W - 579

Total No. of Pages : 3

Seat No.	

B.E. (Civil) (Semester - VIII) Examination, May - 2014
DESIGN OF CONCRETE STRUCTURE - II (New)
Sub. Code : 49175

Day and Date : Tuesday, 20 - 05 - 2014 **Total Marks : 100**

Time : 2.30 p.m. to 5.30 p.m.

Instructions : 1) Attempt any three questions from each section.
2) Figure to the right indicates full marks.
3) Assume any suitable data whenever necessary.
4) Use of non-programmable calculator and relevant I.S. 456 : 2000 are allowed.

SECTION - I

Q1) Determine the reinforcement required for a rectangular beam section with following data :

Width of section = 300 mm; Depth of section = 500 mm; Factored BM = 80 kN-m; Factored torsional moment = 40 kN-m; Factored shear force = 70 kN.

Use M15 grade concrete and Fe 415 grade steel. **[17]**

Q2) A continuous beam ABCD is simply supported at A and B and is continuous over supports B and C. Beam support a superimposed live load of 10kN/m and a dead load of 20 kN/m. Use IS code provisions to design beams. Use M20 grade concrete and Fe 415 grade steel. L(AB) = 4.0 m, L(BC) = 6.0 m and L(CD) = 4.0 m. Draw longitudinal section of beam showing reinforcement details. **[17]**

Q3) a) Explain in briefly

i) Over - reinforced section

ii) Under - reinforced section **[4]**

P.T.O.

b) A reinforced concrete beam section of size 300 × 700 mm effective depth is reinforced with 3 bars 20 mm ϕ in tension. Determine the moment of resistance and the maximum stresses induced in the materials (concrete and steel). Use M20 grade concrete and Fe 415 grade steel. **[12]**

Q4) Design a circular tank with flexible base for capacity of 300000 liters. The depth of water is to be 4.0 m, including a free board of 200 mm. Use M20 grade concrete Fe 415 steel. **[16]**

SECTION - II

Q5) a) What is the basic principle of prestressed concrete? **[4]**

b) Distinguished between pre-tensioned and post-tensioned members. **[4]**

c) Explain in brief various concepts with neat sketch in prestressed concrete? **[8]**

Q6) A rectangular concrete beam, 100 mm wide and 250 mm deep, spanning over 8 m is prestressed by a straight cable carrying an effective prestressing force of 250 kN located at an eccentricity of 40 mm. The beam supports a live load of 1.2 kN/m. **[17]**

a) Calculate the resultant stress distribution for the central cross section of the beam. The density of concrete is 24 kN/m^3.

b) Find the magnitude of the prestressing force with an eccentricity of 40 mm which can balance the stresses due to dead load and live loads at the bottom fibre to the central section of the beam.

Q7) A Prestressed concrete beam, 200 × 300 mm, prestressed with 10 wires of 32 mm^2 each area located at a constant eccentricity of 50 mm and carrying an initial stress of 1000 MPa. The span of beam is 10m. Calculate the percentage loss of stress in wires if

a) The beam is pre-tensioned, and

b) If the beam is post-tensioned, using following data :

E_s = 210 kN/mm^2 and E_c = 210 kN/mm^2

Relaxation of steel stress = 5% of initial stress

Shrinkage of concrete = 300×10^{-6} (pre-tensioning) and 200×10^{-6} (post-tensioning)

Creep coefficient = 1.6

Slip at anchorage = 1 mm

Frictional coefficient for wave effect = 0.0015 / m. **[17]**

Q8) A rectangular beam of prestressed concrete is required to support a dead load moment 15.0 kM-m (inclusive of its own weight) and live load moment 40 kN-m at its mid section. Determine the initial prestressing force and its eccentricity at the mid section. **[16]**

Allowable initial compressive stress = 17.0 MPa

Allowable final compressive stress = 14.0 MPa

Allowable final tensile stress = 1.0 MPa

Ultimate tensile stress in steel = 1500.0 MPa

Losses in prestressing = 15%.