B.TECH. SEM -VII (CIVIL) 2014 COURSE (CBCS) : WINTER - 2017

SUBJECT : STRUCTURAL DESIGN - III

Day : **Friday** Time : **0230 PM TO 06.30 PM**
Date : **12/01/2018** **W-2017-2258** 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 IS 1343-2012, I. S. 3370, IS 456-2000 is allowed.
6) Your answer will be valued as a whole.

Q. 1 **a)** Why high grade material is used in P. S. C.? **(05)**

b) What is a long line system of prestressing? Elaborate with figure. **(05)**

OR

A P. S. C. beam of inverted T- section is simply supported over a span of 14 m. The beam is post tensioned with 3 freyssinet cables each containing 10 wires of 7 mm diameter placed at the centre of the flange.If the initial pre-stress is 1100 N/mm^2 , calculate the maximum uniformly distributed load the beam can carry, if the maximum tensile stress is limited to 1N/mm^2 . Assume loss of prestress = 14 %. The inverted T-section has following dimensions : flange 700 mm × 300 mm. web 300 mm x 900 mm. **(10)**

Q. 2 A P. S. C. beam 300 mm wide and 450 mm deep has a span of 12 m. The beam is prestressed by steel wires of area 450 mm^2 provided at an uniform eccentricity of 75 mm with an initial prestress of 1150 N/mm^2 . Determine the loss of stress in the wires if the beam is post tensioned. **(10)**

Take Es 210 kN / mm^2 $Ec = 35\ kN / mm^2$

Relaxation of steel stress = 6% of initial prestress $\mu = 0.20$

Anchorage slip = 1.3 mm

Friction coefficient for wave effect = $k = 0.0046 / m$

Exclude the losses due to shrinkage and creep.

OR

Design a post tensioned flanged simply supported girder of span 14 m subjected to a dead load of 6 kN/m and a superimposed load of 8 kN/m. Use 7 mm wires and M 40 grade of concrete. Assume loss ratio = 0.84. Design for flexure only. **(10)**

Q. 3 Design on interior panel of a flat slab of size 5.0 m × 5.0 m. The slab is supported on columns of size 400 mm × 400 mm. Superimposed load on the slab is 6.0 kN/m^2 . Use M 25. Fe500 **(10)**

OR

Design an exterior panel of a flat slab of size 6.2 m × 6.2 m for a live load of 5.2 kN/m^2 . Use M 25. **(10)**

P. T. O.

Q. 4 A T-shaped cantilever retaining wall is to retain soil for a height of 4.2 m. The wall is subjected to a horizontal surcharge with unit weight of soil = 18 kN/m^3
S. B. C. of soil = 200 kN/m^3 . Using M 25, Fe500, decide the dimensions of the wall, check for stability and design the stem and the heel of the wall. **(10)**

OR

Design an L – shaped retaining wall to retain soil for a height of 3.4 m. Other data is same as in Q. 4 above. **(10)**

Q. 5 Design a beam-slab type combined footing for two columns for following data. Use M 20, Fe415. **(10)**

	Column 'A'	**Column 'B'**
Size of column	575mm × 575mm	400mm × 400mm
Axial load	1200 kN	900 kN
Distance of property line to the center of column	0.3 m	4.2 m

OR

Design a slab type combined footing for the same data as Q. 5 above. **(10)**

Q. 6 Design a circular water tank of capacity 5 lakh litres with rigid base. Use M 20.Fe415. **(10)**

OR

Elaborate with sketches the difference in detailing of reinforcement when a circular tank is rigid at the base and flexible at the base. Also mention how the reinforcement is different in case of rectangular water tanks. Draw the sketches of reinforcements in case of rectangular water tank. **(10)**

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