PVP 20

Code: 20CE3501

III B.Tech - I Semester – Regular / Supplementary Examinations
NOVEMBER 2023

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)	Draw the idealized stress-strain curves for concrete and steel under compression and explain the salient points of the plot.	L2	CO1	10 M
	b)	Write the assumptions of the working stress method.	L2	CO1	4 M
OR					
2		A singly reinforced beam section is 250 mm wide and 500 mm deep to the center of tensile reinforcement. It is reinforced with 4 bars of 20 mm diameter as tensile steel at an effective cover of 50 mm. Use M 20 concrete and Fe 415 steel to calculate the moment of resistance of the beam section. Use working stress method.	L3	CO1	14 M

UNIT-II					
3	a)	i)Identify whether the RC beam is an under-reinforced, balanced, or over-reinforced section of size 230 mm X 500 mm deep, reinforced with 5 bars of 20 mm dia with an effective cover of 50mm. Use M20 Grade concrete and Fe415-grade steel. ii) Identify whether the RC beam is an under-reinforced, balanced, or over-reinforced section of size 200 mm X 440 mm deep, reinforced with 3 bars of 20 mm dia with an effective cover of 40mm. Use M20-grade concrete and Fe250 Grade of steel.	L3	CO2	7 M
	b)	i) Use the compression test results of 150 mm concrete cubes 28, 32, 30, 26, 31, 33, 27, 26, 34, 28, 32, 33 N/mm^2 to determine the characteristic strength of concrete. ii) Distinguish a doubly reinforced section and a singly reinforced section.	L3	CO2	7 M
OR					
4		Derive Stress-block parameters for a singly reinforced section.	L3	CO2	14 M
UNIT-III					
5		A simply supported R.C beam is 250 mm wide and 500 mm deep to the center of tensile reinforcement and is reinforced with 4 bars of 20 mm diameter as tensile steel. If the beam is subjected to a factored shear of 95 KN at the	L3	CO3	14 M

	support, design the shear reinforcement consisting of stirrups. Use M 20 concrete and Fe 415 steel.			
	OR			
6	Design of bent-up bars as shear reinforcement, a rectangular beam of section 300mm width by 500mm effective depth is reinforced with four 20mm bars, out of which two bars are bent at the ends of the beam at 45^0. Determine the additional shear reinforcement required if the factored shear force at the critical section is 320 kN. Consider M25 grade and Fe415 steel.	L3	CO3	14 M
	UNIT-IV			
7	Design a simply supported RCC slab has to be provided for the roof of a room of clear dimensions 3m x 8.5m. Width of supporting wall is 280mm. The weight of finishes over the slab is $1KN/m^2$.Take the live load on the slab $2KN/m^2$. Check for shear and deflection. Use concrete grade M20 and steel grade Fe 415.	L3	CO4	14 M
	OR			
8	Design a RCC slab has to be provided for the roof of a room of clear dimensions 3m x 4.5m simply supported on all the four sides. The weight of finishes over the slab is $1KN/m^2$. Take the live load on the slab $3KN/m^2$. Check for shear and deflection. Draw the reinforcement detailing. Use concrete grade M20 and steel grade Fe 415.	L3	CO4	14 M

	UNIT-V			
9	A Reinforced square column 500 mm X 500 mm is subjected to a factored axial load 1800 kN accompanied by a factored moment of 100kNm. Providing reinforcement on two sides, determine the reinforcement required for the column. Use M20 Grade of concrete and Fe250 Grade of steel.	L3	CO5	14 M
	OR			
10	Design a RC footing for a RC column of 400 mm X 400 mm size carrying an axial load of 1000kN using M20 Grade concrete and Fe415 Grade of steel. The safe bearing capacity of soil is 200 kN/m^2.	L3	CO5	14 M