B.Tech. SEM -VII (Civil) 2014 Course (CBCS) : SUMMER - 2019

SUBJECT: STRUCTURAL DESIGN – III*

Day: Thursday
Date: 09/05/2019

S-2019-2790

Time: 02.30 PM TO 06.30 PM
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) Compare P.S.C. with R.C.C. **(04)**

b) A P.S.C. beam of T-section has flange 700 mm wide and 300mm thick. The web of the beam is 700mm deep and 300mm thick. The beam is simply supported over a span of 16m. At mid span section, it is post tensioned with 3 Freyssinet cables, each containing 8 wires of 7 mm diameter placed at 150 mm from the extreme bottom fibre of the beam. If the initial pre stress is $1000N/mm^2$ and loss of pre stress = 12% calculate the extreme fibre stress at the mid span section in the final stage. The beam carries a live load of 10 kN/m in addition to its self weight. **(06)**

OR

Q.1 a) Explain Freyssinet system of pre stressing. **(04)**

b) A P.S.C. beam simply supported over a span 15m supports a live load of 20kN/m. Effective pre stressing force of 200kN is applied at 40mm from the soffit of the beam for the mid span section. **(06)**
Top flange of the beam is 500 mm × 100 mm
Bottom flange is 220 mm × 100 mm
Overall depth of the beam is 500mm and thickness of web = 100mm
Draw the stress distribution diagrams at the mid span section.

Q.2 a) Name the different losses .Define Loss ratio, Effective pre stress. **(04)**

b) In a pre-tensioned P.S.C. beam of cross section 300 mm x 520 mm and span 10 m , an initial pre stressing force of 500kN is applied at an eccentricity of 100mm by tendons of area 450 mm^2. Assuming Es = 200 kN/m^2 , Ec= 35 kN/m^2 , anchor slip = 1.8 mm and relaxation of steel = 2%. Find the total percentage of losses.

Q.2 Design a post tensioned P.S.C. beam of unsymmetrical I – section for the following data. **(10)**

i) Span of the beam = 16m
ii) Dead load and live load = 18kN/m
iii) loss ratio = 14%
iv) Grade of concrete M35
v) Use Freyssinet system and 7 mm diameter wires.

Q.3 Design an interior panel of a flat slab 6m × 6m for a live load of 6 kN/m^2. Use M 25, Fe 500. **(10)**

OR

Q.3 Design an exterior panel of a flat slab 6m × 6m for a live load of 6 kN/m^2. Use M 25, Fe 500. **(10)**

P.T.O.

Q.4 An L-shaped R.C. cantilever retaining wall is of 3.8 m height and supports a horizontal backfill of unit weight 18kN/m^3 .Coefficient of friction between soil and concrete = 0.50 and angle of repose = 30^0. Safe bearing capacity of soil = 220 kN/m^2. Decide the dimensions of the wall, check for stability and design the stem. **(10)**

OR

Q.4 A T-shaped R.C. cantilever retaining wall is retaining soil of unit weight 19 kN/m^3 for a height of 4.2m at an angle of surcharge = 14^0. Safe bearing capacity of soil = 230 kN/m^2 and angle of internal friction = 30^0. Decide the dimension of the wall and design the toe. **(10)**

Q.5 Column P is 300mm × 300mm and supports a load of 750 kN. Column Q is 450 mm × 450 mm and carries a load of 950 kN. Centre to centre distance between the columns is 4.8 m and boundary line of the property is at a distance of 500 mm from face of column Q. Design a slab-beam type combined footing for the two columns if safe bearing capacity of soil is 220 kN/m^2. Use M 25, Fe 500. **(10)**

OR

Q.5 Design a slab type combined footing for the two columns P and Q for the data as mentioned in Q. 5 above. **(10)**

Q.6 Design a circular water tank resting on ground with rigid base for a capacity of 4 lakh litres. The depth of water is 3.5 m with a freeboard of 200mm. Use M 20. **(10)**

OR

Q.6 Design a rectangular water tank of size 6m × 4m × 3m. Use M 25 and design by I.S. code method. **(10)**

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