B.TECH SEM – VII (2007 COURSE) (CIVIL ENGG.) : SUMMER - 2018

SUBJECT : STRUCTURAL DESIGN – III

Day : **Tuesday** | Time : **02.30 PM TO 06.30 PM**

Date : **22/05/2018** | **S-2018-2757** | Max. Marks : 80

N. B. ;

1) **Q. No. 1** and **Q. No. 5** are **COMPULSORY**. Out of remaining attempt **ANY TWO** questions from each section.
2) Figures to the right indicate **FULL** marks.
3) Answers to both the sections should be written in **SEPARATE** answer books.
4) Draw neat and labelled diagram **WHEREVER** necessary.
5) Your answer will be valued as a whole.
6) Assume suitable data, if necessary.
7) Use of **IS 456-2000, IS 1343-1980, IS 3370-1967** and electronic **CALCULATOR** is allowed.

SECTION – I

Q. 1 **a)** Compare PSC and RCC. **(05)**

b) Calculate the loss of pre-stress due to elastic shortening of concrete in a simple supported pre-tensioned beam of effective span 20 m. The cross section of the beam is an I – section having the top and bottom flanges as 700 mm × 200 mm and the web of width 150 mm. The overall depth of the beam is 1,200 mm. The pre-stressing cable of cross-sectional area of 2,100 mm^2 is provided at 100 mm from the bottom. The initial pre-stress in steel may be taken as 1,360 N/mm^2. The stress in concrete at transfer is 30 N/mm^2. **(05)**

c) Explain in brief why high grade materials are used for pre-stressed concrete elements. **(04)**

Q. 2 A pre-stressed concrete beam of I-section is as follows: **(13)**

Top flange = 600 mm × 300 mm
Bottom flange = 400 mm × 350 mm
Web = 600 mm deep × 250 mm wide
The beam is S.S. on a span of 14 m. It is post tensioned at mid-span with 3 freyssinet cables, each with 10 wires of 7 mm diameter placed at centre of bottom flange. If the initial pre-stress is 1000 N/mm^2 and loss of pre-stress = 12 %. Calculate the extreme fibre stresses at initial and find stages of mid-span section.

Q. 3 Design a post tensioned pre-stressed concrete rectangular or T section beam for flexure to carry a live load of 14 kN/m over a simply supported span of 14.6 m with M 40 grade of concrete and freyssinet cables of 12/5 (fy = 1750 Mpa) or 1/.7 (fy = 1500 Mpa). **(13)**

Q. 4 Design circular reinforced concrete tank resting on ground to store 4 lakh liters of water. The safe bearing capacity of the supporting strata is 200 kN/m^2. Design the wall of the tank using IS code. Use M 25, Fe 500. Draw all details of reinforcements. **(13)**

P. T. O.

SECTION – II

Q. 5 **a)** What are the various components of a cantilever retaining wall? What are the forces acting on them? **(05)**

b) Name the different types of combined footings? Write the suitability of each type. **(05)**

c) What are the various elements of a flat slab? Elaborate with figure. **(04)**

Q. 6 A T- shaped cantilever retaining wall is to retain embankment for following data: **(13)**

i) Height soil to be retained = 4.2 m

ii) Embankment is horizontal.

iii) Unit wt of soil = 18 kN/m^3

iv) Angle of repose of soil = 30^0

v) S.B.C. of soil = 200 kN/m^2

M 20, Fe 415 is used.

Decide the dimensions, check the stability and design the stem.

Q. 7 Design a slab type combined footing for two columns spaced 4.8 m centre to centre. Column A is 300 mm × 300 mm and transmits a load of 650 kN. Column B is 400 mm × 400 mm and transmits a load of 950 kN. **(13)**
S. B. C. of soil is 180 kN/m^2.

Use M 20, Fe 415.

Q. 8 Design the interior panel of a flat slab 5.3 m × 5.3 m in size for a super imposed load of 6 kN/m^2. Use M 25, Fe 415. **(13)**

* * * * *