B.Tech. SEM -VII (Civil) 2014 Course (CBCS) : WINTER - 2018

SUBJECT: STRUCTURAL DESIGN – III*

Day: Friday | **W-2018-2525** | Time: 02.30 PM TO 06.30 PM

Date: 23/11/2018 | Max Marks: 60

N.B. :

1) All questions are **COMPULSORY.**
2) Use of IS 456-2000, IS 1343, IS 3343 and electronic non programmable **CALCULATOR** is allowed.
3) Draw neat and labeled diagrams wherever necessary.
4) Figures to the right indicate **FULL** marks.
5) Assume suitable data if necessary.
6) Your answers will be valued as a whole.

Q.1 **a)** Explain why high grade materials are used in P.S.C. **(04)**

b) The mid span section of a post tensioned P.S.C. girder of span 14m carries a live load of 14kN/m. The initial pre stressing force is 1000 kN. The beam has **(06)**
Top flange = 650 mm × 150 mm.
Web = 600 mm × 150 mm
Bottom flange = 300 mm ×150 mm.
The pre stressing force is located at 50 mm above the soffit of the beam. Determine the uniformly distributed load the beam can carry at the final stage when the stress at the bottom edge reaches zero.

OR

Q.1 **a)** Compare pre tensioning with post tensioning. **(04)**

b) A post tensioned P.S.C. beam is simply supported over a span of 20 m and is subjected to a super imposed load of 15kN/m. It is pre stressed with 8 cables, each of 10 wires of 7mm diameter placed at 120mm from the soffit of the beam. Initial pre stress = 1050 N/mm^2 **(06)**
Top flange = 800 mm × 200mm.
Bottom flange = 400 mm x 200 mm
Web = 200mm thick
Overall depth = 1100mm.
Calculate the extreme fibre stress at the mid span section for final stage if the loss of pre stress = 15%. Draw the stress distribution diagram.

Q.2 A post tensioned P.S.C. beam of rectangular cross section 300 mm × 600 mm. is pre stressed with an initial pre stressing force of 450 kN. The cross sectional area of wires is 450 mm^2. Calculate the loss of stress due to shrinkage for relative humidity of 50%. **(10)**
i) in general
ii) after one year with age of concrete at transfer = 8 days
Grade of concrete = M 40

OR

Q.2 Design a post-tensioned simply supported girder of an I - section for a span of 20 m subjected to a live load of 10 kN/m and dead load of 5kN/m in addition to its self weight. Assume loss ratio = 0.84. Design for flexure only and give the necessary checks. **(10)**

Q.3 Design an interior panel of a flat slab 6.5 m × 6.5 m for a live load of 7 kN/m^2 Use M 25 ,Fe 500. **(10)**

OR

Q.3 Design an exterior panel of a flat slab 6.5 m × 6.5m for a live load of 7 kN/m^2 Use M 25 ,Fe 500. **(10)**

P.T.O.

Q.4 A T- shaped R.C. cantilever retaining wall has to retain soil for a height of 4.2 m at an angle of surcharge = 11^0. Safe bearing capacity of soil 200kN/m^2 and its unit weight is 19 kN/m^3 .Angle of repose = 31^0. Design the retaining wall dimensions and design the heel. **(10)**

OR

Q.4 A T- shaped R.C. cantilever retaining wall has to retain soil for height of 3.7 m horizontally. Unit weight of soil is 18 kN/m^3 and its safe bearing capacity is 190 kN/m^2. Angle of friction = 31^0. Decide the dimensions of the wall and design the stem. **(10)**

Q.5 Two columns A and B are spaced at 4.6 m. centre to centre, outer face of column A at a distance of 600mm from the outer edge of the property. Column A is 400mm × 400 mm and carries a load of 1000 kN. Column B is 600 mm × 600 mm and carries a load of 1700 kN. Design a slab type combined footing if the safe bearing capacity of soil is 210 kN/m^2. **(10)**

OR

Q.5 Design a beam slab combined footing for the two columns A and B for the data mentioned in **Q.5.**above. **(10)**

Q.6 Design a circular water tank of capacity 6 lakh litre assuming that the joint between the wall and the base is rigid. Depth of water is 3.4m with a free board of 200mm. Use M 30, Fe 250. **(10)**

OR

Q.6 Design a rectangular tank of dimensions 5m × 3.5m × 2.5 m using Is code method. Use M20 grade of concrete. **(10)**

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