

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026***Fifth Semester**Civil Engineering***CE3501 - Design of Reinforced Concrete Structural Elements****(IS456:2000 and SP16 Design Aids are permitted)***Regulations - 2021**Duration : 3 Hrs**Maximum : 100 Marks***PART - A (ANSWER ALL QUESTIONS) (Marks 10*2=20)**

<i>Q.No</i>	<i>Questions</i>	<i>BTL</i>	<i>CO</i>	<i>Marks</i>
1.	Write the formula to find the critical neutral axis in working stress method.	L3	1	2
2.	What is modular ratio?	L3	1	2
3.	What do you understand the term Anchorage?	L2	2	2
4.	Define torsion.	L1	2	2
5.	List the advantages of Cantilever slab.	L2	3	2
6.	What is tread and riser?	L3	3	2
7.	State the behaviour of slender column.	L3	4	2
8.	Summarize the function of lateral ties in an RC column.	L3	4	2
9.	What is uni-axial bending?	L2	5	2
10.	Enumerate safe bearing capacity of soil.	L3	5	2

PART - B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a A rectangular RC section having a width of 350 mm is reinforced with 2 numbers of 28 mm diameters at an effective depth of 700mm. Adopt M20 grade concrete and Fe415 HYSD bars. Determine the ultimate moment of resistance of the section.	L3	1	16
	Or			
	b i Explain the advantages of limit state method over working stress and ultimate load method.	L3	1	10
	ii Distinguish between under reinforced and over reinforced sections.	L3	1	6
12.	a Design a T beam section with a flange width of 1250 mm, a flange depth of 100 mm, a web width of 250 mm and an effective depth of 500 mm, which is subjected to a factored moment of 560 kNm. The concrete mix is to be used is of grade M20 and steel is of grade Fe415. Use limit state method.	L4	2	16
	Or			
	b Design the reinforcement required for a rectangular beam section for the following data. Size of the beam 300mmX500mm, factored moment=80kNm, Factored torsion=40 kNm, Factored shear force =70 kN. Use M 20 concrete and Fe 415 steel.	L4	2	16

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| 13. | a | Design a one-way reinforced concrete slab simply supported at the edges for a public building with a clear span of 4 m supported on 200 mm solid concrete masonry walls. Live load on slab is 5 kN/m ² . Adopt M20 grade concrete and Fe 415 HYSD bars. | L4 | 3 | 16 |
| | | Or | | | |
| | b | Design one of the flights of a dog-legged stairs spanning between landing beams using following data Number of steps in a flight = 10, Tread = 300 mm, Riser = 150 mm, Width of landing beams = 300 mm. | L4 | 3 | 16 |
| 14. | a | Determine the reinforcement for a short column for the following data. Column size: 450 mm x 600 mm, P _u =100 kN, M _{ux} =260 kNm, M _{uy} =120 kNm. Use M25 grade concrete and Fe250 grade steel. | L4 | 4 | 16 |
| | | Or | | | |
| | b | Design the reinforcement in a circular column of diameter 350mm with helical reinforcement of 8mm diameter to support a factored load of 1400kN. The column has an unsupported length of 3.5 m and is braced against side sway. Adopt M20 grade concrete and Fe415 steel bars. | L4 | 4 | 16 |
| 15. | a | Design an isolated square footing for a column 500 x 500 mm, transmitting an axial load of 1200 kN. The column is reinforced with 8 bars of 20 mm diameter. The safe bearing capacity of soil is 120 kN/m ² . Use M20 concrete & Fe415 steel. | L5 | 5 | 16 |
| | | Or | | | |
| | b | Design a combined column footing with a strap beam for two reinforced concrete columns 300 mm x 300 mm size spaced 4 m apart and each supporting a factored axial load of 750 kN. Assume the ultimate bearing capacity of soil at site is 230 kN/m ² . Adopt M20 grade concrete and Fe415 HYSD bars. | L5 | 5 | 16 |