Question Paper Code: R18A31CE03

ANURAG Engineering College
(An Autonomous Institution)
III B.Tech I Semester Supplementary Examinations, June/July-2024
STRUCTURAL ENGINEERING – I
(CIVIL ENGINEERING)

Time: 3 Hours   **Max. Marks: 75**

Section – A (Short Answer type questions)
Answer All Questions   **(25 Marks)**

		Course Outcome	B.T Level	Marks
1.	According to IS: 456-2000, find the limiting value of yield strain for Fe-250 grade steel is-------?	CO1	L2	2M
2.	If the grade of steel is Fe-415, then write the expression for moment of resistance of a single reinforced section is-----?	CO1	L2	3M
3.	Make use of IS:456:2000, compute the maximum allowable shear stress for M25 grade concrete is?	CO2	L2	2M
4.	Make use of IS:456:2000, The lap length in compression shall be equal to the development length in compression, but not less than --- times the bar diameter?	CO2	L2	3M
5.	Make use of IS:456-2000, At corners where slab is dis-continuous over both the edges, then the required torsion steel should be provided is ---- %	CO3	L2	2M
6.	Make use of IS:456-2000, A simply supported slab 4 m and overall depth is 150 mm, compute the area of distribution reinforcement when Fe-415 is used?	CO3	L2	3M
7.	Make use of IS:456:2000, mention the minimum cover to column as per IS: 456:2000?	CO4	L2	2M
8.	Make use of IS:456:2000; If the unsupported length of a 32 cm diameter column is 4.4 m and both ends of the column effectively held in position and restrained against rotation in both ends, then the slender ratio is ---?	CO4	L2	3M
9.	Make use of IS:456-2000, In R.C. footing on piles, the thickness at the edge should not be less than---- mm	CO5	L2	2M
10.	Make use of IS:456-2000, Draw the critical section for finding maximum bending moment for footing under masonry wall.	CO5	L2	3M

Section B (Essay Questions)
Answer all questions, each question carries equal marks.   **(5 X 10M = 50M)**

11.A)	Find the limiting moment carrying capacity of a doubly reinforced beam if it is reinforced with 3 no.s of 20mm diameter mild steel bars in compression and 4no.s of 25mm diameter mild steel bars in tension. The size of the beam is 300mm x600mm and the effective covers to compression and tension reinforcement are 30mm and 50mm respectively. Use M-20 grade concrete.	CO1	L3	10M

<div align="center">OR</div>

B)	Determine area of steel required & moment of resistance corresponding to balanced section of a T – beam with the following data, width (b_f) and depth (D_f) of flange 1000 mm, 100 mm, Width of web (b_w) = 300 mm, effective cover = 50 mm, effective depth (d) = 450 mm, Adopt M-20 concrete & Fe 415 steel.	CO1	L3	10M

12.A) An RC beam has an effective depth of 500 mm and breadth of 350 mm. It contains 4-25 mm bars mild steel(Fe-250) out of which two bars are bent up at 45^0 near the support in tension. Calculate the shear resistance of the bent-up bars. What additional stirrups are needed if it has to resist a design shear force of 350 kN. Use M20 mix. | CO2 | L3 | 10M

OR

B) Design a rectangular reinforced concrete beam to carry a factored BM of 200 kN-m, factored shear force of 120 kN & factored torsion moment of 75 kN-m Assume M-20 concrete & Fe 415steel | CO2 | L3 | **OR** 10M

13.A) A hall has clear dimensions of 3 m × 9 m, with wall thickness of 230 mm. The live load on the slab is 3 kN/m², and a finishing load of 1 kN/m² may be assumed. Use M-20 and Fe- 415. Design the slab. | CO3 | L3 | 10M

OR

B) Design the open-well staircase if supported on brick walls 300 mm thick. Take Risers = 150 mm ,Treads = 260 mm. Assume floor finish loads as 1 kN/m² , Live load (LL) on slab as 5 kN/m² , Use M 20 Fe 415. | CO3 | L3 | 10M

14.A) Design a reinforced concrete spiral column of 400 mm diameter subjected to an axial factored load of 1750 kN. The column is braced against side sway and has unsupported length of 3.3m.Use M-25 grade concrete and Fe 415 HYSD steel. | CO4 | L3 | 10M

OR

B) A short column 250mm square has to carry an ultimate axial load of 1600 kN along with ultimate moment of 60 kN-m about one axis and 40 kNm about the other axis. Take M-30 grade concrete and Fe-415 steel. Design longitudinal steel as per IS :456. | CO4 | L3 | 10M

15.A) Design a square footing for a short axially loaded column of size 300 mm × 300 mm carrying 600 kN load. The safe bearing capacity of the soil is at the site is 200 kN/m². Adopting M-20 grade concrete and Fe-415 HYSD bars. | CO5 | L3 | 10M

OR

B) Design a reinforced circular footing for a circular column of 400 mm diameter supporting a design ultimate load of 850 kN, The safe bearing capacity of the soil at the site is 200 kN/m². Adopt M-20 grade concrete and Fe-415 HYSD bars. | CO5 | L3 | 10M