Total No. of Questions :6]

SEAT No. :

P52

[Total No. of Pages :2

OCT. -16/BE/Insem. - 103
B.E. (Civil)
STRUCTURAL DESIGN - III
(2012 Course) (Semester - I)

Time : 1 Hour 30 minutes] *[Max. Marks :30*

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q6.***
2) ***Neat sketches must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data, if necessary.***
5) ***IS : 1343 - 2012, IS : 1893 - 2002 and IS : 456 - 2000 are allowed in the examination.***
6) ***Use of electronic pocket calculator is allowed in the examination.***
7) ***Use of cell phone is prohibited in the examination hall.***

Q1) A symmetrical I -section with size of top and bottom flange 500 mm × 200 mm and web 150 mm × 600 mm is used to support an imposed load 15 kN/m over a span of 16 m. An effective pre stressing force of 1250 kN is applied through a parabolic cable with an eccentricity of 90 mm from soffit at the mid span and zero at the support. Calculate the extreme fiber stresses in the cross section at mid span at transfer and at service loads. Take loss ratio as 0.82.**[10]**

OR

Q2) A post tensioned prestressed concrete beam of simply supported span 16 m has the cross sectional details: top flange 450 mm × 150 mm, web 150 mm × 600 mm, and bottom flange 350 mm × 200 mm. The beam is prestressed with 3 - 12/5 Freyssinet parabolic cables with its centroid at 100 mm from the soffit, stressed one cable at a time from only one end with an initial prestress of 900 MPa. Calculate total loss of prestress at the age of 120 days, if coefficient of friction = 0.25, coefficient for curvature and wave effect = 0.0026/m length of cable, slip of anchorage at jacking end = 1.5 mm, creep coefficient = 2.0, E_s = 2 .× 10^5 MPa, Creep and relaxation of steel = 1.2% of initial prestress grade of concrete = M40. **[10]**

P.T.O.

Q3) A post-tensioned prestressed rectangular beam of span 15 m is subjected to an imposed uniformly distributed load 10 kN/m. The stresses in concrete should not exceed 16.5 N/mm^2 in compression and 1.1 N/mm^2 in tension. The loss of prestress is 15 percent. Calculate the minimum possible depth and also find minimum prestressing force and the corresponding eccentricity. The width of the beam is to be taken as 300 mm. **[10]**

OR

Q4) A post tensioned simply supported prestressed concrete isolated two way slab of 6.5 m × 9 m with discontinuous edges supports an imposed load 4 kN/m^2. Use M 45 grade of concrete and 3ply - 3 mm strands with a stress of 1900 MPa. Check the safety of the slab against collapse and deflection at ultimate load. Draw layout of cables. **[10]**

Q5) Calculate the total base shear and its distribution along the floors, for a G + 3 building for the following data as per IS 1893 : 2002.

Building : 3 panels and 3 bays of 4 m × 4 m, floor to floor height = 3 m for all floors, Live load for floors : 2.5 kN/m^2 + floor finish 1 kN/m^2.

Live load for roof :1.5 kN/m^2 + water proofing 1 kN/m^2

Cross section of beams and columns (230 × 400) mm, slabs 125 mm thick, walls, 150 mm thick. **[10]**

OR

Q6) a) Explain the approximate analysis for frames subjected to combined load effects. **[3]**

b) What do you understand by load combinations? Explain with a suitable example how the different loads are combined to get the design loads. **[7]**