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VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (Civil Engg.) III Year I-Semester (Main) Examinations, Nov./Dec.-2016

Reinforced Concrete Design – I

Time: **3** hours Max. Marks: **70**

*Note: i) Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***
ii) Missing data, if any, may suitably be assumed
iii) Use of IS 456 – 2000 is permitted

Part-A (10 × 2 = 20 Marks)

1. List out the advantages of Limit State method over Working stress method.
2. What is meant by equivalent section or transformed section in working stress method?
3. Compute effective flange width for a T-Beam with the following data: Slab thickness 120mm; spacing of beams at 3.5 m c/c: span of the beam 5 m; width of web 300 mm; total depth of the beam including the thickness of slab is 550 mm.
4. State the purpose of splicing of reinforcement. What are the different ways by which this can be achieved?
5. Draw shear stress distribution across an R.C. beam and write the expression for the nominal shear stress.
6. List out the factors influencing short term deflection and long term deflection of RC beams.
7. State the necessity and arrangement of torsional reinforcement in slabs.
8. Explain briefly about a yield line.
9. Mention the role of transverse steel ties in reinforced concrete columns.
10. What are the critical sections for one way and two-way shear in the design of footings?

Part-B (5 × 10 = 50 Marks)

11. a) Determine the flexural design constants for M20 grade concrete and Fe415 grade steel. [3]

    b) Determine the reinforcement for a T beam with flange width 1500mm, web width 300mm thickness of slab 100 mm, effective depth 735 mm, to carry a moment of 200 kNm . Use M 20 concrete and Fe 415 steel. Use working stress design. [7]

12. a) Determine the reinforcement required for a beam of width 300mm and overall depth 600mm subjected to a factored moment 320 kNm. Assume M20 concrete and Fe 415 steel. [7]

    b) Derive an expression for developmental length of bars in tension. [3]

13. a) Explain how span/depth ratio can be used to control deflection in beams. [5]

    b) A beam with width 350mm, overall depth 800mm is subjected to a bending moment of 215 kNm, shear of 150 kN and torsion of 105 kNm. Assuming M30 grade concrete and Fe 415 steel, design the reinforcements according to IS 456: 2000. Take cover to the center of steel as 50mm. [5]

14. a) What are the different patterns of yield lines? Explain. [3]

    b) Design a R.C. slab for a room 6m × 6m measuring from inside. The thickness of wall is 400 mm. The superimposed load, exclusive of the self-weight of the slab is 2 kN/m2. The slab may be assumed to be simply supported at all the four edges, with corners held down. Use M20 grade concrete and Fe 415 steel. [7]

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15. a) Write assumptions made in the analysis of columns by limit state method. [3]

    b) Design a rectangular isolated footing of uniform thickness for R.C. column bearing a vertical load of 700 kN and having a base of size 450mm × 650mm. The safe bearing capacity of soil may be taken as 250 kN/m2. Use M20 grade concrete and Fe 415 grade steel. [7]

16. a) Differentiate balanced, under reinforced and over reinforced sections. [5]

    b) Determine the factored moment of resistance of a singly reinforced rectangular beam of width 230mm and 460 mm effective depth, if it is reinforced with 5 no. 20 mm diameter bars. Use M 20 grade concrete and HYSD reinforcement of grade Fe 415. [5]

17. Answer any ***two*** of the following:

    a) What are the major factors that affect deflection and how do these affect deflection in beams? [5]

    b) Write short notes on assumptions in yield line theory of slabs. [5]

    c) A circular column 4.5m high is effectively held in position at both ends and restrained against rotation at one end. Design the column to carry an axial load of 1500 kN, if its diameter is restricted to 400mm. Use M 25 grade concrete and Fe 415 steel. [5]