APR - 17/TE/Insem. - 4

T.E. (Civil)

STRUCTURAL DESIGN - II

(2012 Pattern) (Semester - II) (301010)

Time : 1½ Hour]   *[Max. Marks : 30*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.*
2) *Figures to the right indicate full marks.*
3) *Use of IS 456-2000 and non programmable calculator is allowed.*
4) *Neat diagrams must be drawn wherever necessary.*
5) *Mere reproduction from IS Code as answer, will not be given full credit.*
6) *Assume any other data, if necessary.*

Q1) a) Compare LSM with WSM from consideration of Material behavior. **[3]**

    b) A RC beam section of size 300 mm wide and 565 mm effective depth is reinforced with 4 no's of 25mm bars on tension side and 2 no's on compression side, Calculate what UDL it can carry over a span of 5m using WSM Use M20 and Fe415. **[7]**

OR

Q2) a) State the situations where doubly reinforced beam become necessary and what is the role of Compression reinforcement. **[3]**

    b) Explain Under reinforced, Over reinforced and Balanced section with suitable stress diagram used in WSM. **[4]**

    c) Derive the Values of Neutral Axis constants for M20 grade of concrete is used along with Fe250, Fe415 and Fe500 with reference to WSM. **[3]**

Q3) a) Explain with suitable graphical representation Characteristic load and characteristic strength used in LSM. **[3]**

    b) Calculate the maximum ultimate uniformly distributed imposed load the L-beam of effective span 8 m can carry. The details of beam are as below **[7]**

      i) Width of rib = 230mm

      ii) Effective flange width = 800mm

P.T.O.

    iii)   Flange thickness = 120mm

    iv)   Total depth = 600mm with clear cover 25mm

    v)   Tension steel = 3 no's 20 mm throughout + 2 no's 20mm curtailed at mid span

    vi)   The beam is subjected to ultimate D.L. of 25 kN/m including self weight

    vii)   Use M20 and Fe 415 LSM is recommended.

<center>OR</center>

Q4) Design a one way slab for clear span of 3.8m which carries L.L. of 3kN/sq.m and F.F. of 1kN/Sq.m, slab is supported over 230 mm thick walls and use M20 and Fe 415, Draw the details of reinforcement. **[10]**

Q5) Design a RC slab for a store room having clear dimensions 4.5m × 3.5m. The slab is to be casted monolithically over the 230mm wide beam with corners of slab held down. The slab carries live load of 3 kN/sq-m and floor finish of 1kN/sq-m, Use M20 grade of concrete and Fe 415 grade of steel. Also show details of reinforcement. **[10]**

<center>OR</center>

Q6) Design the first flight of a dog legged staircase for the following data: **[10]**

    a)   Floor to floor height = 3450mm

    b)   Rise = 150mm, Tread = 300mm

    c)   No, of risers in first flight = 11

    d)   No, of risers in second flight = 12

    e)   Width of each flight = 1.2m

    f)   Clear landing at mid landing and first floor level = 1m

At plinth level plinth beam is provided below first step and at mid landing level and first floor level beam is provided at the outer face of landing. Show details of reinforcement Use M20 and Fe 500.