

Total No. of Questions : 6]

SEAT No. :

P74**APR. -16/TE/Insem. - 4****[Total No. of Pages : 2****T.E. (Civil)****STRUCTURAL DESIGN-II****(2012 Pattern) (Semester - II) (301010)***Time : 1.5 Hours]**[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)** Enlist various design methods available for design of RCC structure. Also states limitations of WSM method over LSM method. **[3]**
- b) A RC beam section of size 230 mm wide and 430 mm effective depth is reinforced with 3 no 16 mm diameter bars. Find the moment of resistance of section using WSM approach. Also find safe intensity of uniformly distributed load that can be placed on simply supported beam of effective span 4 m. Use M20 grade of concrete and Fe 250 steel. **[7]**

OR

- Q2) a)** What is purpose of partial safety factors used in LSM? Why these are called as partial? Give the partial safety factors for stresses in steel and concrete. **[3]**
- b) Using stress and strain diagrams for a balanced singly reinforced section as per WSM, derive the design constants (k = Neutral axis constant, j = Lever arm constant, and R = Moment of resistance constant). Use M20 grade of concrete and Fe 415 grade steel. **[7]**
- Q3) a)** What do you meant by doubly reinforced section? Under which circumstances doubly reinforced sections are needed. **[3]**

P.T.O.

- b) Calculate the moment of resistance by LSM for T-beam section detailed as below: [7]
- i) Width of rib = 300 mm
 - ii) Effective flange width = 1200 mm
 - iii) Thickness of flange = 120 mm
 - iv) Effective depth = 565 mm
 - v) Tension steel = 4 no 25 mm diameter
 - vi) M25 grade of concrete and Fe 500 grade of steel.

OR

Q4) Design a corridor slab over a passage of size 15.70m × 3.20m at an entrance of a public building. The slab is simply supported by 300mm wide beams and carries live load 3.00 kN/m² and floor finish of 1 kN/m² Use M20 grade of concrete and Fe 415 grade of steel. Assume mild exposure condition. Also show details of reinforcement. [10]

Q5) Design a RC slab for a store room having clear dimensions as 4.77m × 3.77m. 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/m² and floor finish of 1 kN/m². Use M20 grade of concrete and Fe 415 grade of steel. Also show details of reinforcement. [10]

OR

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

- a) Center line dimensions of staircase room = 2.5 m × 4.75 m;
- b) Floor to floor height = 3.0 m;
- c) Rise = 150 mm; Tread = 300 mm;
- d) Width of landing = 1.25 m;
- e) Live load = 3 kN/m² and Floor Finish = 1 kN/m²;
- f) Material M 20, Fe 500.

Draw neat sketches showing details of reinforcement.

