BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)
B.Tech.Sem - VII CIVIL : : SUMMER - 2022
SUBJECT : STRUCTURAL DESIGN-III

Day : Monday
Date : 30-05-2022

S-13620-2022

Time : 02:30 PM-06:30 PM
Max. Marks : 60

N. B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable calculator is **ALLOWED**.
4) Assume suitable data, if necessary.
5) Use of I.S. 1343-2012. I.S. 3370, IS 456-2000 is allowed.
6) Your answer will be valued as a whole.

Q. 1 **a)** What is the lowest and highest grade of concrete used in prestressed concrete construction as per I.S. requirement? Why these grades are much higher than the grades used in ordinary reinforced concrete construction? **(05)**

b) "In prestressed concrete members eccentric prestressing is preferable than concentric prestressing"- justify the statement with suitable examples. **(05)**

OR

Q. 1 A P.S.C. beam supports a live load of 5kN/m over a simply supported span of 14 m. The beam is an I-section with an overall depth of 1000mm. The thickness of top flange is 200mm, bottom flange is 300mm and that of web is 200mm.The width of top flange is 500mm and that of bottom flange is 350mm.The beam is to be prestressed by an effective prestressing force of 250kN at a suitable eccentricity such that the resultant stress at the soffit of the beam at the centre of the span is zero. Find the eccentricity of the prestressing force. **(10)**

Q. 2 **a)** Name the different losses in prestressing. Define loss ratio, effective prestress. **(04)**

b) In a pretensioned P.S.C. beam of cross section 350mm x 450mm and span 12m , an initial prestressing force of 600kN is applied at an eccentricity of 80mm by tendons of area 400mm^2.Assume E_s = 210 kN/mm^2 and E_c = 35 kN/mm^2, Slip at anchorage = 2mm , Relaxation of steel = 3%. Find the total percentage of losses excluding shrinkage and creep. **(06)**

OR

Q. 2 Design a rectangular post tensioned girder simply supported over a span of 14 m subjected to a dead load of 12kN/m and superimposed load of 10kN/m. Use 7mm wires and M 35 grade of concrete.assume loss ratio=0.85 . Cable profile and shear design not expected. **(10)**

Q. 3 Design an exterior panel of a flat slab of size 5.5 m ×5.5 m for a live load of 5 kN/m^2. Use M 25, Fe 500. **(10)**

OR

Q. 3 Design an interior panel of a flat slab of size 5.5 m ×5.5 m for a live load of 5 kN/m^2. Use M 25, Fe 500. **(10)**

P. T. O.

Q. 4 A T-shaped cantilever retaining wall is to retain soil for a height of 4.4m. The wall is subjected to an inclined surcharge with an angle of inclination = 12 degrees. Unit weight of soil is 19 kN/m^3. S.B.C. of soil is 220 kN/m^2 Using M25, Fe 500, decide the dimensions of the retaining wall by checking the stability. Also design the stem of the wall. **(10)**

OR

Q. 4 Design an L-shaped retaining wall for the same data as in Q.(4) above. **(10)**

Q. 5 Design a slab type combined footing for two columns spaced 5 m apart from their centers. Column A is 300 mm x 300mm and transmits a load of 750kN.Column B is 450mm x450mm and transmits a load of 1100kN. Boundary line of the property is at 600mm from the face of column A. Safe bearing capacity of soil is 180 kN/m^2. Use M20, Fe415 **(10)**

OR

Q. 5 For the same data in Q.(5) above, design a beam-slab type footing. **(10)**

Q. 6 A R.C. circular ground water reservoir of capacity 6 lakh liters is resting on ground with rigid base. Design the tank using I.S. code method. Height of the tank is 3.5m.Use M20, Fe415. **(10)**

OR

Q. 6 Design a rectangular water tank of size 6.5m x 4.5 m x3.5 m. Use I.S. Code method. The tank walls are rigid at the base. Use M25, Fe 415. **(10)**

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