PVP 20

Code: 20CE3501

III B.Tech - I Semester – Regular Examinations - DECEMBER 2022

DESIGN OF REINFORCED CONCRETE STRUCTURES
(CIVIL ENGINEERING)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.

BL – Blooms Level CO – Course Outcome

Use of IS: 456-2000 and SP – 16 design charts are permitted.

			BL	CO	Max. Marks
UNIT-I					
1	a)	Discuss merits and demerits of working stress method and limit state method.	L2	CO1	7 M
	b)	Explain under reinforced and over reinforced design and mention which is advisable for designs.	L2	CO1	7 M
OR					
2		A rectangular reinforced concrete beam has width of 200 mm and reinforced with 2 bars of 20 mm diameter at an effective depth of 400 mm. If M20 grade concrete and Fe415 grade steel bars are used, determine the ultimate moment of resistance of the section. Assume suitable data if necessary.	L4	CO1	14 M

UNIT-II					
3		A doubly reinforced concrete beam having a rectangular section of 250 mm wide and 540 mm overall depth is reinforced with 2 bars of 12 mm diameter in the compression side and 4 bars of 20 mm diameter in the tension side. The effective cover is 40 mm. Using M20 grade concrete and Fe 415 HYSD bars, estimate the flexural strength of the section using IS:456-2000 code recommendations.	L4	CO2	14 M
OR					
4		Design a singly reinforced concrete beam to suit the following data. Clear span = 4 m Width of supports = 300 mm brick walls Service live load = 5 kN/m Materials: M20 grade concrete and Fe415 HYSD bars.	L6	CO2	14 M
UNIT-III					
5	a)	Explain different types of shear failures.	L2	CO3	7 M
	b)	A simply supported beam 300 mm wide, 600 mm effective depth carries a UDL of 70 kN/m including self-weight over an effective span of 6 m. The reinforcement consists of 5 bars of 25 mm diameter out of these 2 bars are bent safely at 1 m distance from support. Design the shear reinforcement for the beam. Use M30 concrete and Fe415 steel.	L6	CO3	7 M

	OR			
6	Design torsional reinforcement in a rectangular beam section 350 mm wide and 750 mm deep subjected to an ultimate twisting moment of 140 kN-m combined with ultimate shear force of 110 kN. Assume M25 grade concrete, Fe415 grade steel and mild exposure conditions.	L6	CO3	14 M
	UNIT-IV			
7	Design a two-way slab for a residential building floor of size 5.5 m x 4.5 m with discontinuous and simply supported edges on all the sides with corners prevented from lifting and supporting a service load of 4 kN/m^2. Consider M20 grade concrete and Fe415 steel.	L6	CO4	14 M
	OR			
8	A hall has clear dimensions of 3 m x 9 m with a wall thickness of 230 mm. Live load on the slab is 4 kN/m^2 and floor finish is 2 kN/m^2. Design the slab using M20 grade concrete and Fe415 steel. Sketch the reinforcement details.	L6	CO4	14 M
	UNIT-V			
9	Design a short axially loaded column 350 mm x 350 mm to support a service load of 1000 kN at an eccentricity of 160 mm. Use M20 grade concrete and Fe415 steel.	L6	CO5	14 M
	OR			

10	Design an isolated footing for a circular column 560 mm in diameter transmitting an axial load of 1200 kN. The column is reinforced with spars of 12 mm dia. The safe bearing capacity of soil is 120 kN/m^2. Use M20 grade concrete and Fe415 steel.	L6	CO5	14 M