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B.E. (Part - IV) (Civil Engineering) (Semester - VIII) Examination, April - 2016

DESIGN OF CONCRETE STRUCTURE - II (New)

Sub. Code : 49175

Day and Date : Friday, 22 - 04 - 2016 **Total Marks : 100**

Time : 03.00 p.m. to 06.00 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, IS 1343:2012 are allowed.**

SECTION - I

Q1) Design the reinforcements required for rectangular beam section with the following data. Use M20 grade concrete and Fe 415 grade steel. Adopt limit state design.
Size of the beam = 400 mm x 800 mm, Factored shear force = 100 kN, Factored torsion = 50 kN-m, Factored bending moment = 120 kN-m. **[17]**

Q2) A continuous beam PQR is simply supported at P and R and is continuous over support Q. Beam support a superimposed live load of 12 kN/m and a dead load of 15 kN/m. Use IS code provisions to design beams. Use M20 grade concrete and Fe 415 grade steel. Length of span AB of 8.0m and span BC of 6.0m respectively. Draw longitudinal section of beam showing reinforcement details. **[17]**

Q3) a) State the assumptions made in theory of bending as applied to the design of reinforced concrete structure? **[4]**

b) A reinforced concrete beam 300 mm wide and 600 mm deep has a span of 6.5 m. Find the necessary tension reinforcement at the mind section to enable the beam to carry a load of 9.50kN/m in addition to its own weight. Cover to reinforcement is 35 mm. Use M20 grade concrete and Fe 415 grade steel. The unit weight of concrete is 25 kN/m^3. Adopt working stress method of design. **[12]**

P.T.O.

Q4) Design a circular tank with flexible base for capacity of 400000 liters. The depth of water is to be 4m,including a free board of 200mm.Use M25 concrete and Fe 415 steel. **[16]**

SECTION - II

Q5) a) Write any four advantages of prestressed concrete bridges **[4]**

b) Enumerate load balancing concept **[4]**

c) Explain the various post-tensioning system based on wedge action with sketches. **[8]**

Q6) A simply supported prestressed concrete beam of rectangular cross section 350x550 mm, is loaded with a total uniformly distributed load of 300 kN over a span of 8 m. Sketch the distribution of stresses at mid span and end sections if the prestressing force is 1820 kN and tendon is **[17]**

a) Concentric

b) Eccentric, located at 180 mm above the bottom fibre.

Q7) A post-tensioning prestressed concrete beam of 16m span is subjected initial prestress of 1458 kN. Profile of the cable is parabolic with the eccentricity 520 mm at the center of span. **[16]**

Estimate the, net loss of prestress due to elastic shortening, shrinkage, creep, slip in anchorage and friction.

$E_s = 210$ kN/mm^2 and $E_c = 38.2$ kN/mm^2

Cross-section area of beam $A_c = 2.42 \times 10^5$mm^2 $I_c = 5.30 \times 10^{10}$mm^4 Cross section area of prestressing wire $A_s = 1386.0$ mm^2 $f_s = 1059.0$ N/mm^2

Frictional coefficient = 0.25 and Wobble correction factor k = 0.0015/m, anchorage slip = 2.5 mm, Shrinkage of concrete 300×10^{-6} and creep coefficient 1.5.

Q8) A rectangular beam of prestressed concrete is required to support a dead load moment 10×10^6 N – mm (inclusive of its own weight) and live load moment 24×10^6 N – mm at its mid section, Determine the initial prestressing force and its eccentricity at the mid section.

Allowable initial compressive stress = $12 N/mm^2$

Allowable final compressive stress = $10 N/mm^2$

Allowable final tensile stress = $1 N/mm^2$

Ulitmate tensile stress in steel $1456.0 N/mm^2$

Losses in prestreeing = 13.8 % **[17]**