliances. Automatic Meter Reading(AMR). Outage Management System(OMS). Home & Building Automation, Substation Automation, Feeder Automation, Smart Sensors, Geographic Information System (GIS). Intelligent Electronic Devices(IED) & their application for Monitoring & Protection.

Module-II:

Phasor Measurement Units (PMU), Wide Area Measurement System (WAMS), Wide-Area based Protection and Control

Micro-grid concepts, need and application, Issues of Interconnection. Protection & control systems for micro-grid.
Storage systems including Battery, SMES, Pumped Hydro. Compressed Air Energy Storage.

Module-III:

Variable speed wind generators, fuel-cells, micro-turbines. Integration of renewables and issues involved, Advantages and disadvantages of Distributed Generation.

Power Quality & EMC in smart Grid. Power Quality issues of Grid connected Renewable Energy Sources. Power Quality Conditioners for micro-grid. Web based Power Quality monitoring, Power Quality Audit.

Suggested Books:

1. Ali Keyhani, “Design of Smart power grid renewable energy systems” ,Wiley IEEE,2011.
2. Clark W. Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”,CRCPress, 2009.
3. Stuart Borlase, “ Smart Grid: Infrastructure,Technology and solutions “ CRC Press.
4. Janaka Ekanayake, Nick Jenkins, KithsiriLiyanage, Jianzhong Wu, Akihiko Yokoyama, “Smart Grid: Technology and Applications”, Wiley.
5. Andres Carvallo, John Cooper, “The Advanced Smart Grid: Edge Power Driving Sustainability: 1”, Artech House Publishers July 2011
6. Mladen Kezunovic, Mark G. Adamiak, Alexander P. Apostolov, Jeffrey George Gilbert “Substation Automation (Power Electronics and Power Systems)”, Springer

PEE8J002 PLC and SCADA

Module: I

PLC and I/O processing: Programmable Logic Controller basics, overview of PLC systems – Architecture of PLC, Principle of Operation, input/output **Unit**s – power supplies and isolators, current sinking and current sourcing, types of PLC memory, fundamental PLC wiring diagram, relays, switches, transducers, sensors –seal-in circuits. Input/output units Signal conditioning. Remote connections Networks Processing inputs I/O addresses

Module: II

Programming of PLC: Fundamentals of logic, PLC programming languages. Ladder diagrams, Ladder Diagram Instruction, Logic functions, Latching, Multiple outputs.

Timer and counter- types along with timing diagrams, shift registers, sequencer function, latch instruction; Arithmetic and logical instruction with various examples.

ON/OFF switching devices, I/O analog devices, Analog PLC operation, PID control of continuous processes, simple closed loop systems, closed loop system using Proportional, Integral & Derivative (PID), PLC interface, and Industrial process example.

Module: III

PLC interface to various circuits: Encoders, transducer and advanced sensors. Measurement of temperature, flow, pressure, force, displacement, speed, level.

Developing a ladder logic for Sequencing of motors, Tank level control, ON-OFF temperature control, elevator, bottle filling plant, car parking etc.

Motors Controls: AC Motor starter, AC motor overload protection, DC motor controller, Variable speed (Variable Frequency) AC motor Drive.

.

Module: IV

SCADA Systems: Introduction, Communication requirements, Desirable Properties of SCADA system, features, advantages, disadvantages and applications of SCADA. SCADA Architectures (First generation - Monolithic, second generation - Distributed, Third generation – Networked Architecture), SCADA systems in operation and control of interconnected power system, Power System Automation (Automatic substation control and power distribution).

Open systems interconnection (OSI) Model, Process Field bus (Profibus). Interfacing of SCADA with PLC.

Text Books:

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Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

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PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

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PEL8J002 PLC and SCADA

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PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

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PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

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PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

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3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PEN8J001/ PEN8J002	IndustrialWasteWater Treatment/Environmental Nanotechnology	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PEN8N201	Seminar	0-0-3	2	100	
2	PSI	PEN8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PEN8J001 INDUSTRIAL WASTEWATER TREATMENT

Module I

Sources and characteristics of industrial wastewater; management of Industrial wastewater-volumereduction, neutralization, equalization and proportioning, treatment and disposal, Chemical Treatment.

Module II

Design and operation of advanced treatment process-adsorption, activated carbon column;, ion exchange,RO process, stripping towers (ammonia stripping), Ozonation Unit operation.

Module III

Wastewater treatmentmethodologies andenvironmental issues for specific industries - chlor-alkali, electroplating, distillery, dairy, tannery, pulpand paper, textile, dye, fertilizer, refinery, pharmaceutical, iron & steel, coke ovens, coal washeries, minewastewater.

Module IV

Management and treatment of acid mine drainage; Industrial complexing for zero pollutionattainment, Common effluent treatment plant (CETP): design, operation and maintenance aspects.

Books and References

1. Wastewater Treatment Plants: Planning, Design and Operation- S.R..Qasim, Holt, Rinehart & Winston, NY, 1985
2. Industrial Water Pollution Control –WW Eckenfelder, Jr., McGraw -Hill , 2nd Edition, NY 1989
3. Wastewater Engineering (including Air Pollution)- B.C. Punmia, Ashok Jain, Arunjain-Laxmi Publications, New Delhi, 2nd Ed.
4. Sewage disposal and air pollution Engineering,- S.K. Garg, Khanna Publishers, Delhi, 8th Ed.

PEN8J002 ENVIRONMENTAL NANOTECHNOLOGY

Module I

Nanotechnology and the environment, nanotechnology and our energy challenge; nanomaterials fabrication.

Module II

Methods for structural and chemical characterization of nanomaterials; instrumentation for nanotechnology, reactive oxygen species generation on nanoparticulate material.

Module III

Principles and procedures to assess nanomaterial toxicity; toxicological impacts of nanomaterials; nanoparticle transport, aggregation, and deposition.

Module IV

Nanomaterials for groundwater remediation; membrane processes; nanomaterials as adsorbents; assessing lifecycle risks of nanomaterials, longevity of nanoparticles.

Books & References:

1. Nanotechnology: Fundamentals and Applications by ManasiKarkare, I. K. International Pvt Ltd.
2. Nanotechnology and the environment: applications and implications by Barbara Karn. AmericanChemical Society.
3. Nanotechnology and the Environment by by Kathleen Sellers, Christopher Mackay, Lynn L.Bergeson, Stephen R. Clough, Marilyn Hoyt, Julie Chen, Kim Henry, Jane Hamblen Press.
4. Environmental and Human Health Impacts of Nanotechnology by Jamie R. Lead, Emma Smith JohnWiley & Sons.
5. Environmental Nanotechnology: Applications and Impacts of Nanomaterials- Mark Wiesner, Jean-Yves Bottero,McGraw Hill.

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

Module III

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Reference Book:

1.Entrepreneurship Development and Management, Vasant Desai, HPH
2.Entrepreneurship Management, Bholanath Dutta, Excel Books
3.Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

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E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center) , Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

Module IV

ERP IMPLEMENTATION: Planning Evaluation and selection of ERP systems, Implementation life cycle - ERP implementation, Methodology, Data Migration, Success and Failure factors of ERP Implementation. Extended ERP systems and ERP add-ons -CRM, SCM, Manufacturing prospective, Business analytics .

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2. Enterprise Resource Planning- Concepts and Practices ; V K Garg and N K Venkatkrishna, PHI
3. Enterprise Resource Planning; Alexix Leon ; TMH

PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

Module – II

Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

Module- III

Consumer Protection Law: Consumers, Rights of Consumers, Redressal Machinery under the Act, Procedure of Complaint, Relief available to the consumers, Procedure of filing appeal, Powers of Redressal agencies, Unfair Trade Practices. Overview of Competition Act,

Module – IV

Company Law:Indian Companies Act 2013, Salient features and Classes of Company. Lifting of corporate veil, Procedure of Incorporation and Certificate of commencement of business, Memorandum and Articles of Association, Doctrine of ultra vires and Indoor Management, Management of Company: Qualification, Appointment of Directors, Company Meetings, Resolutions, Winding-up of Companies and their modes.

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2. Business Law – N D Kapoor, S Chand
3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PFT8J001/ PFT8J002/ PFT8J003	Costing in Apparel Industry /Clothing Comfort/ Textile and Apparel Exim Management	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PFT8N201	Seminar	0-0-3	2	100	
2	PSI	PFT8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PFT8J001 COSTING IN APPAREL INDUSTRY

OBJECTIVE:

To facilitate better understanding of apparel costing and foreign exchange management

Module - 1

Costing as an aid to management-Elements of cost, treatment of stock, Cost terms related to income measurement, profit planning and cost control for apparel industry – material cost, labour cost, overhead cost.

Module – 2

Methods of costing – Job, Batch and contract costing, Process costing; waste cost and its control in a textile mill, Joint and by-product costing, Unit cost; Costing of fabrics; costing of apparel – accounting of prime costs and overhead costs, allocation of overheads; cost sheet preparation

Module-3

Techniques of cost analysis and control - Absorption and marginal costing, cost-volume-profit-analysis, break-even point, contribution margin, margin of safety, standard costing, budgetary control, productivity and value anaylsis,

Module -4

Foreign exchange mechanisms, exchange rates; foreign exchange exposure management – risks, strategies to reduce risk

REFERENCES:

1. Pandey I. M., “Financial Management”, Vikas Publishing House Pvt. Ltd., New Delhi, 8th

Edition, 1999, 59

2. Prasanna Chandra, “Financial Management, Theory and Practice, Tata McGraw-Hill

Publishing Company Ltd, 5th Edition, New Delhi, 2001

3. Aswat Damodaran, “Corporate Finance Theory and Practice”, John Wiley & Sons, 2000

4. James C., Van Home., "Financial Management and Policy", Prentice Hall of India Pvt. Ltd., New Delhi, 1980

5. Thukaram Rao M.E., "Cost and Management Accounting" New Age International, Bangalore, 2004

6. Khan and Jain, "Basic financial Management & Practice", Tata McGraw Hill, New Delhi, 5th edition,2001

PFT8J002 CLOTHING COMFORT

OBJECTIVES:

To enable the students to learn about the

- Important characteristics of the fabric responsible for its comfort properties and
- Different phenomena which take place in the fabric related to the comfort properties of the fabric

Module- I

Comfort – types and definition; human clothing system, comfort perception and preferences

Module- II

Psychological comfort; neuro-physiological comfort-basis of sensory perceptions; measurement techniques - mechanical stimuli and thermal stimuli

Module- III

Thermo physiological comfort – thermoregulatory mechanisms of the human body, role of clothing on thermal regulations

Heat and moisture transfer – moisture exchange, wearer's temperature regulations, effect of

physical properties of fibres, behaviour of different types of fabrics

Module- IV

Fabric tactile and mechanical properties - fabric prickliness, itchiness, stiffness, softness,

smoothness, roughness, and scratchiness; predictability of clothing comfort performance

REFERENCES:

1. Apurba Das., and Alagirusamy R., "Science in clothing comfort", Wood head Publishing

India Pvt. Ltd., India, 2010, ISBN: 1845697898 | ISBN-13: 9781845697891

2. Guowen Song., "Improving comfort in clothing", Wood head Publishing Ltd., UK, 2011,

ISBN: 1845695399 | ISBN-13: 9781845695392

3. Ukponmwan J.O., "The Thermal-insulation Properties of Fabrics", Textile Progress

24:4, 1-54, Taylor and Francis, UK, 1993, ISBN: 1870812654 | ISBN-13:

9781870812658.

4. Hassan M. Behery., "Effect of Mechanical and Physical Properties on Fabric Hand",

Wood head Publishing Ltd.,2005, ISBN: 1855739186 | ISBN-13: 9781855739185

5. Li Y., "The Science of Clothing Comfort", Textile Progress 31:1-2, Taylor and Francis,

PFT8J003 TEXTILE AND APPAREL EXIM MANAGEMENT

OBJECTIVE:

 To give the students an exposure on international market for textile products, regulations with respect to export and import of textiles.

Module- I

International markets scenario of yarns, woven fabrics; apparel and knitted garments for cotton, silk, jute, wool and other fibres; export and import of textiles by India – current status, promotional activities

Module- II

International markets for carpets and home textiles – product types, market potential and statistics, India - current status and promotional activities, role of export promotional councils

Module- III

Marketing – strategies, global brand building; logistics & SCM; role of export finances & EXIM banking, ECGC, Indian council of arbitration, FERA; impact of foreign trade on Indian economy

Module- IV

Exim policy - customs act, acts relating to export/import of textile and apparel; Indian customs formalities - export documentation for excisable goods, import documentation, clearance of import goods; concepts - 100% export oriented units, export processing zones, special economic zones; duty drawback procedure; import/export incentives; licenses; case study

REFERENCES:

1. Charles W.I. Hill and Arun Kumar Jain, “International Business”, 6th edition, Tata Mc Graw Hill, 2009

2. John D. Daniels and Lee H. Radebaugh, “International Business”, Pearson Education Asia,New Delhi, 2000

3. K. Aswathappa, “International Business”, Tata Mc Graw Hill, 2008

4. Michael R. Czinkota, IlkkaA. Ronkainen and Michael H. Moffet, “International Business”, Thomson, Bangalore, 2005

5. Aravind V. Phatak, Rabi S. Bhagat and Roger J. Kashlak, “International Management”, Tata Mc Graw Hill, 2006

6. Oded Shenkar and Yaong Luo, “International Business”, John Wiley Inc., Noida, 2004

7. Datey V.S., “Taxmann’s Indirect Taxes”, Taxmann Publications, 2008

8. Kapoor D.C., “Export Management”, Vikas Publishing House Pvt.

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

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Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

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2.Entrepreneurship Management, Bholanath Dutta, Excel Books
3.Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

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Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

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PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

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2. Business Law – N D Kapoor, S Chand
3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PIT8J001/ PIT8J002	Algorithm for Bioinformatics/ Expert Systems	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PIT8N201	Seminar	0-0-3	2	100	
2	PSI	PIT8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PIT8J001 ALGORITHMS FOR BIOINFORMATICS

UNIT I – [10 HOURS]

DYNAMIC PROGRAMMING ALGORITHMS (9 hours) Introduction to Algorithms, Dynamic Programming, Sequence Alignment: Edit distance, LCS. PAM and BLOSUM Scoring Matrices. Global alignments: Needleman Wunsch Algorithm, Local Alignments: Smith Waterman Algorithm, Gap Penalties.

UNIT II- [8 HOURS]

GRAPH ALGORITHMS (9 hours) Graph Algorithms, SBH and Eulerian Paths, De-novo Peptide Sequencing: Longest Paths and Space Efficient Alignment Algorithms. Fast LCS using Table Lookup.

UNIT III- [10 HOURS]

PATTERN MATCHING AND CLUSTERING (9 hours) Exact Pattern Matching: KMP Algorithm, Keyword Trees, Aho-Corasick Algorithm. Clustering Basics: Hierarchical Clustering, Multiple Sequence Alignment: CLUSTAL, Center-based Clustering, Clustering via Cliques.

UNIT IV- [12 HOURS]

EVOLUTIONARY TRESS AND PHYLOGENY (9 hours) Evolutionary Trees and Ultrametrics, Additive distance trees, Perfect Phylogeny Problem, Small Parsimony Problem, Nearest Neighbor Interchange. HIDDEN MARKOV MODELS, RANDOMIZED ALGORITHMS (9 hours) Hidden Markov Models: Basics, Forward and Backward (Viterbi) Algorithms, Randomized algorithms and their applications.

REFERENCES

1. Neil C. Jones and Pavel A. Pevzner, “An Introduction to Bioinformatics Algorithms”, MIT Press, 2005.

2. Gusfields D, “Algorithms on strings, trees and sequences: Computer Science and Computational Biology”, Cambridge University Press, 1997.

3. Steffen Schulze-Kremer, “Molecular Bioinformatics: Algorithms and Applications”, Walter de Gruyter, 1996.

4. Gary Benson, Roderic Page (Eds.), “Algorithms in Bioinformatics”, Springer International Edition, 2004.

5. Richard Durbin, Sean R. Eddy, Anders Krogh, Graeme Mitchison. “Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acid”, Cambridge University Press, 1999.

PIT8J002 EXPERT SYSTEMS

UNIT I – [10 HOURS]

The meaning of an expert system, problem domain and knowledge domain, the advantages of an expert system, general stages in the development of an expert system, general characteristics of an expert system, history and uses of expert systems today, rule-based expert systems, procedural and nonprocedural paradigms, characteristics of artificial neural systems. - The study of logic, difference between formal logic and informal logic, meaning of knowledge, how knowledge can be represented, semantic nets, how to translate semantic nets into PROLOG, limitations of semantic nets, schemas, frames and their limitations, how to use logic and set symbols to represent knowledge, the meaning of propositional and first order predicate logic, quantifiers, imitations of propositional and predicate logic.

UNIT II- [10 HOURS]

Trees, lattices, and graphs, state and problem spaces, AND-OR trees and goals, methods of inference, rules of inference, limitations of propositional logic, logic systems, resolution rule of inference, resolution systems, and deduction, shallow and causal reasoning, applying resolution to first-order predicate logic, forward and backward chaining, additional methods of reference, Meta knowledge, the Markov decision process.

UNIT III- [10 HOURS]

The meaning of uncertainty and theories devised to deal with it, types of errors attributed to uncertainty, errors associate, with induction, features of classical probability, experimental and subjective probabilities, compound and conditional probabilities, hypothetical reasoning and backward induction, temporal reasoning, Markov chains, odds of belief, sufficiency and necessity, role of uncertainty in inference chains, implications of combining evidence, role of inference nets in expert systems, how probabilities are propagated.

UNIT IV- [10 HOURS]

Sources of uncertainty in rules, methods of dealing with uncertainty, Dempster-Shafer theory, theory of uncertainty based on fuzzylogic, commercial applications of fuzzy logic. How to select an appropriate problem, the stages in the development of an expert system, types of errors to expect in the development stages, the role of the knowledge engineer in the building of expert systems, the expected life cycle of an expert system, how to do a life cycle model.

Textbook:

1. J. Giarratano and G. Riley, "Expert Systems -- Principles and Programming". 4th Edition, PWS Publishing Company, 2004.
2. Durkin, J., Expert systems Design and Development, Macmillan, 1994 2. Elias M. Awad, Building Expert Systems, West Publishing Company 1996
3. Peter Jackson, Introduction to Expert Systems, Addison Wesley Longman, 1999.ISBN 0-20187686-8.
4. Gonzalez and D. Dankel, "The Engineering of Knowledge-Based Systems", Prentice Hall, 1994. 5. Nikolopoulos, "Expert Systems", Marcel Dekker Inc. 1997. ISBN 0 8247 9927 5

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

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PCP8H003 BUSINESS REGULATORY FRAMEWORK

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3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

B.Tech (Mechanical Engineering) detail Syllabus for Admission Batch 2015-16 *8th Semester*

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PME8J001/ PME8J002/	Fatigue Creep & Fracture/ Mechatronics & MEMs/	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
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PME8J001 FATIGUE CREEP AND FRACTURE

(PROFESSIONAL ELECTIVE)

MODULE – I : (12 HOURS)

Design philosophy : (i) Infinite life, (ii) Safe life, (iii) Fail safe and (iv) Damage tolerant design concepts.

Fatigue Design : Cyclic stress and stress reversals, Fatigue and progressive fracture, Endurance limit, Fatigue Tests : Cantilever and Beam type of Fatigue Tests, Axial Fatigue Tests. Influence of mean stress on fatigue : Gerber, Goodman and soderberg's criteria. Effect of compressive cyclic stress on fatigue. Fatigue design formula for axial, bending, torsional and combined loading.

Fatigue controlling factors: Effect of frequency, Temperature, size, form, stress concentration factors, Notch, sensitivity & surface conditions, residual stresses.

MODULE – II : (12 HOURS)

Improvement of fatigue strength' by chemical/metallurgical processes such as ritriding, flame hardening, case carburizing. Fatigue strength enhancement by mechanical work : cold rolling, peening, shot peening.

Effect of environment : Corrosion Fatigue, Concept of cumulative fatigue damage

Fracture Mechanics : Ductile and brittle fracture Theoretical cohesive strength of metasl, Griffith Theory of brittle Fracture, Oruron's modification to Griffith Theory.

MODULE – III (14 HOURS)

Modes of fracture : Mode I, II and III, fatigue creek growth Behaviour of metals, Linear Elastic Fracture Mechanics (LEFM), Stress Intensity Factor(SIF), Stress field near the crack tip, Critical SIF and Fracture Toughness, Experimental determination of fracture toughness K_{IC}, COD gauges and standard ASTM Tests.

Strain Energy Release Rates (SERR), Elasto-Plastic Fracture Mechanics (EPFM), Plastic zone size and its evaluation, J-Integral Method.

CREEP ANALYSIS :

Definition, Constant stress and constant, strain creep tests. Uniaxial creep tests : Baily's Power Law, Creep relaxation : strain hardening and time hardening creep relaxation. Introduction to Creep bending and deflection of simple problems.

TEXT BOOKS:

1. George E. Dieter, Mechanical Metallurgy, - Mc Graw Hill, NY, 1988
2. Joseph Marin, Mechanical Behaviour of Engg. Materials, - Prentice Hall of India, 1966
3. Stephens, R.I. and Fuchs, H.O., Metal Fatigue in Engg. ,- Wiley, NY 2001
4. Finnie, I. and Heller, W.R., Creep of Engg. Materials, - Mc Graw Hill Book Co., 1959
5. Prasant Kumar, Fracture Mechanics

REFERENCE BOOKS:

1. L.S. Srinath, Advanced Mechanics of Materials, - Tata Mc Graw Hill Ltd., ND, 2009.
2. Norman E, Dowling, Mechanical Behaviour of Materials, - Prentice Hall, NJ, 1999.
3. Lessells, J.M., strength and resistance of materials, - John wiley & sons, 1954
4. Peterson, R.E., Stress Concentration Design Factors,- John Wiley & Sons, 1953
5. Meguid, S.A., Fracture Mechanics,- John Wiley & Sons, 1996
6. Kare Hellan, Introduction to Fracture Mechanics, - Mc Graw Hill Book Co., 1985

PME8J002 MECHATRONICS AND MICRO ELCTRO MECHANICAL SYSTEMS

MODULE 1 (10 HOURS)

Evolution of Mechatronics, components of mechatronic system, types of mechatronic products, Signal theory, signal analysis and processing. Basic electronics devices: junction diodes, Bipolar transistors Basic Digital Technology: Digital number system, Binary number system, Hexadecimal number system, Binary addition, Boolean Algebra, Logic function, Universal GATES, FLIP-FLOP, Registers counters.

MODULE II (10 HOURS)

System modeling: Frequency response, Mechanical system, electrical system, Thermal system, Fluid system. Actuators- Electric motors; D.C. Motors, Stepper motor, , Hydraulic actuators, Pneumatic actuators Transducer and Sensors : Principles, difference between transducer and sensors, transducer types – photo emissive, photo conductive, photovoltaic, thermistors, Thermocouple, Inductive, capacitive, Peizoelectric,

MODULE III (10 HOURS)

Overview of MEMS and Microsystems. Micromachining Techniques: Silicon as material for micromachining, Photolithography, thin film deposition, doping, wet and dry etching, surface and bulk micromachining, Wafer bonding, packaging.

MODULE IV (10 HOURS)

Microsystem Modeling and Design: Mechanics of deformable bodies, Energy method, Estimation of stiffness and damping for different micro-structures, Modeling of electromechanical systems, Pull-in voltage. MEMS Applications: Mechanical sensors and actuators: Piezoresistive pressure sensors, MEMS capacitive accelerometer, Gyroscopes, Piezoelectric actuators.

TEXT BOOKS

1. A Text Books of Mechatronics, R.K.Rajput, S.Chand& company
2. Mechatronics, N.G. P.C Mahalik, Tata McGraw Hill
3. Micro and Smart Systems, G.K. Ananthsuresh, K.J. Vinoy, S. Gopalakrishnan, K.N. Bhat and V.K. Atre, Wiley India, New Delhi, 2010.
4. N.P. Mahalik: MEMS, Tata McGraw-Hill, New Delhi, 2007.

REFERENCE BOOKS:

1. 3. Mechatronics, D.G. Alciator, M.B. Histand, Tata McGraw Hill
2. Mechatronics, A.Smaili& F Mrad, Oxford University Press
3. Mechatronics, K.P.ramchandran, G,K Vijay Raghavan, M. S Balachandran
4. Mechatronics AnIntigrated approach, Clarence W de Sliva, CRC Press
5. T. Hsu: MEMS and Microsystems: Design and Manufacture, Tata McGraw-Hill, New Delhi, 2002.

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

Module II

Entrepreneurial Environment, Identification of Opportunities, Converting Business Opportunities into reality. Start-ups and business incubation, Setting up a Small Enterprise. Issues relating to location, Environmental Problems and Environmental pollution Act, Industrial Policies and Regulations,

Module III

Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

Module IV

Sickness of Small-Scale Industries, Causes and symptoms of sickness, cures of sickness, Role of Banks and Governments in reviving industries.

Reference Book:

1.Entrepreneurship Development and Management, Vasant Desai, HPH
2.Entrepreneurship Management, Bholanath Dutta, Excel Books
3.Entrepreneurial Development, Sangeeta Sharma, PHI
4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

Module I

Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

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E-Commerce and Internet, Electronic Market, Business to Business E-Commerce, Four C`s (Convergence, Collaborative Computing, Content Management and Call Center) , Wireless Application Protocol (WAP), Intranet and Extranets. Data Interchange (EDI), Electronic PaymentSystems,E-Security

Module-III

Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

Module IV

ERP IMPLEMENTATION: Planning Evaluation and selection of ERP systems, Implementation life cycle - ERP implementation, Methodology, Data Migration, Success and Failure factors of ERP Implementation. Extended ERP systems and ERP add-ons -CRM, SCM, Manufacturing prospective, Business analytics .

Reference Book:

1. E- Commerce and Enterprise Resource Planning ; CSV Murthy, HPH
2. Enterprise Resource Planning- Concepts and Practices ; V K Garg and N K Venkatkrishna, PHI
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PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

Module – II

Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

Module- III

Consumer Protection Law: Consumers, Rights of Consumers, Redressal Machinery under the Act, Procedure of Complaint, Relief available to the consumers, Procedure of filing appeal, Powers of Redressal agencies, Unfair Trade Practices. Overview of Competition Act,

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Company Law:Indian Companies Act 2013, Salient features and Classes of Company. Lifting of corporate veil, Procedure of Incorporation and Certificate of commencement of business, Memorandum and Articles of Association, Doctrine of ultra vires and Indoor Management, Management of Company: Qualification, Appointment of Directors, Company Meetings, Resolutions, Winding-up of Companies and their modes.

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1. Business Regulatory Framework–Mohapatra and Patra, HPH
2. Business Law – N D Kapoor, S Chand
3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	Category	Course Code	Course Title	L-T-P	Credit	University Marks	Internal Marks
1	PE	PMT8J001/ PMT8J002	Surface Engineering/ Electrometallurgy	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PMT8N201	Seminar	0-0-3	2	100	
2	PSI	PMT8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PMT8J001 SURFACE ENGINEERING

Module – I (12 hours)

Importance and necessity of surface engineering; classification and scope of surface engineering in metals, ceramics, polymers and composites, Surface dependent engineering properties, - wear, friction, corrosion, fatigue, reflectivity, emissivity; common surface initiated engineering failures; mechanism of surface degradation.

Module – II (12 hours)

Conventional surface engineering methods: carburising, nitriding, cyaniding, diffusion coating, hot dipping, galvanizing. Scope and application of conventional surface engineering techniques in engineering materials; advantages and limitations of conventional processes. surface modification by directed energy beams like ion, electron and laser beams; energy transfer, beam configuration and modes, surface integration, heat and mass transfer (composition and temperature profile) during directed energy beam irradiation; novelty of composition and microstructure; post irradiation characterization (microstructural & compositional) and testing/evaluation of surface-properties; structure-property correlation.

Module –III (12 hours)

Recent trends in surface engineering: Coatings and Thin Films and their applications; Stress, defect formation and surface evolution; classification of Processing routes; Physical/chemical vapour deposition, plasma spray coating, plasma assisted ion implantation, Sol-gel processing, Langmuir-Blodgett films, Electrodeposition; Characterization; Thickness, residual stress, morphology, adhesion.

Books for Reference:

1. *Surface engineering of metals - principles, equipments, technologies, by Tadeusz Burakowski and Tadeusz Wierzchon, CRC press.*
2. *ASM Handbook on Surface Engineering.*
3. *M. Ohring, Materials Science of Thin Films, 2nd Edition, Academic Press, 2002.*
4. *L. I. Tushinsky, I. Kovensky, A. Plokhov, V. Sindeyev, P. Reshedko, Coated Metal: Structure and Properties of Metal-Coating Compositions, Springer, Germany, 2002.*

PMT8J002 ELECTROMETALLURGY

Module I (12 Hours)

Principles of Electrochemistry: Equilibrium Potential; Nernst Equation; Polarization and over voltage; EMF and Galvanic Series.

Module II (12 Hours)

Electroplating: Principles of electrodeposition of single Metals and alloys; preplating operations; plating baths; throwing power; electroless plating; electroforming; testing of electrodeposits; Anodic Electrometallurgical Processes-Anodizing, Electro-cleaning, Electro-polishing, Electrolytic etching, Electrolytic machining and grinding

Module III (12 Hours)

Electro winning and Electro refining: special features of electrochemical extraction & refining of metals and electrochemical extraction & refining of important metals like copper, zinc and aluminium.

Books for Reference:

1. *Introduction to Electrochemistry, by S. Glasstone.*
2. *An Introduction to Electrometallurgy, by Sharan & Narain, Standard Publishers Distributors, Delhi*
3. *Electrochemical Engineering, by Mantell.*
4. *Principles of Electroplating and Electroforming, by Blum and Hogaboom.*
1. *5.Fundamental aspects of electrometallurgy, by K.I.Popov, S.S. Djokic, B.N.Grgur, Kluwer Academic / Plenum Publishers*

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

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PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

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PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

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3. Business Law – Pathak, Tata Mc Graw Hill
4. Legal frame work, Oxford.

Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PMI8J001/ PMI8J002	Process Plant Simulation /Cement Technology	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PMI8N201	Seminar	0-0-3	2	100	
2	PSI	PMI8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PMI8J001 PROCESS PLANT SIMULATION

MODULE-I (10 hours)

Introduction, types of standard simulators available in the market and their features.

MODULE-II (10 hours)

Development of simulation of packages involving mineral characterization files, feed composition files and other data bases required for the plant flow sheet, computations.

MODULE-III (10 hours)

Software for the development of the flow sheet matrices; simulation of unit operations andrecycle calculations. Simulation software of mineral processing like MODSIM, JKTech, USIM PAC etc

MODULE-IV (10 hours)

Graphic display and error traps for computer program to simulate beneficiation plant flow sheets.

REFERENCES:

1. King R.P.: Modelling and Simulations of Mineral Processing Systems, Butterworth-Heinemann
2. Ford, M.A.: Simulation of Ore dressing Plants. Ph.D Thesis, University of the Witwatersrand, Johannesburg.

PMI8J002 CEMENT TECHNOLOGY

Module-I (8 Hours)

Overview of Indian cement industry and global scenario.

Raw materials used in cement manufacturing and their mineralogy, Size reduction and drying of raw materials, Finish grinding

Module-II (10 Hours)

Various processes of cement manufacturing: dry and wet, overview of various unit operations

Pre-homogenization of raw mixture: Phase composition of clinker minerals and cement, pozzolanic reaction, hydration of cement, Raw mix proportioning, 2-, 3- and 4-component mixes, concepts of burn ability, absorption and effect of coal ash

Module-III (10 Hours)

Burning and cooling: Kiln burning and control, different zones in a cement kiln, pre-heating and pre-calcinations, burners, Clinker cooling, Fuels in cement industry, waste-derived fuels, Pet coke, refractory and refractory practices. Cement milling and separation

Module-IV (8 Hours)

Approaches to energy conservation, energy audit, co-generation of power, pollution control, noise abatement, concepts of LCA, EIA and EMP.

Books:

1. The Cement Plant Operations Handbook: P.A. Aslop, Tradeship Publications Ltd.
2. Cement Data Book: W. H Duda , Verlag Gmbh, Berlin, R. H. Bouge.

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

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PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

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PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

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Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PMN8J001/ PMN8J002	Computer Application in Mines/Eco-friendly Mining	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PMN8N201	Seminar	0-0-3	2	100	
2	PSI	PMN8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PMN8J001 Computer Application in Mines

Module-I:
Introduction to structure terminology and peripherals, algorithms, flow charts, programs, dedicated systems;Application in Mining: Exploration, rock topographic models, bore hole compositing, compositing, ore reservecalculation, interpolation and geo-statistical models

Module-II:
Open pit design: Ultimate pit design, introductory processcontrol, underground mine design: Production scheduling; Operation Simulation: Introduction, Simulation overview,objective, understand the role of modeling, Understanding the basic concept in simulation

Module-III:
Example of simulation inmining aspects: Simulation of machine repair problems, Concepts of variability and prediction, Example with dumpingtime problem, fitting distribution with chi-square test; Random number generation: Methods of random numbergeneration, Properties of random number, pseudorandom number; Random variates generation: Methods of randomvariates generation, inverse transformed method, acceptance rejection method, composition method, empiricalmethod and rectangular approximation

Module-IV:
Simulation languages: GPSS, SLAM; Logical flow diagram of different miningactivities, Coding with GPSS and SLAM of different mining problems; Computer Control: Remote control, automaticcontrol, application and limitations of control

PMN8J002 ECO-FRIENDLY MINING

Module-I:
Basic concepts of eco-friendly mining, Selection of eco-friendly equipment and exploitation operations

Module-II:
Water quality – physical, chemical, biological, criteria and standards. Classification and chemistry of major air pollutants. Soil chemistry – nature and importance of soil, soil properties, soil amendments

Module-III:
Waste water management – sources characteristics, techniques of treatment. Acid mine drainage– occurrence, effects and treatment techniques. Solid waste management for mine spoils

Module-IV:
Mine Reclamation & Mine Closure- Mine Reclamation strategies, Principles, planning, financial provisions, implementation, standards for closure criteria, systems approach for mine closure and development of closure plan, Socio-economic Aspects of Mining

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

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PCP8H003 BUSINESS REGULATORY FRAMEWORK

Module – I

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Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PPE8J001/ PPE8J002/ PPE8J003	Speciality Elastomers/ Polyurethane Technology/ Plastic Product Design Using CAD/CAM/CAE	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PPE8N201	Seminar	0-0-3	2	100	
2	PSI	PPE8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PPE8J001 **SPECIALITY ELASTOMERS**

Module I

Introduction of specialty rubbers – Silicones (Q) – Introduction, Manufacture – Structure and its influence on properties – Compounding – Fabrication – Curing – General properties – Applications – Copolymers – PMQ, PVLQ, FMQ, FVMQ – Silicones Rubber for medical use.

Epichlorohydrin – (CO, ECO, ETIR) – Introduction – Manufacture – Structure and its influence on properties – Compounding and Curing Properties and application. Fluoro Elastomers (FKM) – Introduction – Manufacture – Structure and its influence on properties – Compounding – Curing – Properties and applications.

Module II

Polyurethane Rubbers – Introduction Manufacture – Structure and its influence on properties – Compounding – Curing – Properties and applications. Thermoplastic Polyurethanes – Introduction – Manufacture – Structure and its influence on Properties – Compounding – Curing – Properties and applications.

Acrylic Rubber (ACM), Ethylene acrylic copolymers, Introduction, Manufacture – Structure and its influence on Properties – Compounding – Curing – Properties and applications. Ethylene Vinyl Acetate – Copolymer – Introduction, Manufacture – Structure and its influence on Properties – Compounding – Curing – Properties and applications

Module III

Chlorinated Polyethylene – Introduction – Manufacture – Structure and its influence on Properties – Compounding – Curing – Properties and applications. Chlorosulphonated polyethylene – Introduction – Manufacture – Structure and its influence on properties – Compounding – Curing – Properties – Applications. EPM, EDPM – Introduction, Manufacture – Structure and its influence on Properties – Compounding – Curing - Properties and applications.

Total Lecture: 35 Hours

Reference Books:

1. Hoffmann, Rubber Technology Hand Book, Hanser Publishers Munich–1989.
2. Anil. K., Bhowmick, Howard L. Stephens (ed.) Hand Book of Elastomers, New
3. Development & Technology, Marcel Decker Inc. New York, 1988
4. Penn; W. S. (Ed.), Injection Moulding of Elastomers, MacLaren and Sons Ltd., London (1969).
5. Houwink; R. (Ed.), Elastomers and Plastomers: Their Chemistry, Physics and Technology, Volume-1 General Theory, Elsevier Publishing Co., Inc., New York (1950).

PPE8J002 POLYURETHANE TECHNOLOGY

Module I

Introduction to polyurethane- chemistry and materials of polyurethane manufacture: basic reaction, cross linking in polyurethane, important building blocks for polyurethane- Polyurethane processing-basic design principles of polyurethane- steps in the polyurethane processing. Processing equipment- foam, carpet backing, Flexible foams- flexible molded foams & semi-rigid molded foams. Reinforced RIM – trends in the use of RIM and RRIM.

Module II

Rigid polyurethane foams-chemistry of raw materials, manufacturing of rigid polyurethane, properties, relationship between production methods and properties- application of rigid polyurethane. Polyurethane skin integral foam- production, properties and applications.

Solid polyurethane materials- polyurethane casting systems- thermoplastic polyurethane elastomers: processing- properties and applications, polyurethane paints, technique and coatings, adhesives builders, processing and applications.

Module III

Determination of composition and testing of polyurethane-chemical compositions, detection methods, identification of functional groups, determinations of properties materials and products (Characterisation, physics/mechanical, temp dependence, chemical performance, combustibility) polyurethane and environment health and safety: making and using polyurethane safety.

Total Lecture: 35 Hours

Reference Books:

1. Dr. Gumter Oertal (ed.), Polyurethane Hand Book, Hanser Publication Munich.
2. George woods,The ICI Polyurethane book -published journls by ICI, John Wiley and sons NY
3. Bruins; Paul F. (Ed.), Polyurethane Technology, Interscience Publishers, New York (1969)

PPE8J003 PLASTICS PRODUCT DESIGN USING CAD/CAM/CAE

UNIT I

Plastics Product Design : Material Selection - Properties – Mouldability - Fits and Tolerance – Shrinkage – Warpage - Wall Thickness – Fillets - Sharp Corners - Ribs and Bosses - Holes- Moulded Threads - Inserts and Fasteners – Integral hinge – Lettering on Moulded Products. Surface finish – Functional / Aesthetic aspects of part shape-Safety aspects of part shape - Safety aspects if the part should burn - Safety aspects if the part should fail - Use of color and design to promote safety.

UNIT II

Introduction to CAD/CAM –Wire frame model, Surface and Solid Modeling –NC Machines – NC Part Programming – Manual part programming – Computer assisted part programming – APT Language – Manual data input – NC Programming using CAD/CAM
– Computer automated part programming.

UNIT III

Finite element analysis - introduction, types of analysis - need for approximation - Weight residual, Ritz and Galerkin method - Variational. Procedure for finite element analysis - stiffness matrix, solution procedure, details of finite element analysis package, model building, post processing

UNIT IV

Introduction to CAE for plastics– Design principles for part design, Analysis using CAE software. Case studies – Interpretation of results. Identification of Uneconomical design-redesign for manufacture.

Rapid Prototyping – Streolithography – Laminated Object Manufacturing, Selective Laser Sintering – Solider – Vacuum Casting – Resin injection – Application of rapid prototyping. Rapid Tooling – Cast – IT Epoxy Tooling System, Parts in Minutes – Vacuum grade Polyurethanes, Composite tooling board.

Total Lecture: 35 Hours

Reference Books

1. Technology of Computer Aided Design and Manufacturing, S Kumar & A K Jha, Danpatrai & Co, 1998
2. Tucker III, C L, Fundamentals of Computer Modeling for Polymer Processing, Hanser, 1989
3. R.D.Beck Plastics Product Design,
4. C-B & Liv C.N.K. Computer aided design & manufacture, East West Press.

4. Durvent W.R. The Lithographic Hand book, Narosa Pub., 1995. Paul F. Jacob. Rapid Prototyping and manufacture Fundamentals of Stereolithography, 1985

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

Module-I

Entrepreneurship: Concept of entrepreneurship and intrapreneurship, Types of Entrepreneur, Nature and Importance, Entrepreneurial Traits and Skills, Entrepreneurial Motivation and Achievement, Entrepreneurial Personality

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Need to know about Accounting, Working capital Management, Marketing Management, Human Resources Management, and Labour Laws. Organizational support services - Central and State Government, Incentives and Subsidies.

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4.Entrepreneurship, Rajeev Roy, Oxford University Press

PCP8H002 E-COMMERCE AND ENTERPRISE RESOURCE PLANNING

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Overview of Electronic Commerce, Driving the Electronic Commerce Revolution, The Internet, Portals. Open Systems Inter Connection (OSI) Model, XML, Data Warehousing, BuildingOwnWebSite,InternetSecurity

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Overview of enterprise systems – Evolution - Risks and benefits - Fundamental technology - Issues to consider in planning designing and implementation of cross functional integrated ERP systems. Small, medium and large enterprise vendor solutions, BPR, and best business practices - Business process Management, Functional modules.

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PCP8H003 BUSINESS REGULATORY FRAMEWORK

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Overview of legal world, Law of Contract : Contract Act: Indian Contract Act, 1872, Agreement, Contract, Essentials of Contract (Offer & Acceptance, Consideration, Capacity of Parties, Free Consent, and Legality of Object), Performance and Discharge of Contract, Remedies for breach of contract, Quasi-Contract and Contingent Contract.

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Special Contracts: Contract of Agency: Mode of creating & revocation of Agency, Rights and Duties of Agents and Principals. Contract of Bailment (Rights and duties of Bailer and Bailee). Sales of Goods Act: Sale and agreement to sell, Condition and Warranty, Transfer of properties, Finder of Goods, Performance of Contract of sale, Unpaid seller and his rights.

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3. Business Law – Pathak, Tata Mc Graw Hill
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Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PPD8J001/ PPD8J002/	Instrumentation & Control Engineering/ Mechatronics & MEMs/	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
Total Credit (Theory)					**6**		
Total						**200**	**100**
1	PSI	PPD8N201	Seminar	0-0-3	2	100	
2	PSI	PPD8N202	Major Project	0-0-6	7	400	
Total Credit (Practical)					**9**		
Total						**500**	
Total Marks = 800							
Total Semester Credit					**15**		

PPD8J001 INSTRUMENTATION AND CONTROL ENGINEERING

Module-I (10 hours)

Introduction to Instruments and their Representation:
Typical Applications of Instrument Systems, Functional Elements of a Measurement System, Brief Description of the Functional Elements of the Instruments, Classification of Instruments, Microprocessor -Based Instrumentation, Standards and Calibration.
Static and Dynamic Characteristics of Instruments:
Static Performance Parameters, Impedance Loading and Matching, Selection and Specifications of Instruments, Dynamic Response, Compensation.
Transducer Elements:
Analog Transducers, Digital Transducers,
Basic detector transducer elements : Electrical transducer, Sliding Contract devices, Variable-inductance transducer elements, the differential transformer, Variable-reluctance transducers, Capacitive transducers. The piezoelectric effect, photo-electric transducer, electronic transducer element.
Intermediate Elements:
The simple current sensitive circuit, the ballast circuit, The voltage-dividing potentiometer circuit, The voltage balancing potentiometer circuit, Resistance bridges.
Indicating, Recording and DisplayElements:
Meter Indicators. The vacuum tube voltmeter, CRO, Electronic Switch, CRO recording techniques, Oscillographs. Digital Recorders

Module-II (10 hours)

Strain Measurement
The electrical resistance strain gauge. The metallic resistance strain gauge, Selection and Installation factors for metallic strain gauge, Circuitry, metallic strain gauge. The strain gauge ballast circuit, the staring gauge bridge circuit, Temperature compensation.
Measurement of Pressure
Pressure measurement systems, Pressure measurement transducers, Elastic diaphragms, strain gauge pressure cells, measurement of high pressure, Measurement of low pressures, dynamic characteristics of pressure measuring systems.
Measurement of Fluid Flow
Flow characteristics obstruction meters, Obstruction meter for compressible fluids- Orifice, Venturi meter and Pitot tube, The variable-area meter, Turbine Flow meters.

Module-III (10 hours)

Temperature Measurement
Use of bimetals pressure thermometers, Thermocouples, Pyrometry, Calibration of temperature measuring devices.

Force, Power, Speed and Torque Measurement :
Load Cell, Dynamometers, Tachometer and Tacho-generator, Stroboscope, The seismic instrument.- Vibrometers and accelerometers

Module-IV (10 hours)

Description of open and closed loop control systems and their block diagrams. Use of block diagram and signal flow graph to find overall transfer function.

1st and 2nd order systems and their response to step and sinusoidal input, error analysis, static and dynamic error coefficients.
Routh's stability criterion. The Root-Locus method, Bode Plot and Nyquist plot, Gain margin and phase margin.

TEXT BOOK(S):

1. Instrumentation Measurement and Analysis, B.C.Nakra and KK.Chaudhry, Tata Mc Graw Hill, Third Edition.
2. Mechanical Measurements- T.G. Beckwith & N.Lewis Buck, Oxford and IBH.
3. Modern Control Engineering- K.K. Ogata, PHI.

REFERENCE(S):

1. Control Systems Emgineering- I.J.nagrath and M.Gopal, New Age international.

PPD8J002 MECHATRONICS AND MICRO ELCTRO MECHANICAL SYSTEMS

MODULE 1 (10 HOURS)

Evolution of Mechatronics, components of mechatronic system, types of mechatronic products, Signal theory, signal analysis and processing. Basic electronics devices: junction diodes, Bipolar transistors Basic Digital Technology: Digital number system, Binary number system, Hexadecimal number system, Binary addition, Boolean Algebra, Logic function, Universal GATES, FLIP-FLOP, Registers counters.

MODULE II (10 HOURS)

System modeling: Frequency response, Mechanical system, electrical system, Thermal system, Fluid system. Actuators- Electric motors; D.C. Motors, Stepper motor, , Hydraulic actuators, Pneumatic actuators Transducer and Sensors : Principles, difference between transducer and sensors, transducer types – photo emissive, photo conductive, photovoltaic, thermistors, Thermocouple, Inductive, capacitive, Peizoelectric,

MODULE III (10 HOURS)

Overview of MEMS and Microsystems. Micromachining Techniques: Silicon as material for micromachining, Photolithography, thin film deposition, doping, wet and dry etching, surface and bulk micromachining, Wafer bonding, packaging.

MODULE IV (10 HOURS)

Microsystem Modeling and Design: Mechanics of deformable bodies, Energy method, Estimation of stiffness and damping for different micro-structures, Modeling of electromechanical systems, Pull-in voltage. MEMS Applications: Mechanical sensors and actuators: Piezoresistive pressure sensors, MEMS capacitive accelerometer, Gyroscopes, Piezoelectric actuators.

TEXT BOOKS

1. A Text Books of Mechatronics, R.K.Rajput, S.Chand& company
2. Mechatronics, N.G. P.C Mahalik, Tata McGraw Hill
3. Micro and Smart Systems, G.K. Ananthsuresh, K.J. Vinoy, S. Gopalakrishnan, K.N. Bhat and V.K. Atre, Wiley India, New Delhi, 2010.
4. N.P. Mahalik: MEMS, Tata McGraw-Hill, New Delhi, 2007.

REFERENCE BOOKS:

1. 3. Mechatronics, D.G. Alciator, M.B. Histand, Tata McGraw Hill
2. Mechatronics, A.Smaili& F Mrad, Oxford University Press
3. Mechatronics, K.P.ramchandran, G,K Vijay Raghavan, M. S Balachandran
4. Mechatronics AnIntigrated approach, Clarence W de Sliva, CRC Press
5. T. Hsu: MEMS and Microsystems: Design and Manufacture, Tata McGraw-Hill, New Delhi, 2002.

PCP8H001 ENTREPRENEURSHIP DEVELOPMENT

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2. Business Law – N D Kapoor, S Chand
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Eighth Semester							
Theory							
Sl. No.	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Marks**
1	PE	PTX8J001/ PTX8J002/ PTX8J003	Advancement in Textile Testing/Intelligent and Functional Textile/ Costing and its application in Textiles	3-0-0	3	100	50
2	OE	PCP8H001/ PCP8H002/ PCP8H003	Entrepreneurship Development/E-Commerce & ERP / Business Regulatory Framework	3-0-0	3	100	50
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Total Credit (Practical)					**9**		
Total						**500**	
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PTX8J001 ADVANCEMENT IN TEXTILE TESTING

Module-1

Fiber, Yarn and Fabric Testing: New approaches to textile measurements, Innovations in yarn testing instruments (dynamic, continuous and on-line testing of yarn quality) and fabric testing, Assessment of comfort, Standard tests, analysis of data and test reports such as HVI, AFIS, Classimat, Colour maching, Analysis of KES and FAST data.

Module-2

Testing of Garments:Tests related to garment appearance and performance such as measurement of seam pucker, seams slippage, seam strength and buffer strength etc.

Testing of Technical Textiles: Testing of Filtration Characteristics, Test for geotextiles, Test for protective clothing, Test of various form of medical textiles, Test for textiles for sports application, Test for Composites, Testing for sewing threads, industrial cords etc, Special tests for carpets and nonwoven fabrics.

Module-3

Product Leveling and Standards: Textile product leveling. International quality parameters and standards like Uster standards, AITCC, JIS and ASTM.

Books Recommended:

1. Saville B P, “Physical Testing of Textiles”, Woodhead Publishing Ltd, Cambridge, 2002.
2. Booth J E, “Principles of Textile Testing”, CBS Publishers and Distributors, New Delhi, 1999.
3. Fabric Testing, Ed. J Hu, Woodhead Textiles Series No. 76, 2008, UK.
4. “Testing and Quality Management”, Ed. V. K. Kothari, IAFL Publications, New Delhi, 1999.

5. Mukhopadhyay A, “Process Characterization and Evaluation of Filter Media” in “Pulse-Jet Filtration: An Effective Way to Control Industrial Pollution -Part II”, Textile Progress, 42 (1), Taylor and Francis, UK., 2010.

PTX8J002 INTELLIGENT AND FUNCTIONAL TEXTILE

Module-1

Definition of smart and intelligent textiles, Passive and active functionality,

Textile with high protection and comfort properties, Extreme winter clothing with low heat transmission, heat absorbing, heat storing systems.

Phase change materials, incorporation of PCMs in fibres and fabrics.

Module-2

Breathable textile. Multifunctional textiles with incorporated electronics for integrated communication, music, health monitoring, defence support functions, wearable computers.

Environmentally sensitive textiles- photochromic and thermochromic (chameleonic) fabrics, camouflage (radar shielding) fabrics, variable heat absorption surfaces, stimuli sensitive polymers such as temperature, pH, ionic, magnetic sensitive materials, design and their applications to textile.

Module-3

Fibres as solar cells, Recent advances in multifunctional textiles.

Books Recommended:

1. X. Tao, Xiaoming Tao ," Smart Fibres, Fabrics, And Clothing", Woodhead publishing (2001).

2. Jinlian Hu , "Adaptive and Functi polymers, Textiles and Their Applications", imperial college press (2011).

3. Tao Xiaoming, "Wearable Electronics And Photonics", Woodhead publishing limited (2005).

4. H. Mattila, H. Mattila, " Intelligent Textiles and Clothing", CRC press (2006).

5. Vincenzini, "Smart Textiles", Trans tech pub ltd (2009).

PTX8J003 COSTING AND ITS APPLICATION IN TEXTILES

Module-1

Costing as an aid to management-Elements of cost, treatment of stock, Cost terms related to income measurement, profit planning and cost control for textile industry.

Material cost - Costing of materials, Methods of valuing materials : FIFO, LIFO, Average cost method, Inflated price method, identification method, base stock method, HIFO, Market price method, Techniques of material control: Economic order quantity, Just in Time inventory system, stock control through ABC Analysis, VED analysis,

Module-2

Labour cost – Types of labour, control of labour cost, labout turnover and turnover cost, Time and motion study, job analysis and job evaluation, Remuneration and Incentives, time wage system, Piece wage system

Overheads – Importance and classification of overheads, Allocation and apportionment of overhead to cost centres

Methods of costing – Job, Batch and contract costing, Process costing; waste cost and its control in a textile mill, Joint and by-product costing, Unit cost; costs of yarns and fabrics, fabric processing cost.

Module-3

Techniques of cost analysis and control - Absorption and marginal costing, cost-volume-profit-analysis, break-even point, contribution margin, margin of safety, standard costing, budgetary control, productivity and value anaylsis,

Books Recommended:

1. Jain S P, Narang K L and Dhingra T R, “Cost Accounting”, 6th Ed., Kalyani publishers, N Delhi, 2000.
2. Khan M Y and Jain P K, “Cost Accounting and Financial Management”, Tata McGrawhill, Delhi, 2008.

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