BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA

CURRICULLUM FOR B.TECH AS PER GUIDELINES OF AICTE

2018-19

First Year B.Tech Syllabus As Per AICTE Model Curriculum.

Credit Break-up Semester-wise									
Category	**Semester**								**Total**
	1st	2nd	3rd	4th	5th	6th	7th	8th	
HS/MS Humanities and Social Sciences Including Management Courses	3		3	3				3	12
BS (Basic Science Courses)	9	9	3						21
ES(Engineering Science Courses)	6	14	5						25
PC (Professional Core Courses)			10	15	15	10	3	3	56
PE (Professional Elective Courses Relevant to Chosen Specialization/Branch)				3	6	6	3		18
OE(Open Electives From Othe Technical and/or Emerging Subjects)						3	6	3	12
Project/Seminar /Internship * *4-6 Weeks			Evaluation of Internship after 2nd Semester-1		Evaluation of Internship after 4th Semester-1	Seminar-1 Skill Project-2	5=3+1+1 Project-3 Seminar-1 Evaluation Of Internship after 4th Semester-1	6 Project-5 Grand Viva-1	16
MC (Mandatory Courses)	0	0	0	0	0	0			0
Total	18	23	22	21	22	22	17	15	160

Course Structure for First Year Engineering

First Semester						
Theory						
Category	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Evaluation**
BS	RMA1A001	Mathematics –I	3-0-0	3	100	50
BS	RPH1A001/ RCH1A002	Physics/Chemistry	3-0-0	3	100	50
ES	RBE1B001/ RBL1B002	Basic Electrical Engineering /Basic Electronics Engineering	2-0-0	2	100	50
ES	RBM1B001/ RBC1B002	Basic Mechanical Engineering / Basic Civil Engineering	2-0-0	2	100	50
HS	RCE1E001	Communicative English	2-0-0	2	100	50
MC	RIT1F301	Induction Training (21 Days)		0		
Total Credit (Theory)				**12**		
Total Marks					**500**	**250**
Practical						
BS	RPH1A201/ RCH1A202	Physics Lab/Chemistry Lab	0-0-3	1	-	100
ES	RBE1B201/ RBL1B202	Basic Electrical Engineering / Basic Electronics Engineering Lab	0-0-3	1	-	100
ES	RBM1B201/ RBC1B202	Basic Mechanical Engineering / Basic Civil Engineering Lab	0-0-3	1	-	100
ES	REG1B201/ RWO1B202	Engineering Graphics & Design Lab/Workshop	0-0-3	2	-	100
HS	RCE1E201	English Language Lab	0-0-3	1		100
Total Credit (Practical)				**6**		
Total Semester Credit				**18**		
Total Marks						**500**
Grand Total (Theory & Practical)= 1250						

Second Semester						
Theory						
Category	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Evaluation**
BS	RMA2A001	Mathematics-II	3-0-0	3	100	50
ES	REM2B001	Engineering Mechanics	3-0-0	3	100	50
BS	RPH2A001/ RCH2A002	Physics / Chemistry	3-0-0	3	100	50
ES	RBE2B001/ RBL2B002	Basic Electrical Engineering /Basic Electronics Engineering	2-0-0	2	100	50
ES	RBM2B001 / RBC2B002	Basic Mechanical Engineering / Basic Civil Engineering	2-0-0	2	100	50
ES	RPL2B001	Programming for Problem Solving using C	3-0-0	3	100	50
MC	RNC2F301	NCC/NSS/Yoga		0		
Total Credit (Theory)				**16**		
Total Marks					**600**	**300**
Practical						
BS	RPH2A201/ RCH2A202	Physics Lab/Chemistry Lab	0-0-3	1		100
ES	RBE2B201/ RBL2B202	Basic Electrical Engineering / Basic Electronics Engineering Lab	0-0-3	1		100
ES	RBM2B201/ RBC2B202	Basic Mechanical Engineering / Basic Civil Engineering Lab		1		100
ES	REG2B201/ RWO2B202	Engineering Graphics & Design Lab/Workshop	0-0-3	2		100
ES	RPL2B201	Programming for Problem Solving using C Lab	0-0-3	2		100
Total Credit (Practical)				**7**		
Total Marks (Practical)						**500**
Grand Total (Theory & Practical) = 1400						
Total Semester Credit				**23**		
Total First Year Credit				**41**		

RMA1A001 Mathematics-I 3-0-0

OBJECTIVE:

The objective of the course Mathematics-I is to familiarize the prospective engineers with techniques in calculus, Gamma & Bita function, differential equation of first and second order, series solution of differential equations, Laplace transform. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Module-1 (8 hrs.)

Asymptote, Curvature (Cartesian and polar), Gamma & Beta function , Partial differentiation, Maxima and Minima for function of two variables.

Module-2 (8 hrs.)

Differential Equation: First order differential equations, Separable Equation, Exact differential equation, Linear differential equation, Bernoulli's equation application to Electrical circuits.

Module-3 (9hrs.)

Linear differential equation of second, Homogeneous equation with constant co-efficient, Euler-Cauchy equations, Solution by undetermined co-efficient, Solutions by variation of parameters, Modelling of electric circuits

Module-4 (10 hrs.)

Series solution of differential equations, Power series method, Legendreequation and Legendre polynomial. Bessels function and its properties.

Module – 5 (10 hrs.)

Laplace transformation and its use in getting solution to differential equations, Convolution, Integral Equations.

OUTCOMES

On completion of this course, student are able to:

- Apply the knowledge of calculus, Gamma & Beta functions for analyzing engineering problems.
- Solve first order differential equation analytically using standard method.
- Demonstrate various physical models through higher order differential equation and solve such linear ordinary differential equation.
- Obtain series solution of differential equation and explain application of Bessel'sfunction.
- Apply Laplace problem to determine complete solution to ordinary differential equation.

Text Books:

1. Differential Calculus by Santi Narayan and Mittal,

2. Advanced Engineering Mathematics by E. Kreyszig, Tenth Edition ,Willey

3. Higher Engineering Mathematics by B.V. Raman, , Mc-Graw HillsEducation

4. Engineering Mathematics by Srimanta Pal and S.C. Bhunia, Oxford Publication

References:

1. Ordinary and Partial Differential equations by J. Sihna Ray and S Padhy, Kalyani Publishers

2. Advance Engineering Mathematics by P.V.O'NEIL, CENGAGE

3. Ordinary Differential Equation by P C Biswal , PHI second edition.

4. Engineering Mathematics by P. S. Das & C. Vijayakumari, Pearson.

N.B:Thecourseisof3creditwith4contacthours.

PHYSICS 3-0-0

For 1st Semester Code (RPH1A001)
For 2nd Semester Code (RPH2A001)

Module I

Oscillation & Amp; Waves (8 Hours)

Simple Harmonic Oscillation: velocity of motion, acceleration, time period, frequency, phase; damped harmonic oscillation: Wave equation of damped vibration, logarithmic decrement, quality factor, relaxation time; Forced oscillation, resonance, velocity resonance and amplitude resonance, coupled oscillation, Normal coordinates and normal frequencies, In- phase and out-of-Phase Oscillation, Concept of wave and wave equation,, reflection and transmission of longitudinal waves at boundaries.

Module II

OPTICS (10 Hours)

Concept of interference, two sources interference pattern, Bi-prism, Fringe width, uses of biprism, Newton's ring & measurement of wavelength and refractive index. Diffraction: Huygen's principle, Fresnel's Diffraction and Fraunhoffer's diffraction, Half period zone, Zone plate, construction, principle, multiple foci, comparison ofzone plate with convex lens, Fraunhoper's diffraction of Single slit, intensity distribution

Module III

LASER and Fibre Optics :(6 Hours)

Atomic excitation and energy states, Interaction of external energy with atomic energy states, Absorption, spontaneous emission and stimulated emission, Population inversion, Pumping mechanism, optical pumping, Electrical Pumping, Components of laser system, active medium, population inversion, Ruby laser, Helium-Neon laser, Semiconductor laser (basic concepts, and Engineering application only),Structure of optical fibre, Principle of propagation and numerical aperture, Acceptance angle, classification of optical fibre (Single mode and Multimode, SINand GRIN), FOCL (Fiber Optic Communication Link)

Solid State Physics (4 Hours)

Crystalline and Amorphous solid, unit cell, lattice parameter, Miller Indices, Reciprocal Lattice(Only Concept), Bragg's law, Concept of fermions and Bosons and their distribution Functions, Band theory of Solids(Qualitative),Classification of materials: metals, semiconductor and insulator in terms of band theory.

Module IV

Electromagnetism (8 Hours)

(Student will be familiarized with some basic used in vector calculus prior to Development of Maxwell's electromagnetic wave equations. No proof of theorems and laws included in this unit expected- statement and interpretation should sufficient.)

Introduction; Scalar & vector fields, Gradient Of Scalar Field, divergence and curl of Vector Field, Gauss divergence theorem, Stokes theorem (Only Statements, noproof), Gauss's law of electrostatics in free space and in a medium (Onlystatements), Faraday's law of electromagnetic induction (Only statements)Displacement current, Ampere's circuital law, Maxwell's equation in Differential andIntegral form, Electromagnetic wave equation in E and, Electromagnetic Energy,Poynting theorem and Poynting vector(no derivation)

Module V

Quantum Physics: (10 Hours)

Elementary concepts of quantum physics formulation to deal with physical systems.
Need for Quantum physics- historical overviews (For concept), Einstein equation, de

Broglie Hypothesis of matter waves, Compton Scattering, Pair production (no derivation), Uncertainty Principle, Application of Uncertainty Principle, Non-existence of electrons in the Nucleus, Ground state energy of a harmonic oscillator.Basic Features of Quantum Mechanics: Transition from deterministic to Probabilistic,Wave function, probability density, Normalization of wave function (Simple problem),observables and operators, expectation values (Simple problem), Schrodingerequation-Time dependent and time independent equation Application: Free Particle and Particle in a box

Books:

1. Engineering Physics by D.R. Joshi, Mc Graw Hill
2. Principle of Physics Vol. I & Vol. II by Md. M. Khan & S. Panigrahi(Cambridge Univ. Press).
3. Lectures on Engineering Physics byL. Maharana, Prafulla ku. Panda, Sarat Ku. Dash, Babita Ojha (Pearson)
4. Engineering Physics by D.K. Bhattacharrya and Poom Tondon , Oxford University Press

Reference Books:

1. Optics - A. K. Ghatak
2. Introduction to Electrodynamics - David J. Griffiths, PHI Publication
3. Concepts of Modern Physics – Arthur Beiser.
4. Physics-I for engineering degree students - B.B. Swain and P.K.Jena.

CHEMISTRY 3-0-0

For 1st Semester Code (RCH1A002)
For 2nd Semester Code (RCH2A002)
Course Objectives:

(1) To understand the basics of quantum mechanical concepts and spectroscopy.
(2) To predict the bulk properties and processes using thermodynamic considerations.
(3) To learn an introductory idea about new materials.
(4) To understand the fundamental concepts on fuels and corrosion chemistry.

Module I: [10Classes]

Quantum Chemistry and Spectroscopy: Basic concepts and postulates of quantum mechanics. Introduction to Schrodinger Wave Equation (without derivation), Particle in a box: Energy levels, quantum numbers and selection rule.

Spectroscopy: Lambert Beer's Law, Principles and applications of UV-Visible Molecular Absorption Spectroscopy; Chromophores, applications on quantitative analysis. Effect of conjugation on chromophores, Absorption by aromatic systems, introductory idea on rotational and vibrational SpectroscopyPrinciples and application to diatomic molecules.

Module II: [8 Classes]

The phase rule: Statement of Gibb's phase rule and explanation of the terms involved, Phase diagram of one component system – water and sulfur system, Condensed phase rule, Phase diagram of two component system – Eutectic Bi-Cd, Pb-Tin system &Isomorphous System.

Module III: [10 Classes]

Fuels: Classification of fuels, calorific value. (Determination by Dulong's formula), G.C.V. and N.C.V., Solid fuels, Analysis of coal. Liquid fuels: Classification of petroleum, Refining of petroleum, Cracking, Knocking and anti knocking, cetane and octane numbers. Unleaded petrol, synthetic petrol, power alcohol. Gaseous Fuel: Producer gas, Water gas, LPG, CNG, Kerosene gas, Combustion calculation.

Module IV: [08 Classes]

Corrosion: Electrochemical theory of corrosion, galvanic series, Types of corrosion; Differential metal corrosion, Differntial aeration corrosion (Pitting and water line corrosion), Stress corrosion (caustic embrittlement in boilers), Factors affecting, metal coatings – Galvanizing and Timing, Corrosion inhibitors, cathodic protection.

Module-V: [10 Classes]

New Materials: Introduction to nanomaterials, classification (0D, 1D, 2D) with examples, size dependent properties, Top-down and Bottom-up approaches of nanomaterial synthesis. Introductory idea on synthesis of nanomaterials via green synthetic route. Application of nanomaterials in environmental fields and electronic devices.

Text Books:

1. Engineering Chemistry (NPTEL web-book) by B. L. Tembe, Kamaludddin and M. S. Krishan.
2. Text Book in Applied Chemistry by A. N. Acharya and B. Samantaray, Pearson India.
3. Fundamentals of Molecular Spectroscopy by Banwell, Tata McGraw Hill Education.
4. Textbook of nanoscience and Nanotechnology, McGraw Hill Education (India) Pvt. Ltd., 2012.
5. Advanced Engineering Chemistry by M. R. Senapati, University Science Press, India..
6. Engineering Chemistry, Jain and Jain, DhanpatRai Publication.

Reference Books:

1. Inorganic Chemistry by Donald A. Tarr, Gary Miessler, Pearson India, Third Edition.
2. Quantum Chemistry by Ira N. Levine, Pearson 7th Edition.
3. Molecular Spectroscopy, Ira N. Levine, John Wiley and Sons
4. Modern Spectroscopy – A Molecular Approach, by Donald McQuarrie and John Simon, published by University Science Books.
7. Inorganic Chemistry by W. Overton, Rounk and Armstrong, Oxford Univesity Press, 6th edition.
8. Introductory to Quantum Chemistry by A. K. Chandra. , 4th Edition, Mcgraw Hill Education.

Course Outcomes:

1. Understand the basics of quantum mechanical concepts and spectroscopy.
2. Rationalise bulk properties and processes using thermodynamic considerations.
3. Preliminary understanding on introductory idea about nano materials.
4. Analyse the quantitative aspects of fuel combustion and the mechanism of corrosion.

Basic Electrical Engineering 2-0-0

For 1st Semester Code (RBE1B001)

For 2nd Semester Code (RBE2B001)

Module 1:

DC & AC Circuits (6 hours)

Circuit laws: Fundamentals of electrical circuit, Ohm's law, Kirchoff's laws, series and parallel connections, analysis of circuits using Node voltage, mesh current, superposition, Thevenin and Norton Theorems to solve simple circuits with dc excitation. Single phase circuit: Single phase emf generation, Representation of sinusoidal waveforms, average, effective, peak and rms values, j operator, Rectangular and polar representation of phasors, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel).

Module 2:

Three Phase Circuits (5 hours)

Three phase circuit: Three phase emf generation, Delta-star and star-delta conversions, voltage and current relations in star and delta connections. solution of the three phase circuits with balanced voltage and balanced load conditions, phasor diagram, measurement of power in three phase circuits.

Module 3:

Magnetic Circuits (5 hours)

Magnetic Circuits: MMF, flux, reluctance, inductance. Review of Ampere Law, Biot Savart Law. Magnetic field, BH characteristics and Hysteresis loss, Series and parallel magnetic circuits.

Module 4:

Electrical Machines (6 hours)

Transformers (Single Phase): Construction, operation, Phasor diagram and performance testing. Induction Motors (Three Phase): Basic Principles, Rotating Magnetic Field, Equivalent circuit, Phasor diagram, Torque-Speed Characteristics Basics of DC machines: EMF Equation, Torque Equation, Methods of Excitation

Text / References:

1. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010
2. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford UniversityPress, 2011.
3. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.
4. D.C.Kulshreshtha,"BasicElectricalEngineering",McGrawHill,2009.

Basic Electronics Engineering 2-0-0

For 1st Semester Code (RBL1B002)
For 2nd Semester Code (RBL2B002)
Module 01 : (6Hours)

Introduction to Semiconductors, Junction Diode: Principle of Diodes, V-I characteristics of junction diode, AC and DC Resistance of Diode, Diode Current Equation, Equivalent circuit of Diode, Breakdown Mechanism, Zener Diode, Rectifier circuit, Clipper and Clamper, Avalanche Diode Bipolar Junction Transistor: Transistor Operation, Current Equation in n-p- n &amplifier; p-n-p transistors, CB,CE,CC Configurations and their Characteristics, Load line Analysis, DC Biasing (Fixed bias and Voltage Divider), Introduction to Amplifiers.

Module 02 : (6 Hours)

Field Effect Transistor: JFET-types, Operations and their Characteristics,
MOSFETs- types, Operations and their Characteristics
CMOS: Brief Introduction to CMOS, Principle of operation of Digital Inverters, VTC Characteristics,

Module 03: (5 Hours)

Operational Amplifiers: The Ideal Op Amp, Inverting and Non – Inverting configurations, Equivalent Circuit model, Op amp application in Integration,
Differentiation and Summing Circuits.

Module 04 : (5 Hours)

Digital Electronic Principles: Introduction, Binary digits, Logic levels and Digital waveforms, Introduction to basic Logic operation, Number system, Decimal numbers, Binary numbers, Decimal-to-Binary conversion, Simple binary arithmetic, Logic Gates, Boolean algebra and Combinational Logic Circuits: The inverter, The AND, OR, NAND NOR, Exclusive-OR and Exclusive-NOR gate, Boolean operations and expressions, Laws and Rules of Boolean algebra, De Morgan's theorem, Boolean analysis of logic circuits, Standard forms of Boolean expressions, Boolean expression and truth table. Basic combinational logic circuits, Implementation of combinational logic, the universal properties of NAND and NOR gates, Basic adders.

Text book:

1. Electronic Devices Circuit Theory - by Rober L. Boylestad 11th Edition, Pearson Publication, 2014
2. Microelectronic Circuits by A. S. Sedra and Kenneth C. Smith 7th Edition, Oxford University Press. 2017
3. Digital Design by M. Morris Mano, 5th Edition, Pearson Publication, 2016.

BASIC MECHANICAL ENGINEERING 2-0-0

For 1st Semester Code (RBM1B001)
For 2nd Semester Code (RBM2B001)

MODULE-I (8 classes)

Thermodynamics:
Systems, Properties, Process, State, Cycle, Internal energy, Enthalpy, Zeroth Law, First law and Second Law of Thermodynamics, Basic Concept of Entropy, Properties of ideal gas., Properties of pure substances, Steam formation, Types of Steam, Enthalpy, Specific volume, Internal energy and dryness fraction of steam, use of Steam tables. Related numericals.

MODULE-II (6 classes)

Application of Thermodynamics:
Air compressors, Steam Power Plant, Refrigerators and Heat pump, I.C. Engines (Brief Description of different components of above mentioned systems and working principles with Schematic diagram only)

MODULE-III (5Classes)

Basic Power transmission devices:
Belt, Rope, Gear drives.Coupling, clutch, brakes. (Working principle only)

Introduction to Robotics:
Robot anatomy, joints and links and common robot configurations

MODULE-IV (5 Classes)

Mechanical Measurements:
Temperature, pressure, velocity, flow, strain, force, torque measurements. (Working principle only).

Text books

i. Basic Mechanical Engineering by Pravin Kumar, Pearson
ii. Basic Mechanical Engineering by A R Israni, P K Shah, BS Publications
iii. Text book of Elements of Mechanical Engineering, S T Murthy, Universities press
iv. Basic and applied Thermodynamics by P. K. Nag, Tata McGraw Hill

Reference books

i. Basic Mechanical Engineering by .D. Mishra, P.K Parida, S.S.Sahoo, India Tech Publishing company
ii. Elements of Mechanical Engineering by J K Kittur and G D Gokak,Willey
iii. Basic Mechanical Engineering by BasantAgrawal, C M Agrawal,Willey
iv. Engineering Thermodynamics by P. Chattopadhaya, Oxford University Press

BASIC CIVIL ENGINEERING 2-0-0

For 1st Semester Code (RBC1B002)
For 2nd Semester Code (RBC2B002)

MODULE-I (6 classes)

Introduction and Scope of Civil Engineering. Broad disciplines of Civil Engineering; Importance of Civil Engineering, Early constructions and developments over time, Development of various materials of construction and methods of construction.

Building Material and Building Construction:

Bricks: Brick as a construction material and its importance, qualities of a good brick, Stone: classification, composition and characteristics, Cement: Classification, tests for cement, uses of cement, types of cement, Concrete: Quality of mixing water, Workability, Compaction of concrete, concrete mix design, Grade and strength of Concrete. Fundamentals of R.C.C. and Prestressed concrete. Types of steels used in civil engineering works.
Building Components and their basic requirements, Mortar, Stone masonry, brick masonry, roof, floors.

MODULE-II (6 classes)

Surveying: Linear measurement and chain survey: Use of chains and tapes for measurement of correct length of lines, direct and indirect ranging,Compass surveying: Use of prismatic compass, bearing of a line. Local attraction, Introduction to modern surveying instruments EDM and Total Station.

MODULE-III (6 classes)

Fundamental of soil and its classification, Foundations: Types of shallow and deep foundations with neat sketches. Fundamentals of Irrigation Engineering. Introduction of Hydraulics structure like canals, siphons, weirs, dams etc.

MODULE-IV (6 classes)

Transport, Traffic and Urban Engineering: Introduction to planning and design aspects of transportation engineering, different modes of transport, highway engineering, rail engineering, airport engineering, traffic engineering, urban engineering

TEXT BOOKS

i. Basic Civil Engineering, S. Gopi, Pearson
ii. Building Construction, Sushil Kumar, Standard Publishers Distributors
iii. Surveying and Levelling by R. Subramanian, Oxford University Press

REFERENCE BOOKS

i. Engineering Materials, S.C. Rangwala, Charotar Publishing House
ii. Building Material and Construction, G C Sahu, Joygopal Jena, McGrow Hill
iii. Surveying Vol-1 by R Agor, Khanna Publishers
iv. Basic Civil Engineering, M.S. Palanichamy, McGraw Hill

RCE1E001 Communicative English 2-0-0

Course Objectives:

- To enhance the Listening, Speaking, Reading and Writing skills of the students.
- To make the students Industry-ready.

Module 1

Introduction to communication (6 hours)

The importance of communication through English at the present time; the process of communication and factors that influence communication : sender, receiver, channel, code, topic, message, context, feedback, 'noise', filters and barriers; the importance of audience and purpose

Verbal and non-verbal communication

Listening Skills: Importance and types of Listening

Identifying and rectifying common errors: Subject-verb agreement,

Noun/ Pronoun/ Articles/ Prepositions Usage, Word choice

Vocabulary Building

Module 2

The sounds of English (6 hours)

The International Phonetic Alphabet (IPA); Vowels, diphthongs,consonants, consonant clusters; phonemic transcription;

Syllable division and word stress; sentence rhythm and weak forms, contrastive stress

Intonation: falling, rising and falling-rising tunes

Problem sounds in cultural contexts (Indian context)

Module 3

Workplace Communication (6 hours)

Communication challenges in culturally diverse workforce; Ethics in Communication

Bias-free communication

3.2 Effective Business Presentations: Importance in workplace communication; Planning, Preparing, Organizing, Rehearsing, and Delivering Oral presentations, Handling Questions; Power Point Presentation

Module 4

Writing at Work (6 hours)

Business letters

Writing notices, circulars, emails.

Writing reports and Proposals

Writing CVs (for Technical Positions and Internships)

Module 5

5. **Soft Skills/Life Skills** (8 hours)

Body Language

Connected Speech (Intonation in Everyday Speaking and Conversation)

Types of interviews, Planning and Preparing for a Job Interview; Stages of an Interview; Mastering the art of giving interviews.

Team Management and Leadership Skills; Group Discussion; Public Speaking (Reference: Martin Luther King: I have a Dream, Vivekananda: Chicago Address, Toni Morrison: Noble Prize Acceptance Speech)

Recommended Books:

1. Business Communication by Carol M Lehman, Debbie D Dufrene and Mala Sinha. Cengage Learning. 2nd Edition.
2. English Grammar in Use. Raymond Murphy. Cambridge UP. 4th Edition.
3. A Textbook of English Phonetics for Indian Students by T. Balasubramanian [MACMILLAN]
4. Soft Skills: Key to Success in Workplace and Life by Meenakshi Raman and Shalini Upadhyay. Cengage Learning. 2018 Edition.

Reference Books:

1. Technical Communication, Principle and Practice by Meenakshi Raman & Sangeeta Sharma, Oxford University Press
2. Business Communication Today by Courtland L Bovee and Thill, Pearson.
3. Communication skill by Sanjay Kumar & Puspa Lata, Oxford University Press. 2nd Edition.
4. Body Language. Allan Pease. Free on Googlebooks.
5. Business and Managerial Communication, Sengupta, PHI
6. Business Communication for Managers, P. Mehra, Pearson

Physics Laboratory 0-0-3

For 1st Semester Code (RPH1A201)
For 2nd Semester Code (RPH2A201)

Minimum hours: 30 Hours Credit: 02

A student is expected to perform ten experiments form the list given below.

1. Determination of Young's modulus by Searle's method.
2. Determination of Young's modulus by bending of beams.
3. Determination of Rigidity modulus by static method.
4. Determination of surface tension by capillary rise method.
5. Determination of acceleration due to gravity by Bar pendulum.
6. Verification of laws of vibration of string using sonometer.
7. Determination of wave length of light by Newton's ring apparatus.
8. Determination of wavelength of laser source by diffraction rating method.
9. Determination of grating element of a diffraction grating.
10. Plotting of characteristic curve of a PN junctiondiode.
11. Plotting of characteristic curves of BJT.
12. Study of Hall Effect.
13. Study of RC circuit.
14. Determination of unknown resistance using Meter Bridge.
15. Energy gap determination by Four-Probe method.

Books:

1. Engineering Practical Physics, by S.Panigrahi and B. Mallick, (CENGAGE learning)

CHEMISTRY LAB 0-0-3

For 1st Semester Code (RCH1A202)
For 2nd Semester Code (RCH2A202)

B. Tech. (for all branches):

1. Preparation of Polymer/drug.
2. Determination of cell constant and conductance of solutions.
3. Determination of partition coefficients of iodine between benzene and water.
4. Determination of rate constant of acid catalysed hydrolysis reaction.
5. Determination of dissolved oxygen in a sample of water.
6. Determination of Viscosity of a lubricating oil by Red Wood Viscometer.
7. Determination of Flash point of a given oil by Pensky-Marten's flash pointapproach.
8. Colligative properties using freezing point depression.
9. Proximate analysis of coal.
10. Determination of percentage of available chlorine in a sample of bleaching powder.
11. Estimation of calcium in limestone.
12. Acid-Base Titration by Potentiometry.
13. Determination of total hardness of water by EDTA method.
14. Determination of amount of sodium hydroxide and sodium carbonate in a mixture.
15. Standardization of $KMnO_4$ using sodium oxalate. Determination of ferrous iron in Mohr's salt by potassium permanganate.
16. Preparation of colloidal/nano particle solutions.

Basic Electrical Engineering Lab 0-0-3

For 1st Semester Code (RBE1B201)
For 2nd Semester Code (RBE2B201)

List of Experiment under Basic Electrical Engineering Lab:

1. Power and phase measurements in three phase system by two wattmeter method
2. Verification of super position, Thevenin and Norton's theorem
3. Plotting of B-H curve of magnetic material and calculation of hysteresis loss
4. Series RLC circuit (Power measurement, Phasor diagram)
5. OC and SC test of 1-phase transformer.
6. Study of House wiring**.**

Basic Electronics Engineering Lab 0-0-3

For 1st Semester Code (RBL1B202)
For 2nd Semester Code (RBL2B202)
List of Experiment under Basic Electronics Engineering Lab.

1. Familiarization with electronic components (Active & Passive) & electronic equipments (Multi-meters, CROs and function generators)
2. Study of the V-I characteristics of P-N junction diode & Calculate DC & AC resistance.
3. Construction of half-wave rectifier and full wave rectifier circuits (with &without Filter) & study of their output waveforms by CRO and calculation of efficiency and ripple factor
4. a) Construction of positive, negative and biased clipper circuits & study of their output waveforms by CRO
b) Construction of positive and negative clamper circuits & study of their output waveforms by CRO
5. Design of inverting and non-inverting amplifiers using Op-Amp for a given gain withthe help of breadboard and distinct components.
6. Study and realization pf logic gates. (Truth table verification)

BASIC MECHANICAL ENGINEERING 0-0-3

For 1st Semester Code (RBM1B201)
For 2nd Semester Code (RBM2B201)

(Minimum 5 experiments/studies)

1. Model study of Steam Power Plant
2. Model study of Two stroke and Four stroke I.C. Engine
3. Model study of Refrigerator & Air conditioners
4. Model study of Automobile Parts
5. Determination of velocity ratio of belt drive
6. Study of Gears and Gear trains
7. Verification of Bernoulli's Theorem and its application to Venturimeter.
8. Calibration of Bourdon Tube Pressure gauge and measurement of pressure using manometers

BASIC CIVIL ENGINEERING LAB 0-0-3

For 1st Semester Code (RBC1B202)
For 2nd Semester Code (RBC2B202)

(Minimum 5 experiments/studies)

1. Shape and size test of brick
2. Compressive strength of brick
3. Testing of chain and measurement of correct length of the line
4. Bearing of a line
5. Study of Total Station
6. Setting time of cement
7. Tensile strength of reinforcing steel
8. Compressive strength of concrete

ENGINEERING GRAPHICS & DESIGN LAB 0-0-3

For 1st Semester Code (REG1B201)
For 2nd Semester Code (REG2B201)

Introduction: Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning line Conventions

AUTO CAD: layout of the software, standard tool bar/menus and description of most commonly used toolbars, navigational tools. Co-ordinate system and reference planes. Definitions of HP, VP, RPP &LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints. 2 – Sheets

Orthographic Projections:

Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only),True and apparent lengths, True and apparent inclinations to reference planes. 2 – Sheets

Orthographic Projections of Plane Surfaces (First Angle Projection Only):

Introduction, Definitions–projections of plane surfaces–triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only 1-Sheet

Projections of Solids (First Angle Projection Only):

Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions. 2-Sheets

Sections and Development of Lateral Surfaces of Solids

Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. 2 – Sheet

Isometric Projection (Using Isometric Scale Only):

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of
tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres. 2-Sheets

Text Books:

i. Engineering Drawing - N.D. Bhatt & V.M. Panchal, Charotar Publishing House, Gujarat.
ii. Computer Aided Engineering Drawing - S. Trymbaka Murthy, 4th Ed, University Press
iii. Engineering Drawing by N.S. Parthasarathy and Vela Murali Oxford University Press

Reference Books

i. Engineering Graphics - K.R. Gopalakrishna, Subash Publishers Bangalore.
ii. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production-Luzadder Warren J., Duff John M., Eastern Economy Edition, Prentice-Hall of India Pvt. Ltd., New Delhi.
iii. Computer Aided Engineering drawing, Prof. M. H. Annaiah, New Age International Publisher, New Delhi

WORKSHOP PRACTICE 0-0-3

For 1st Semester Code (RWO1B202)
For 2nd Semester Code (RWO2B202)

Fitting Practice:

Use of hand tools in fitting, preparing a male and female joint of M.S. or making a paper weight of M.S.

Welding Practice (Basic Theory to be explained prior to practice):

Gas Welding & Electric Arc welding Practice.
A joint such as a Lap joint, a T-joint or a Butt joint is to be prepared or to make furniture.

Machining (Basic Theory to be explained prior to practice):

(i) Stepped cylindrical Turning of a job and Thread-cutting in lathe.
(ii) Shaping
(iii) Milling

RCE1E201 English Language Lab 0-0-3

Objective: To assist students master the listening, speaking, reading and writing skills through practice.

Module1:

Listening and Speaking(8 Hrs)
Accent in speech (1 Hr)
Longer Discourse (dialogues, songs, contextual speech etc.) (1 Hr)
Role-play (2 Hrs)

Practicing sounds of English (1 Hr)
Extempore (1 Hr)
Presentations (2 Hr)

Module 2: Reading 4 Hrs

Reading comprehension practice: Technical text (2 Hrs),
General text (2 Hrs)

Module 3 : Writing 4 Hrs

Guided composition (2 Hrs)
Free-writing (2 Hrs)

Recommended Books:

1. English for Technical Communication by N P Sudharshana & C Savitha Cambridge University Press, 1st edition, 2018.
2. Communication Skills A Workbook by Sanjay Kumar & Pushp Lata, Oxford Publication.
3. English Language Communication Skills : Lab Manual cum Workbook by Rajesh Kumar, Cengage Learning, Ist edition, 2014.

RMA2A001 Mathematics-II 3-0-0

OBJECTIVE:

The objective of the course Mathematics-II is to familiarize the prospective engineers with techniques in Matrix algebra, Vector differential calculus, Vector integral calculus, Fourier series, Fourier transform, Fourier integral. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Module-1 (8 hrs.)

Matrix Algebra, Solution of system of linear equations (Gauss Elimination), Rank and Inverse of matrices (Gauss-Jordan), Examples of Vector Spaces.

Module-2 (8 hrs.)

Eigen values and eigen vectors, Symmetric and skew-symmetric matrices, Orthogonal matrices, Complex matrices, Hermitian and skew matrices, Unitary matrices and similarity of matrices, Diagonalisation of Matrices

Module-3 (9hrs.)

Vector differential calculus: vector and scalar functions and fields, Derivatives, Curves, tangents and arc Length, gradient, divergence, curl

Module-4 (10 hrs.)

Vector integral calculus: Line Integrals, Green Theorem, Surfaceintegrals, Gauss theorem and Stokes Theorem (Without Proof)

Module – 5 (10 hrs.)

Fourier series, Fourier expansion of functions of any period, Even and odd functions, Half range Expansion, Fourier transform and Fourier Integral.

OUTCOMES

On completion of this course, student are able to :

- Apply the knowledge of matrix algebra for solving system of linearequations and compute the inverse of matrices.
- To develop the essential tool of matrices to compute eigen values and eigen vectors required for matrix diagonalization process.
- Illustrate the concept of vector differential calculus to understand the solenoidal and irrotational vectors
- Illustrate the concept of vector integral calculus and exhibit the inter dependence of line, surface and volume integrals.
- Know the use of periodic functions and Fourier series, Fourier intergral, Fourier transform to analyze circuit and system communication.

Text Book:

1. Advanced Engineering Mathematics by E. Kreyszig, Tenth Edition,Willey

References:

2. Higher Engineering Mathematics by B.V. Raman, , McGraw Hills Education

3. Engineering Mathematics by P. S. Das & C. Vijayakumari, Pearson.

4. Advance Engineering Mathematics by P.V.O'NEIL, CENGAGE.

REM2B001 ENGINEERING MECHANICS 3-0-0

Module I (10 Hours)

Concurrent forces on a plane – Composition and resolution of forces and equilibrium of concurrent coplanar forces, Method of projections, Methods of moment, Friction, Parallel forces in a plane- Two parallel forces, General case of parallel forces.

Module II (8 Hours)

Center of parallel forces in a plane and center of gravity- centroids of composite plane figure and curves, Distributed parallel forces in a plane.

General case of forces in a plane- composition of forces in a plane and equilibrium of forces in a plane.

Moments of Inertia- Plane figure with respect to an axis in its plane and perpendicular to the plane- parallel axis theorem, Moment of Inertia of material bodies.

Plane trusses- method of joints and method of sections, Principle of virtual work –equilibrium of ideal systems.

Module III (8 Hours)

Rectilinear Translation- Kinematics- Principles of Dynamics- Concept of Inertial and Non-inertial frame of reference, D'Alemberts Principles.

Module IV (10 Hours)

Momentum and impulse, Work and Energy- impact

Curvilinear translation- Kinematics- equation of motion- projectile- D'Alemberts Principle in curvilinear motion, Moment of momentum, Work- Energy in curvilinear motion.

Kinetics of Rotation of rigid body

Text Book:

1. Engineering Mechanics by S Timoshenko, D.H Young and J.V.Rao, McGraw Hill.

Reference Books:

i. Vector Mechanics for Engineers Statics /Dynamics by Beer, Johnston, McGraw Hill
ii. Fundamental of Engineering Mechanics by S. Rajesekharan & G. Sankara Subramanium, Vikash Publishing House Pvt. Ltd.
iii. Engineering Mechanics by Shames and Rao, Pearson Education.
iv. Engineering Mechanics, Statics and Dynamics by Boresi and Schmidt, Thomson.
v. Engineering Mechanics by K.L. Kumar, Tata McGraw Hill.

RPL2B001 PROGRAMMING FOR PROBLEM SOLVING USING C

Course Outcomes

The student will learn

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.

- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Contact hrs : 40

Detailed contents

Unit 1:
Introduction to Programming (4 lectures)

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - **(1 lecture).**
Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. **(1 lecture)**
From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and logical errors in compilation, object and executable code- **(2 lectures)**

Unit 2:
Arithmetic expressions, operators and precedence (2 lectures)

Conditional Branching and Loops (6 lectures)
Writing and evaluation of conditionals and consequent branching **(3 lectures)**
Iteration and loops **(3 lectures)**

Arrays (6 lectures)
Arrays (1-D, 2-D), Character arrays and Strings

Unit 3:
Function (5 lectures)
Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

Recursion (4 lectures)
Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Unit 4:
Pointers (2 lectures)
Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation). Dynamic memory allocation.

Structure (4 lectures)
Structures, Defining structures and Array of Structures, Structure vs Union.

File handling: ASCII and binary Files **(1 lecture)**

Unit 5:
Basic Algorithms (6 lectures)
Searching (Linear and Binary), Basic Sorting Algorithms (Bubble, Insertion, and Selection), Concepts of time and space complexity.

Assignments: All lab should be handled in UNIX/LINUX environment.

Minimum 3-5 problems should be implemented from Unit-2 to Unit-5 each..

Suggested Text Books
(i) Reema Thareja, Introduction to C Programming, 2nd Edition, Oxford University Press.
(ii) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Books
(i) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
(ii) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
(iii) Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press.

RPL2B201 Programming for Problem Solving using C (Laboratory)

1. Familiarity with basic UNIX/LINUX command, vi editor.
2. Programs on arithmetic expressions, operators and precedence.
3. Programs on Conditional Branching.
4. Programs on Loops.
5. Programs on single dimensional array.
6. Programs on two-dimensional array.
7. Programs on Functions.
8. Programs on Recursive Functions.
9. Programs on Pointers.
10. Programs on Dynamic Memory Allocation.
11. Programs on Structure.
12. Programs on Union.
13. Programs on File Handling.
14. Implementation of Linear and Binary Search.
15. Implementation of Bubble, Insertion and Selection.

Distribution of Credit Semester wise:

Semester	Credit
First	18
Second	23
Third	22
Fourth	21
Fifth	22
Sixth	22
Seventh	17
Eighth	15
Total	**160**

Internal Evaluation Scheme

Classification	Marks
Attendance and Classroom interaction	05
Assignment	05
Surprise Test	05
Quiz	05
Class Test-I & Class Test-II	30
Total	50

Pass Mark in Internal is 50% of total marks i.e. 25

External Evaluation Scheme

University Semester Examination of 3 Hours duration.

Pass mark will be 35% which means students have to score 35 out of 100.

Practical/Sessional Evaluation Scheme

Pass mark will be 50% which means students have to score 50 out of 100.

Evaluation Scheme

Attendance & Daily Performance	-20
Lab Record	- 20
Lab Quiz	- 10
Final Experiments & Viva	– 50

Total=100

- All Lab examinations are to be completed one week before the end semester examination and marks are to be displayed on the college notice board.
- Students are to be shown their copies and marks within 15 days of any Internal Examination. For each internal examination secured marks are to be displayed in the college notice board.
- Highest mark secured must be displayed with name.
- Every month the attendance must be displayed with name.
- At least three student feedbacks are to be collected. (After one month of teaching, after Class Test-II and after completion of course and before end semester examination.)
- Remedial classes if conducted must be shown as the part of the Time table and attendance record to be maintained.

Question Format

Registration no: -

[FOR ALL UG-PG & INTEGRATED PROGRAMS]
(--) Sem +++++ Regular Examination- 2018-19
SUB:
Time: 3 Hours
Max marks: 100
Answer Question No.1 (Part-1) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right hand margin indicate marks.

Part- I

Q1	**Short Answer Type Questions (Answer All-10)**		**(02x10)**
	a)		
	b)		
	c)		
	d)		
	e)		
	f)		
	g)		
	h)		
	i)		
	j)		
		Part- II	
Q2	**Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)**		**(08x06)**
	a)		
	b)		
	c)		
	d)		
	e)		
	f)		
	g)		
	h)		
	i)		
	j)		
	k)		
	l)		
	m)		
		Part-III	
		Long Answer Type Questions (Answer Any Two out of Four)	
Q3			**(02X16)**

Q4			**(16)**
Q5			**(16)**
Q6			**(16)**

BIJU PATNAIK UNIVERSITY OF TECHNOLOGY, ODISHA
ROURKELA

Curriculum and Syllabus

of

B.Tech (*Civil Engineering*) from the Batch 2018-19

Semester (3rd)

Director, Curriculum Development
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Rourkela

Third Semester							
Theory							
Sl No	**Category**	**Course Code**	**Course Title**	**L-T-P**	**Credit**	**University Marks**	**Internal Evaluation**
1	BS	RMA3A001	Mathematics - III	3-0-0	3	100	50
2	ES	ROP3B001	Object Oriented Programming Using JAVA	3-0-0	3	100	50
3	HS	REN3E001 / ROB3E002	Engineering Economics / Organisational Behaviour	3-0-0	3	100	50
4	PC	RME3C001	Mechanics of Solid	3-0-0	3	100	50
5	PC	RME3C002	Fluid Mechanics and Hydraulic Machines	3-0-0	3	100	50
6	MC*	RES3F001	Environment Science	3-0-0	0	—	100 (Pass mark is 37)
				Total Credit (Theory)	15		
				Total Marks		**500**	**250**
Practical							
1	PC	RCI3C201	Building Drawing using Auto CAD	0-0-3	2		100
2	PC	RME3C202	Fluid Mechanics and Hydraulic Machines Lab.	0-0-3	2		100
3	ES	ROP3B201	OOP Using JAVA Lab.	0-0-3	2		100
4	PSI	RIP3H201	Evaluation of Internship - I	0-0-3	1		100
				Total Credit (Practical)	**7**		
				Total Semester Credit	**22**		
				Total Marks			**400**

***Mandatory Non-Credit Courses (MC) result will be reflected with Pass (P) / Fail (F) grade. Thus the grade obtained will not be affecting the grade point average. However it shall appear on the grade sheet as per AICTE rule.**

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3rd Semester	RMA3A001	MATHEMATICS – III	L-T-P 3-0-0	3 CREDITS

Module-I (10 Hours)

Solution of Non-linear equation in one variable (Bisection, Secant, Newton Rapson Method, Fixed Point Iteration method). Numerical Solutions of system of Linear equations (Gauss-Seidel, Successive Over Relaxation, Doolittle method, Crouts method, Choleskys Method).
Interpolation: Newton's forward and backward interpolation, Newton divided difference interpolation, Lagrange Interpolation.

Module-II (8 Hours)

Numerical Differentiation, integration and Solution of Differential Equations: Numerical Differentiation, The trapezoidal rule, The Simpson's rule, 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-III (8 Hours)

Sample Space, Probability, Conditional Probability, Independent Events, Bayes' Theorem, Random variables, Probability distributions, Expectations, Mean and variance, Moments.

Module-IV (9 Hours)

Bernoulli Trials, Binomial, Poisson, Hyper Geometirc Distribution, Uniform., Exponential and Normal distribution, Bivariate Distributions.

Module-V (10 Hours)

Correlation and Regression Analysis, Rank Correlation, Maximum Likely hood estimate, Method of Moments, Confidence intervals mean and variance of a Normal Distribution, p-value. Testing of hypothesis: test for goodness of fit, Test for single mean and variance of a Normal Distribution.

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
4. R. E. Walpole, R. h. Myers, S. L. Myers, K. E. Ye; "Probability and Statistics, Pearson".
5. R. L. Burden, J. D. Faires, " Numerical Analysis, Cenage Learning India Pvt. Ltd"
6. B.V.RAMANA,"Higher Engineering Mathematics"Tata Magraw Hill

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3rd Semester	ROP3B001	OBJECT ORIENTED PROGRAMMING USING JAVA	L-T-P 3-0-0	3 CREDITS

Module-I (10 Hrs)

Chapter 1-: An introduction to programming.

Different types of programming languages, Description of Compiler and Interpreter, Advantage of Object Oriented Programming, Object Oriented Programming, Features of Object Oriented Programming.

Chapter 2-: Introduction to Java.

What is Java?, Why Java?, History behind Java, Different versions of Java, Difference between C/C++ and Java, Features of Java, First Java Program, Prerequisites Before start writing a java program, Writing the program, Compiling the program, How Java program compiles?, Executing the program, How Java program executes?, What is JVM and its significance in executing a program?, Architecture of JVM.

Chapter 3-: Understanding First Program and a step forward, Understanding every term of the program, Java Tokens, Datatypes, Operators, What are Operators?, Different types of Operators, Typecasting, Control Structures and Arrays, Different types of control structures, Conditional Statements, Loops/ Iterators, Jumping Statements, Java Arrays, Multidimensional Arrays, Taking Input from keyboard, Command Line Arguments, Using Scanner Class, Using Buffered Reader class.

Module-II: (08 Hrs.)

Chapter 1-: Introduction to Classes and Objects.

Classes, Methods, Objects, Description of data hiding and data encapsulation, Constructors, Use of static Keyword in Java, Use of this Keyword in Java, Array of Objects, Concept of Access Modifiers (Public, Private, Protected, Default).

Chapter 2-: Inheritance

Understanding Inheritance, Types of Inheritance and Java supported Inheritance, Significance of Inheritance, Constructor call in Inheritance, Use of super keyword in Java, Polymorphism, Understanding Polymorphism, Types of polymorphism, Significance of Polymorphism in Java, Method Overloading, Constructor Overloading, Method Overriding, Dynamic Method Dispatching.

Chapter 3-: String Manipulations.

Introduction to different classes, String class, String Buffer, String Builder, String Tokenizer, Concept of Wrapper Classes, Introduction to wrapper classes, Different predefined wrapper classes, Predefined Constructors for the wrapper classes. Conversion of types from one type (Object) to another type (Primitive) and Vice versa, Concept of Auto boxing and unboxing.

Module-III: (09 Hrs.)

Chapter 1:-Data Abstraction

Basics of Data Abstraction, Understanding Abstract classes, Understanding Interfaces, Multiple Inheritance Using Interfaces, Packages, Introduction to Packages, Java API Packages, User-Defined Packages, Accessing Packages, Error and Exception Handling, Introduction to error and exception, Types of exceptions and difference between the types, Runtime Stack Mechanism, Hierarchy of Exception classes, Default exception handling in Java, User defined/Customized Exception Handling, Understanding different keywords (try, catch, finally, throw, throws), User defined exception classes, Commonly used Exceptions and their details.

Chapter 2:-Multithreading

Introduction of Multithreading/Multitasking, Ways to define a Thread in Java, Thread naming and Priorities, Thread execution prevention methods. (yield(), join(), sleep()), Concept of

Synchronisation, Inter Thread Communication, Basics of Deadlock, Demon Thread, Improvement in Multithreading, Inner Classes, Introduction, Member inner class, Static inner class, Local inner class, Anonymous inner class.

Module-IV: (10 Hrs.)

Chapter 1:-IO Streams (java.io package)
Introduction, Byte Stream and Character Stream, Files and Random Access Files, Serialization, Collection Frame Work (java.util), Introduction, Util Package interfaces, List, Set, Map etc, List interfaces and its classes, Setter interfaces and its classes.

Chapter 2:-Applet
Introduction, Life Cycle of an Applet, GUI with an Applet, Abstract Window Toolkit (AWT), Introduction to GUI, Description of Components and Containers, Component/Container hierarchy, Understanding different Components/Container classes and their constructors, Event Handling, Different mechanisms of Event Handling, Listener Interfaces, Adapter classes.

Module-V: (08 Hrs.)

Chapter 1:-Swing (JFC)
Introduction Diff b/w awt and swing, Components Hierarchy, Panes, Individual Swings Components JLabel, JButton, JTextField, JTextArea.

Chapter 2:-JavaFX
Getting started with JavaFX, Graphics, User Interface Components, Effects, Animation, and Media, Application Logic, Interoperability, JavaFX Scene Builder 2, Getting Started with scene Builder.
Working with scene Builder.

Books :-

1. Programming in Java. Second Edition. OXFORD HIGHER EDUCATION. (SACHIN MALHOTRA/SAURAV CHOUDHARY)
2. CORE JAVA For Beginners. (Rashmi Kanta Das), Vikas Publication
3. JAVA Complete Reference (9th Edition) Herbalt Schelidt.

3rd Semester	ROP3B201	OOP USING JAVA LAB.	L-T-P 0-0-3	2 CREDITS

JAVA programs on:

1. Introduction, Compiling & executing a java program.
2. Data types & variables, decision control structures: if, nested if etc.
3. Loop control structures: do, while, for etc.
4. Classes and objects.
5. Data abstraction & data hiding, inheritance, polymorphism.
6. Threads, exception handlings and applet programs
7. Interfaces and inner classes, wrapper classes, generics

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3rd Semester	REN3E001	ENGINEERING ECONOMICS	L-T-P 3-0-0	3 CREDITS

Module - I (08 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), Demand Forecasting – Meaning
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).

Module - II (08 hours)

Production - Production function, Laws of returns: Law of variable proportion, Law of returns to scale
Cost and Revenue Concepts - Total Costs, Fixed cost, Variable cost, Total revenue, Average revenue and Marginal revenue, Cost-Output Relationships in the Short Run, and Cost-Output Relationships in the Long Run, Analysis of cost minimization.

Module III (08 hours)

Market - 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).

Module - IV (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, SOYD method, After tax comparison of project.

Module –V (06 Hours)

Inflation-Meaning of inflation, types, causes, measures to control inflation.
National Income-Definition, Concepts of national income, Method of measuring national income.
Banking -Commercial bank, Functions of commercial bank, Central bank, Functions of Central Bank.

Books:

1. Principles of Economics by Deviga Vengedasalam and Karaunagaran Madhavan, Oxford
2. Riggs, Bedworth and Randhwa, "Engineering Economics", McGraw Hill Education India
3. C. S. Park, Contemporary Engineering Economics, 6th Edition, Pearson Education, 2015.
4. Engineering Economy by William G.Sullivan, Elin M.Wicks, C. Patric Koelling, Pearson
5. R.Paneer Seelvan, " Engineering Economics", PHI
6. Ahuja,H.L., "Principles of Micro Economics" , S.Chand & Company Ltd
7. Jhingan,M.L., "Macro Economic Theory"
8. Macro Economics by S.P.Gupta, TMH

Course Outcomes of Engineering Economics

At the end of the course the engineering graduates will be able to

1. **Remembering** : Define the basic concept of micro and macro economics, engineering economics and their application in engineering economy.
2. **Understanding** : Evaluate numerically the effects of changes in demand and supply on price determination of products and services.
3. **Analyze :** the macroeconomic environment and financial systems of the country and its impact on business, society and enterprise.
4. **Develop :** the ability to account for time value of money using engineering economy factors and formulas.
5. **Apply:** knowledge of mathematics, economics and engineering principles to solve engineering problems and to analyze decision alternatives in engineering projects considering upon depreciation, taxes and inflation.

3rd Semester	ROB3E002	ORGANISATIONAL BEHAVIOUR	L-T-P 3-0-0	3 CREDITS

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.

Module-I: **(06 Hrs.)**

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.

Module-II: **(12 Hrs.)**

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.

Module-III: **(10 Hrs.)**

Foundations of Group Behavior: The Meaning of Group & Group behavior & Group Dynamics, Types of Groups, The Five – Stage Model of Group Development.
Managing Teams: Why Work Teams, Work Teams in Organization, Developing Work Teams, Team Effectiveness & Team Building.
Leadership: Concept of Leadership, Styles of Leadership, Trait Approach Contingency Leadership Approach, Contemporary leadership, Meaning and significance of contemporary leadership, Concept of transformations leadership, Contemporary theories of leadership, Success stories of today's Global and Indian leaders.

Module-IV: **(08 Hrs.)**

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.

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Module-V: **(09 Hrs.)**

Organizational Change: Meaning, Definition & Nature of Organizational 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.

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

3rd Semester	RME3C001	Mechanics of Solid	L-T-P 3-0-0	3 CREDITS

MODULE – I (10 Hrs.)

Concept of Stress: 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, Concept of Statically indeterminate problems. Shear stress, Complimentary shear stress, Shear strain, Modulus of rigidity, Poisson's ratio, Bulk Modulus, Relationship between elastic constants.

MODULE – II (09 Hrs.)

Biaxial State of Stress and Strain : Analysis of Biaxial Stress. Plane stress, Principal plane, Principal stress, Mohr's Circle for Biaxial Stress. Two dimensional state of strain, Principal strains, Mohr's circle for strain, Calculation of principal stresses from principal strains, Strain Rossette.

Thin Cylinder: Stresses in thin cylinders and thin spherical shells under internal pressure, wire winding of thin cylinders.

MODULE - III (09 Hrs.)

Shear Force and Bending Moment Diagrams: Shear force and bending moment. Types of load and Types of support. Support reactions, Relationship between bending moment and shear force, Point of inflection, Point of contraflexture. Shear Force and Bending Moment diagrams.
Bending of Beams: Theory of simple bending of initially straight beams, Bending stresses, Shear stresses in bending, Distribution of normal and shear stress, Composite beams.

MODULE - IV (9 Hrs.)

Deflection of Beams : Differential equation of the elastic line, Slope and deflection of beams by integration method and area - moment method.
Theory of Columns: Long columns, Euler's column formula, Lateral buckling, Critical Load, Slenderness ratio, Eccentric loading of short column

MODULE – V (08 Hrs.)

Torsion: Torsion in solid and hollow circular shafts, Twisting moment, Strain energy in shear and torsion, strength of solid and hollow circular shafts. Strength of shafts in combined bending and twisting, Close - Coiled helical springs.
Testing of materials with UTM; testing of hardness and impact strength.

Books:

- Strength of Materials by G. H. Ryder, Macmillan Press
- Elements of Strength of Materials by S.P.Timoshenko and D.H.Young, Affiliated EastWest Press
- Strength of Materials by R.Subramaniam, Oxford University Press
- Mechanics of Materials by Beer and Johnston, Tata McGraw Hill
- Mechanics of Materials by R.C.Hibbeler, Pearson Education
- Mechanics of Materials by William F.Riley, Leroy D.Sturges and Don H.Morris,Wiley

- Mechanics of Materials by James M. Gere, Thomson Learning
- Strength of Materials by James M. Gere and Barry J. Goodno, Cengage Learning
- Strength of Materials by S.S.Rattan, Tata Mc Graw Hill
- Engineering Mechanics of Solids by Egor P. Popov, Prentice Hall of India

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3rd Semester	RCI3C201	Building Drawing using Auto CAD	L-T-P 0-0-3	2 CREDITS

Laboratory Experiments

1. The drawing is to be drawn using **Auto CAD.**
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 Residential Building/ Bank building/ Post office/ Hostel/ Library/ Hospital/ Auditorium etc

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3rd Semester	RME3C002	Fluid Mechanics and Hydraulic Machines	L-T-P 3-0-0	3 CREDITS

Module - I **(12 Hrs.)**

Introduction: Scope of fluid mechanics and its development as a science 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 process 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 **(08 Hrs.)**

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 **(08 Hrs.)**

Fluid dynamics : Introduction to N-S equation and non-dimensional number, 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 Hrs.)**

Impact of Jets : Flat, inclined and curved plates with stationary and moving case.
Hydraulic turbines: 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 cavitation.

Module - V **(07 Hrs.)**

Centrifugal 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

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Books:

- Fluid Mechanics, Y A Cengel, TMH
- Fluid Mechanics and Hydraulic Machines, Modi & Seth
- Introduction to Fluid Mechanics and Fluid Machines, S.K. Som and G. Biswas, TMH
- Fluid Mechanics and Machinery, Mohd. Kareem Khan, OXFORD
- Introduction to Fluid Mechanics, Fox, McDonald, Willey Publications
- Fluid Mechanics and Fluid Machines by A.K.Jain, Khanna Publishers
- Fluid Mechanics and Machinery, CSP Ojha and P.N. Chandramouli, Oxford University Press
- Fluid Mechanics by Kundu, Elsevier
- An Introduction to Fluid Dynamics, G.K.Batchelor, Cambridge University Press
- Engineering Fluid Mechanics by Garde et. al., Scitech
- Fluid Mechanics by J.F.Douglas, J.M.Gasiorek, J.A.Swaffield and L.B.Jack, Pearson Education
- Fluid Mechanics and Machines, Sukumar Pati, TMH

3rd Semester	RME3C202	Fluid Mechanics and Hydraulic Machines Lab.	L-T-P 0-0-3	2 CREDITS

Laboratory Experiments (Minimum 8 experiments)

1. Determination of Metacentric Height and application to stability of floating bodies.
2. Determination of Cv and Cd of Orifices.
3. Experiments on impact of Jets
4. Experiments on performance of Pelton Turbine
5. Experiments on performance of Francis Turbine
6. Experiments on performance of Kaplan Turbine
7. Experiments on performance of centrifugal pump
8. Experiments on performance of reciprocating pump
9. Experiments on Reynold's Apparatus
10. Experiments on Flow through pipes
11. Experiments on performance of Gear pump
12. Verifications of momentum equation

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3rd Semester	RES3F001	ENVIORMENT SCIENCE	L-T-P 3-0-0	0 CREDIT

We as human being are not an entity separate from the environment around us rather we are a constituent seamlessly integrated and co-exist with the environment around us. We are not an entity so separate from the environment that we can think of mastering and controlling it rather we must understand that each and every action of ours reflects on the environment and vice versa. Ancient wisdom drawn from Vedas about environment and its sustenance reflects these ethos. There is a direct application of this wisdom even in modern times. Idea of an activity based course on environment protection is to sensitize the students on the above issues through following two type of activities.

(a) Awareness Activities:

i) Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste
ii) Slogan making event
iii) Poster making event
iv) Cycle rally
v) Lectures from experts

(b) Actual Activities:

i) Plantation
ii) Gifting a tree to see its full growth
iii) Cleanliness drive
iv) Drive for segregation of waste
v) To live some big environmentalist for a week or so to understand his work
vi) To work in kitchen garden for mess
vii) To know about the different varieties of plants
viii) Shutting down the fans and ACs of the campus for an hour or so

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