K – 151

Total No. of Pages : 3

Seat No.	

B.E. (Civil) (Semester - VIII) Examination, 2013
DESIGN OF CONCRETE STRUCTURES - II
Sub. Code : 49175

Day and Date : Tuesday, 21- 05 - 2013 **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 and mention it clearly.
4) Use of non programmable calculator.
5) Uses of relevant I.S. Codes are allowed.

SECTION - I

Q1) A beam rectangular in cross section having width of 400 mm and overall depth of 700 mm is subjected to factored bending moment of 200 KN-m and factored shear force of 100 KN. Determine the torsional reinforcement for the beam, if the beam is subjected to a factored torsional moment of 50 KN-m. Assume effective cover to tension reinforcement = 50 mm. Use M20 grade concrete and Fe 415 grade steel. **[16]**

Q2) A R.C.C. beam ABCD spanning over four supports carries a live load of 10 KN/m and dead load from brick walls 230mm, 3m high. If M20 Grade concrete and Fe 415 grade steel is to be used, design the continuous beam using IS 456:2000 provisions. Span AB = Span CD = 6 m and Span BC = 5m.

Take unit weight of brick wall 19 Kn/Cu. M. Draw a sketch showing reinforcement details. **[16]**

Q3) a) Write a note on balanced, under reinforced and over reinforced section. **[4]**

b) A rectangular R.C. beam 200mm × 400mm effective depth is simply supported over a span of 5m. The beam supports a uniformly distributed load of 7 KN/m inclusive of self weight. State whether the beam section would be under reinforced or over reinforced and calculate the reinforcement required at the mid span. Assume allowable stresses in concrete and steel as 4 N/mm^2 and 130 N/mm^2 respectively. Take m = 16. **[12]**

P.T.O.

Q4) Design a R.C.C. circular water tank for a capacity of 200,000 liters resting on ground having flexible base at bottom. The depth of water is to be restricted to a depth of 2.5m. Use M20 Grade concrete and assume allowable values as $6_t = 1.2$ N/mm^2, $6_{st} = 115$ N/mm^2 and modular ratio = 13. Draw cross section of tank showing reinforcement details in tank walls and base slab. **[18]**

SECTION - II

Q5) a) Describe in detail different concepts of pre-stress concrete design. **[12]**

b) Explain different types of pre stressing. **[5]**

Q6) A pre stressed concrete beam of rectangular beam 300mm × 600mm is pre stressed with a force of 1565 KN applied at 180mm from bottom, the force finally reducing to 1361 KN. The span of the beam is 12.20m and carries two equal live loads 45 KN each at a distance of 4.6m from each support. Find the extreme fibre stresses at mid span under :

a) Initial prestress and no live load.

b) Final condition. **[16]**

Q7) A pre stressed concrete beam 250mm wide and 360mm deep has a span of 12m. The beam is prestressed with steel wires of 350mm^2 provided at uniform eccentricity of 60mm with an initial prestress of 1250 N/mm^2. Determine percentage loss of prestress in the wires for : **[16]**

a) If the beam is pretensioned.

b) If the beam is post tensioned.

Take $E_s = 210$ KN/mm^2 and $E_c = 35$ KN/mm^2.

Ultimate creep strain = 45×10^{-6} for pretension.

Ultimate creep strain = 22×10^{-6} for post tension.

Shrinkage of concrete = 300×10^{-6} for pretension.

Shrinkage of concrete = 215×10^{-6} for post tension.

Relaxation of steel stress = 5% of initial stress.

Anchorage slip = 1.25mm.

Friction coefficient for wave effect = k = 0.00015/m.

Q8) A pre tensioned prestressed beam of rectangular section 80mm wide and 120mm deep is to be designed to support working loads of 4 KN each concentrated at the one third points over a span of 3m. If the permissible stresses in tension are zero at transfer and 1.4 N/mm^2 under working loads, design the number of 3mm wires and corresponding eccentricity required at mid span section. Permissible stresses in wire is 1400 N/mm^2. The loss of prestress is 20% and density of concrete 24 KN/m^3. **[17]**