Total No. of Questions : 10]

SEAT No. :

P3707

[Total No. of Pages : 3

[5561]-103
B.E. (Civil)
STRUCTURAL DESIGN AND DRAWING - III
(2012 Pattern) (401003) (Semester - I)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.***
2) ***Figures to the right indicate full marks.***
3) ***IS 456, IS 1343, IS 3370 and IS 1893 are allowed in the examination.***
4) ***The designs should comply with the latest codal provisions.***
5) ***If necessary, assume suitable data and indicate clearly.***
6) ***Use of electronic pocket calculator is allowed.***

Q1) a) Explain the concept of cable profile selection in prestresses concrete beam with suitable example. **[4]**

b) A prestressed simply supported concrete beam is 200 mm wide and 300 mm deep with an effective span of 6 m. It supports an UDL of 4 kN/m, which includes the self-weight of the beam having density 24 kN/m^3.

The beam is prestressed by a straight concentric cable. Find the force in the cable for developing zero fibre stress at the soffit for fully loaded condition.

Also find the eccentric prestressing force applied at eccentricity of 50 mm which would nullify the bottom fibre stresses due to loading. **[6]**

OR

Q2) a) Explain the procedure to design two way prestressed slab. **[4]**

b) A post-tensioned bonded prestressed concrete beam is prestressed by 300 mm^2 of high tensile steel located at an eccentricity of 100 mm. the cross section of the beam is 200 mm wide and 400 mm deep. Using the codal provisions of IS 1343, estimate the ultimate moment capacity of the section. Take the characteristic cube compressive strength of concrete as 40 MPa and the characteristic tensile strength of prestressing steel as 1600 N/mm^2. **[6]**

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Q3) a) Explain the codal provisions for permissible compressive and tensile stresses of concrete in prestressed concrete structure. **[4]**

b) A three storey reinforced concrete office building located in Pune. There are four frames placed c/c distance of 7 m with three bay of size 7 m. Storey height of 3 m is provided. The column and beam sizes may be taken as 400 mm × 400 mm and 250 mm × 400 mm respectively. Thickness of slab is 150 mm. The wall thickness is 120 mm with 20 kN/m^3 density. Consider OMRF structure. Consider live load as 3 kN/m^2. Using seismic coefficient method, calculate the base shear and show shear distribution over the height. **[6]**

OR

Q4) a) Explain the design of a prestresses section for shear using the codal provisions. **[4]**

b) Explain the importance of approximate methods for lateral load analysis. State the assumptions for the methods and explain with suitable example any one method. **[6]**

Q5) a) Explain with neat sketches, the deformation of T shape retaining wall and show the position of the main reinforcement to be provided. **[2]**

b) Propose suitable dimensions and perform the stability analysis for L-shaped retaining wall provided to retain a horizontal leveled backfill of height 3 m having unit weight respectively equal to 18 kN/m^3. Angle of repose = 31º, Coefficient of friction between concrete and soil = 0.6, SBC of soil = 150 kN/m^2, depth of foundation = 1.0 m. **[14]**

OR

Q6) Design the stem of a T-shaped retaining wall of height 5 m to retain a backfill with two different layers. The upper layer of 2.5 m height is having unit weight equal to 18 kN/m^3 with angle of repose = 31º. The lower layer has unit weight of 18 kN/m^3 and angle of repose equal to 28º. Coefficient of friction between concrete and soil = 0.55, SBC of soil = 150 kN/m^2, depth of foundation = 1.2 m. Sketch the details of reinforcement in the wall. **[16]**

Q7) a) Draw the deflected shape of slab-beam type of footing in longitudinal direction and show the typical detailing of a longitudinal section of footing. **[3]**

b) Design a slab beam type combined footing for two columns spaced 3.5 m apart center to center carrying a service load of 800 kN each. The columns are 400 mm × 400 mm. The SBC of soil is 180kN/m^2. Use M25 grade of concrete and steel of grade Fe 500. Detailing not required. **[13]**

OR

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Q8) Design a slab type combined footing for two boundary columns spaced 3 m apart out to out. The columns are 500 mm × 500 mm. Both columns carry 550 kN characteristic loads. The SBC of soil is 150 kN/m^2. Use M25 grade of concrete and steel of grade Fe 500. **[16]**

Q9) a) Using coefficients from IS 3370, determine the bending moments and hoop tension at 1m interval of height for a circular water tank of height 5 m and diameter 6 m. The tank wall is free at top and hinged at bottom. **[6]**

b) Design the wall of a square water tank of size 4.0 m × 4.0 m × 3.0 m. Use Fe 500 grade of steel and M30 grade of concrete. Provide detailing of reinforcement. **[12]**

OR

Q10) Design a rectangular water tank open at top resting on ground having a size of 5.5 m × 4.0 m × 2.5 m high. Use M 35 and Fe 500 grade material. Sketch details of reinforcement for the wall. **[18]**

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