

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025*****Fifth Semester******Civil Engineering*****CE3501 - Design of Reinforced Concrete Structural Elements****(Use code book IS 456-2000, Design charts and relevant tables of SP 16)*****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>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	Identify the main concept of elastic method.	L2	1	2
2.	What is serviceability limit state?	L2	1	2
3.	Illustrate the advantages of flanged beams.	L2	2	2
4.	Differentiate bond and anchorage.	L2	2	2
5.	Show the value of partial safety factor for (a) concrete (b) steel.	L1	3	2
6.	Write the different types of staircase.	L2	3	2
7.	Give the minimum number of steel rods for different types of columns.	L1	4	2
8.	On what condition intermediate column is more suitable?	L2	4	2
9.	List the different condition for usage of footing.	L1	5	2
10.	List any two situations in which combined footings are preferred to isolated footings.	L2	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 Examine the working stress method with limit state method and ultimate load methods of design of R.C structures.	L3	1	16
	Or			
	b A simply supported over an effective span of 8m carries a live load of 15KN/m. Design the beam, using M20 concrete and Fe415 grade steel. Keep the width equal to half the effective depth. Use working stress method of design.	L3	1	16
12.	a Determine the area of steel required for a T beam with following dimensions; Depth of slab=100 mm Breadth of flange=750 mm Width of web=250 mm Total depth=600 mm The beam is subjected to an ultimate moment of resistance of 525 KNm. Concrete grade M20 and steel grade Fe415 are used with cover 50 mm.	L3	2	16

Or

	b	A reinforced concrete beam of rectangular section has a width of 250mm and an effective depth of 500mm the beam is reinforced with 4 bars of 25 mm dia on the tension side. Two of the tension bars are bent up at 45° near the support section. In addition the beam is provided with two legged stirrups of 8mm dia at 150mm centers near the supports. If $f_{ck}=25\text{N/mm}^2$; $f_y=415\text{N/mm}^2$. Estimate the ultimate shear of the support section.	L3	2	16
13.	a i	Write about structural classification of slab and staircase.	L2	3	8
	ii	Explain about continuous slab with neat diagram.	L2	3	8
		Or			
	b	Find the reinforcement details of a one way slab for an office floor which is continuous over tee beam spaced 3.5m intervals. Assuming a live load of 4 kN/m^2 . Adopt limit state design. Use M20 grade concrete and Fe415 steel bars.	L3	3	16
14.	a i	Discuss various assumptions used in the limit state methods of design of compression members.	L2	4	6
	ii	Explain the design procedure of column and give specification on the same.	L2	4	10
		Or			
	b	Design a biaxial eccentric loaded braced circular column deforming in single curvature for the following data: Ultimate load=200kN. Ultimate moment in longer direction at bottom $M_{ux1}=178\text{ kNm}$ and at top $M_{ux1}=128\text{ kNm}$. Ultimate moment in shorter direction at bottom $M_{uy1}=108\text{ kNm}$ and at top $M_{uy2}=88\text{ kNm}$. Unsupported length of column = 9m. Effective length in long direction $l_{ex}=8\text{m}$. Effective length in shorter direction $l_{ey}=5.8\text{m}$. Diameter of column = 550mm. Use M25 & Fe415 grades.	L3	4	16
15.	a i	Write down the different types of footings and their suitability.	L2	5	6
	ii	Enumerate the procedure for the design of combined rectangular footing for two columns only.	L2	5	10
		Or			
	b	Design an isolated square sloped 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 M ₂₀ & Fe ₄₁₅ .	L2	5	16