B.Arch. Part-II 4th Semester Examination, 2009

Structural Engineering-II
(CE-401A)

Time : 3 hours   Full Marks : 70

Use separate answerscript for each half.
Answer SIX questions, taking THREE from each half.
The questions are of equal value.
Assume any suitable data, if necessary.

FIRST HALF

1. a) What are the basic assumptions in Working Stress Method of design for R.C. flexural members?
   b) Explain with neat sketches:
      i)   Balanced Section
      ii) Under reinforced section
      iii) Over reinforced section

2. A roof slab of a room is supported on all four sides by 250mm brick-walls. The inside dimensions are 3000mm x 6500 mm. The slab carries 100 mm (av.) lime terracing of unit weight of 20 kN/m^3 and live load on roof slab may be taken as 1.5 kN/m^2. Using M20 Grade Concrete and Fe 415 steel. Design the slab & show the reinforcement details. (Assume τ_c = 0.3, τ_{bd} =1.28 and Modification factor = 1.4).

3. Design a simply supported rectangular beam over a span of 5m carrying udl of 15KN/m including its self-weight. The width of the beam may be kept as 300 mm. Use M20 concrete and Fe415 steel bars as reinforcement. (Assuming τ_c = 0.35, τ_{bd} =1.28 and modification factor = 1.5).

4. Design a circular column of 400 mm diameter to carry an axial load of 1000 kN. The effective height of column is 6m. Use M20 concrete and Fe415 steel bars.

5. Design an isolated footing for a column (500mmx500mm size) carrying 1000 kN load. Safe bearing capacity of soil may be taken as 100kN/m^2. Use M25 grade of concrete and Fe415 grade of steel bars. (Assuming τ_c = 0.33 N/mm^2, for one way shear).

SECOND HALF

6. a) What is welding? Define the different types of welding.
   b) Define the following :
      (i) fillet weld, (ii) size of the weld, (iii) Throat fillet weld.
   c) What are the advantages and disadvantages of fillet weld.

7. a) Write the formula for shear strength of a fillet weld, mentioning the meaning of each affix.

    b) Find the safe load that can be transmitted by the fillet weld of 6 mm size and 250 mm in length.

8. a) Determine the tensile stress of a main tie 50×50×6 mm in size of a truss if it is connected to a gusset plate by one rivet of yield stress of steel in 250 MPa.

    b) Also find the tensile stress of above if the joint in welded.

9. a) What is a column? Write the effective length of the column of length 'L' under following condition.

    (i) Effectively held in position at both ends and restrained against rotation at one end.

    (ii) Effectively held in position at both ends but not against rotation.

    b) A column of effective length 3.36 m. Properties of column are
    (i) Area = 5340 mm^2, (ii) γ_{min} = 36.1 mm, (iii) Yield stress = 250 MPa. Given value of axial compressive stress at $\frac{l}{\gamma_{min}}$ = 90, σ_{ac} = 90 N/mm^2 and $\frac{l}{\gamma_{min}}$ = 100, σ_{ac} = 80 N/mm^2. Find the load carrying capacity of the given column section.

10. Design a slab base for column section SC 250 with two cover plates 300×25 mm carrying an axial load of 2500 kN. Safe bearing stress of concrete is 400 kN/m^2 and safe bearing capacity of soil is 250 kN/m^2 and allowable bending stress σ_{bc} = 185 N/mm^2.

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