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CE 131701 (NR)

Roll No. of candidate

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Azara, Hatkhowapara
Guwahati - 781017

8/2/2021

B.Tech. 7th Semester End-Term Examination

CE

DESIGN OF STRUCTURES — III

(New Regulation)

Full Marks – 70

Time – Three hours

The figures in the margin indicate full marks
for the questions.

Note :

1. Question 1 is compulsory.
2. Solve any *four* from question 2 to question 7.
3. Use of IS : 456, IS : 1343, IS : 800, IS : 806, IS : 1161, IS : 3370 part II and IV and steel tables are allowed.
4. Assume any missing data.

1. Write the correct answer for the following questions: (10 × 1 = 10)
 - (i) Concrete mix lower than _____ should not be used for construction of liquid retaining structures.
 - (ii) As per IS: 1343-1980, the minimum 28 days of compressive strength for pre tensioned member is _____
 - (iii) Torsional reinforcement is provided in the form of _____ and _____ reinforcement.
 - (iv) Staircases used in public buildings should have a maximum riser of _____
 - (v) High grade concrete is used in pre-stressed concrete to reduce the _____
 - (vi) Minimum clear cover required for the design of water tank is _____

[Turn over

- (vii) If the dimension of water tank is less than 15m in this case minimum steel requirement of steel is _____
- (viii) Prestressing results in elimination or reduction of _____
- (ix) The loss in pre-stress in pre-tensioning system is primarily due to _____
- (x) The vertical stiffeners in plate girder is provided when the thickness of web is less than _____
2. (a) What are the different components of crane system?
- (b) Design a welded plate girder of span 24 m to carry superimposed load of 30 kN/m. Avoid use of end bearings and stiffeners. Use Fe415 steel. (3+12 = 15)
3. (a) What are the assumptions made for calculation of forces in truss members?
- (b) Design the purlin of a roof truss for following requirements:
- Span of the truss = 16 m
- Rise of the truss = 4 m
- Spacing of truss = 4 m
- Live load = 0.5 kN/m²
- Wind Pressure = 1.2 kN/m²
- Slope of the roof is 1:2
- Spacing of the purlins along the slope of the roof = 2.2 m. (3+12 = 15)
4. Design a circular water tank with flexible connection at base for a capacity of 4,00,000 liters. The tank rests on a firm level ground. The height of tank including a free board of 200 mm should not exceed 3.5m. The tank is open at top. Use M 20 concrete and Fe 415 steel. Draw to a suitable scale: (a) Plan at base (b) Cross section through centre of tank. (15)
5. (a) Discuss briefly the basis of Indian standard IS:1343 code recommendations regarding the design of reinforcements in prestresses sections subjected to moment, shear and torsion.
- (b) A concrete beam of rectangular section 250 mm wide and 650 mm deep, is prestresses by a parabolic cable located at an eccentricity of 100 mm at midspan and zero at the supports. If the beam has a span of 10m and carries a uniformly distributed live load of 6 kN/m, find the effective force necessary in the cable for zero shear stress at the support section. For this condition, calculate the principal stresses the density of concrete is 24 kN/m³. (3+12 = 15)

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6. (a) Design a reinforced concrete beam of size $300 \text{ mm} \times 600 \text{ mm}$ subjected to factored bending moment of 150 kNm , factored shear force of 100 kN and factored torsional moment of 50 kNm . Use M20 concrete and Fe415 steel.
- (b) Explain the method for the design of beam subjected to torsion as per IS codal provisions. (12+3 = 15)
7. (a) List out various losses of prestress.
- (b) A simply supported prestressed concrete beam of rectangular cross section $400 \text{ mm} \times 600 \text{ mm}$ is loaded with a UDL of 60 kN/m . The parabolic profile of the tendon has an eccentricity of 100 mm at ends and 200 mm at midspan. Calculate the stresses at top and bottom fibre of the beam at midspan and end sections and sketch the distribution of stresses if the applying prestressing force is 1920 kN .
- (c) What is relaxation of stress in steel? What do you mean by creep of concrete? (4+8+3 = 15)

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