Total No. of Questions: 04

B. Tech (Civil) [Final]

Structural Design -III

(CE 402)

(END Semester Examination)

Duration: 3 Hrs. **Max. Marks: 50 +10 = 60**

Instructions to candidate:

1) All questions are compulsory.
2) Assume suitable data, if necessary.
3) Use of non-programmable electronic calculators is allowed.
4) Use of IS code 456 –2000, IS: 1893, 3370, IS : 1343 is permitted.

Q.1

A prestressed concrete bridge has following unsymmetrical section spanning over 20 m. The dimensions of the section are,

Top flange = 1200 mm wide x 250 mm thick.
Web = 1200 mm deep x 300 mm thick
[overall depth, 1450 mm]

The beam is subjected to superimposed dead load 20 kN/m and live load of 10 kN/m throughout the span. The beam is prestressed by an effective prestressing force of 3500 kN with parabolic profile , eccentricity at support is 100 mm above the center of section and at mid span, 200 mm from soffit. Find the resultant stresses developed at mid span and supports at initial and final condition. Assume prestress loss ratio 0.85.

(10) +5
= (20)

Q.2

A simply supported post tensioned prestressed concrete girder of 30 m is required in multiplex building . The live load is worked out 20 kN/m acting throughout the girder. The specified 28 day cube strength is 50 N/sq.mm. Assume ultimate tensile stress in prestressing steel equal to 1600 N/sq.mm & loss ratio = 0.86 Assume other suitable data and state it clearly.

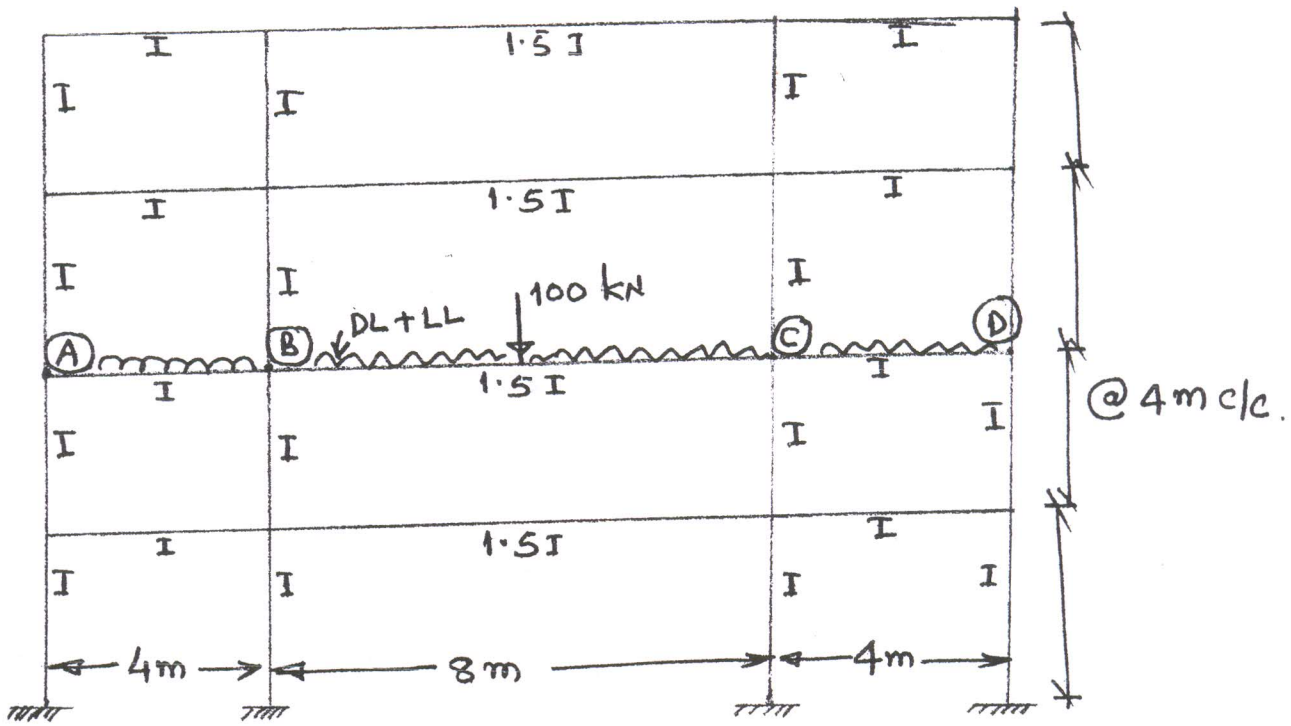
Design the beam which should cover the followings,

i) the cross section of the girder [rectangular section] .
ii) Cable profile
iv) Compliance of IS: 1343 provisions.

(10) +5
= (20)

Q.3

A multi-storey intermediate frame of building has following details.



Loading on beam ABCD is, DL = 25 kN/m & LL = 20 kN/m. Design the beam section at support at B, if the moment due seismic is ± 90 kN.m . The worst combination of loads should be considered for design and relevant provisions of Indian codes.

[15]

Q.4

Design a circular water tank resting at 3.0 m below the ground level, it has following data.
Diameter = 15 m open to sky.
Depth of water = 3.00 m
Free board = 0.5 m
SBC of soil = 500 kN/sq.m
Angle of internal friction = 25 degree
Density of soil = 19 kN/cu.m
Water table effect should be considered maximum at ground level
Use IS: 3370, M-30 and Fe500.
Apply all necessary checks for stability and ensure the safety.
Show the details of reinforcement in wall and base slab.

[15]