

R 8146

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2006.

Sixth Semester

Civil Engineering

CE 337 — STRUCTURAL DESIGN — II

Time : Three hours

Maximum : 100 marks

Use of IS 456, Design Aids SP 16 and IS 1905 is Permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Discuss the merits of working stress method?
2. What is modular ratio? Determine the modular ratio at M20 grade concrete.
3. Discuss the different limit state to be considered in Reinforced concrete design?
4. Why is it necessary to provide transverse reinforcement in a one —way slab?
5. Under what circumstances are doubly reinforced beams used?
6. Reinforced concrete slab are generally safe in shear and do not require shear Reinforcement? Why?
7. Explain :
 - (a) equilibrium torsion
 - (b) compatibility torsion.
8. How do you classify a column as long?
9. Draw a neat sketch of a Masonry footing.
10. What is slenderness ratio for a masonry wall? State the maximum values.

15(b).
assume

PART B — (5 × 16 = 80 marks)

11. (a) A singly reinforced concrete beam is at width 400 mm and effective depth 615 mm. It is reinforced with 8 nos at 20 mm mild steel bars. Assume M 25 concrete, determine its moment of resistance according to the working stress method. Determine also the stress in steel when the beam is subjected to the above moment.

Or

- (b) Determine the reinforcement for a T beam with flange width = 1500 mm, web width = 300 mm, thickness of slabs = 100 mm, effective depth 735 mm to carry a moment of 380 kNm due to characteristic loads. Use M 20 concrete and Fe 415 steel. Use working stress design.
12. (a) A rectangular beam has $b = 200$ mm, $d = 400$ mm if steel used is Fe 415 and grade of concrete is M25. Find the steel required to carry a factored moment of 12 kNm.

Or

- (b) Design a roof slab for an interior panel of size 5 m × 6 m. Live load is 5.0 kN/m². Use M 30 Concrete and Fe 415 steel.
13. (a) A simply supported beam is 5 m in span and carries a characteristic load at 75 kN/m. If 6 nos of 20 mm bars are provided at the centre of span and 4 nos of these bars are continued into the supports. Check the development length at the supports assuming grade M20 concrete and Fe 415 steel.

Or

- (b) A rectangular RCC beam is 400 × 900 mm in size. Assuming the use of grade M 25 concrete and Fe 415 steel, determine the maximum ultimate torsional moment at the section can take it.
- (i) No torsion reinforcement is provided and
- (ii) Maximum torsion reinforcement is provided.
14. (a) Design the reinforcement in a spiral column of 400 mm diameter subjected to a factored load of 1500 kN. The column has an unsupported length of 3.4 m and is braced against side way. Use M 20 concrete and Fe 415 steel.

Or

- (b) A column 300×400 mm has an unsupported length of 3 m and effective length of 3.6 m. If it is subjected to $P_u = 1100$ kN and $M_u = 230$ kNm about the major axis, determine the longitudinal steel using $f_{ck} = 25$ N/mm² and $f_y = 415$ N/mm². Assume $d' = 60$ mm.
- (a) A solid footing has to transfer a dead load of 100 kN and an imposed load of 400 kN from a square column 400 mm \times 400 mm. Assuming $f_{ck} = 20$ N/mm² and $f_y = 415$ N/mm² and safe bearing capacity to be 200 kN/m², Design the footing.

Or

- (b) Design a combined rectangular footing for two columns spaced at 500 cm centre to centres. The first column 300 mm \times 300 mm carries a load of 100 kN and second column 300 mm \times 300 mm carries a load of 1500 kN at service state. Weight of soil 20 kN/m³ angle of repose 30° and SBC of soil is 150 kN/m². Use M 25 concrete and Fe 415 steel.