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Total Number of Pages : 02

B.Tech
PCI4I103

4th Semester Regular / Back Examination 2018-19
DESIGN OF CONCRETE STRUCTURES

BRANCH : CIVIL

Time : 3 Hours

Max Marks : 100

Q.CODE : F834

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 Only Short Answer Type Questions (Answer All-10) (2 x 10)

- What are the circumstances where doubly reinforced beams are preferred?
- Why does the code limit the compressive strength of concrete in structural design to $0.67f_{ck}$, and not f_{ck} ?
- Find the tensile strength and modulus of elasticity of M25 grade concrete.
- What is the maximum spacing required for main bars and distribution bars in slab as per IS code?
- Determine the effective flange width of a T-beam having an effective span of 6m, rib width of 250mm and flange thickness 100mm.
- What are the different type of torsion in reinforced concrete and where it occurs?
- For a beam of 300mm wide and 500mm effective depth calculate the minimum area of tension steel required (use Fe415).
- What is meant by slenderness ratio of a compression member and what are its applications.
- Calculate the development length of a 25mm diameter HYSD bar of Fe415 grade. Take the bar in tension and use M20 grade concrete.
- Under which circumstances combined footing is provided.

Part- II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 x 8)

- What is meant by limit state? Discuss the different limit states to be considered in reinforced concrete design.
- Find the moment of resistance of the rectangular section of 250mm width and 500mm overall depth. The section is reinforced with 3bars of 20mm diameter as compression reinforcement and 5 bars of 25mm diameter as tension reinforcement. Use M25 grade concrete and Fe415 steel.
- Explain different types of shear reinforcement provided in reinforced concrete design with neat sketch.
- Find the moment of resistance of a T-beam having width of flange 800mm, thickness of flange 120mm, width of rib 200mm, effective depth 400mm and area of tensile steel is 3500mm^2 . Use M15 grade concrete and Fe250 steel.
- Explain clearly the difference in the behavior of one-way slabs and two-way slabs.
- Describe the common geometrical configurations of staircase with neat sketch.
- Design a short axially loaded circular column to carry a service load of 1000kN. Use M20 concrete and Fe 415 steel.
- Enumerate the main factors that influence the bond strength of reinforced concrete structures.

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	i)	What is meant by eccentric loading on a footing, and under what circumstances does this occur?					
	j)	What is the purpose of a shear-key? Describe its action.					
	k)	What is the purpose of retaining wall? State different types of concrete retaining walls with neat sketch.					
	l)	Illustrate the assumptions made for design of concrete water tank.					

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				Part-III			

				Only Long Answer Type Questions (Answer Any Two out of Four)			
Q3	A simple supported beam, 300mm wide and 600mm effective depth carries a udl of 74kN/m including its own weight over an effective span of 6m. The reinforcement consists of 5bars of 25mm diameter, out of these two bars can safely bent up at 1m distance from the support. Design the shear reinforcement for the beam. Use M20 grade concrete and Fe 415 steel.						(16)
Q4	Design a reinforced concrete slab for a room 4m x 4m measuring from inside. The thickness of wall is 400mm. The superimposed load, exclusive of the self weight of the slab is 2 kN/m ² . The slab may be assumed to be simply supported at all the four edges, with corners free to lift. Use M20 grade concrete and Fe 415 steel.						(16)
Q5	A short reinforced concrete column of 300mm x 400mm section is reinforced with 6bars of 16mm diameter uniformly distributed along the four sides, at an effective cover of 50mm. Determine the maximum allowable ultimate load if the unsupported lengths about x-axis and y-axis are equal to 5m and 3m respectively. Use M25 grade concrete and Fe 415 steel bars.						(16)
Q6	Design a cantilever retaining wall to retain earth embankment 3m high above ground level. The unit weight of earth is 18 kN/m ³ and its angle of repose is 30°. The embankment is horizontal at its top. The safe bearing capacity of soil is 100 kN/m ³ and the coefficient of friction between soil and concrete is 0.5. Use M20 grade concrete and Fe 415 steel.						(16)

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