BTS-VII-11.19-1321 Reg. No. | | | | | | | | |

A

B.Tech. Degree VII Semester Examination November 2019

CE 15-1702 DESIGN OF CONCRETE STRUCTURES II

(2015 Scheme)

(Use of Indian Standard cods are permitted. Data may be assumed/taken from code suitably if not specified. Design questions are to be supported with detailing of reinforcement.)

Time: 3 Hours Maximum Marks: 60

(4 × 15 = 60)

I. (a) Differentiate between the structural behaviour of cantilever retaining wall and counterfort retaining wall. (3)

(b) Design an isolated footing for a square column (400 mm x 400mm) to carry an axial load of 1000 kN and uniaxial moment of 120 kN-m due to dead load and live load at service state. Safe bearing capacity of foundation soil is 200 kN/m^2. Adopt M25 concrete and Fe500 steel. (12)

OR

II. (a) What are the situations in which combined footings are preferred to isolated footings. Also discuss various types of combined footings. (3)

(b) Design a cantilever type retaining wall to retain earth of 3.5m high above ground level. Unit weight of earth is 18 kN/m^3 and φ = 32°. The embankment is horizontal. SBC of soil is 160 kN/m^2. Coefficient of friction between concrete and ground is 0.4. Adopt M25 grade of concrete and Fe415 steel. (12)

III. (a) Explain the need for high strength steel and concrete in prestressed concrete. (3)

(b) Discuss the concept of load balancing with reference to prestressed concrete beams. (3)

(c) A simply supported pre tensioned beam 250 mm wide and 450 mm deep with span of 15 m is prestressed by 12 wires of 8 mm diameter, initially stressed to 1300 Mpa, with their centroid located at 120 mm from the soffit. Es = 210 kN/mm^2. Concrete is M50 grade. Initial stress in steel is 0.7 f_p. Consider RH of the location as 80%. Determine maximum loss and the percentage of loss in prestress, using guidelines as per IS 1343:2012. (9)

OR

IV. (a) What is meant by (i) circular prestressing (ii) external prestressing (3)

(b) A post tensioned, simply supported beam 200 mm x 600 mm of span 12 m which is prestressed with a parabolic cable that has a maximum eccentricity of 150 mm at mid span and zero eccentricity at supports. The cable is jacked from both ends. Given the following; (i) Cable consists of 24 wires each of 7 mm diameter housed in lead, (ii) Initial prestress in steel is limited to 0.8 times the characteristic strength of steel, (iii) anchorage slip = 1.5 mm per end (iv) consider dry atmospheric condition with RH = 50%, (v) wire cables are housed in lead coated ducts, (vi) characteristic strength of steel = 1600 N/mm^2; (vii) Characteristic strength of concrete = 40 N/mm^2, Es=210 kN/mm^2. Determine the maximum loss of prestress and effective prestress with the given data and using guidelines in IS 1343:2012. (12)

(P.T.O.)

V. (a) What is meant by kern points and kern section? (3)

(b) A prestressed concrete simply supported beam of T-section having 300 mm x 100 flange and 100 mm x 500mm web with span of 9m is to support a superimposed load of 10 kN/m in addition to its own weight. Determine the initial prestressing force required to nullify the bottom fibre stress at midspan section when the beam is fully loaded. Prestressing wires are located at 100 mm from the soffit. Assume loss of prestress as 20%. (12)

OR

VI. Design section, prestressing force, eccentricity of cable and area of steel for a pretensioned prestressed concrete beam carrying a live load of 30 kN/m over a span of 18 m. The member is to be designed as *Type* I, and in Zone II. Assume 20% loss in prestress. Use M40 concrete. Characteristic strength of steel is 1800 N/mm^2. (15)

VII. (a) Differentiate between the structural behaviour of tank walls of circular water tank and rectangular water tanks. (3)

(b) Design tank wall and base slab of a circular water tank of capacity 400 m^3 resting on ground with firm strata having rigid joint between the wall and base slab. Height of the tank is restricted to 5m with a free board of 300mm. Use M30 grade concrete and Fe 415 steel. (12)

OR

VIII. Design a rectangular water tank resting on ground with firm strata having capacity of 50 m^3. Overall height of tank is restricted to 4.5 m with free board of 300mm. Use M30 concrete and Fe500 steel. Assume that the tank walls are hinged at bottom and free at top. (15)

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