(3) BE-sem-VII-old-Civil-LSM&CS (07) 25/5/16

QP Code : 29814

(3 Hours) **[Total Marks: 100**

N.B: (1) Question **No. 1** is compulsory.

(2) Attempt any **FOUR** questions out of remaining six questions.

(3) Assume suitable data wherever required and state it clearly.

(4) Illustrate your answers with neat component sketches wherever required.

1. Attempt any **four** of the following

(a) Draw the stress distribution diagram for reinforced beam section used in ULM and LSM. **05**

(b) State the functions of longitudinal and transverse reinforcement use in column. **05**

(c) Explain the concept of equivalent flange thickness in analysis of Tee beam LSM. **05**

(d) State the assumptions made in theory of Limit state load method of design for flexure. **05**

(e) What is modification factor? State its significance. **05**

2. **(a)** A RC rectangular beam of size 250 mm × 500 mm (effective) is reinforced with 6 bar of 20 mm diameter on tension side. Wall bearing 230 mm. Determine workimg udl carried by beam over clear span of 6 m. Use concrete M20 and steel Fe415. **08**

(b) A Reinforced Concrete beam of cross section 250mm × 400 mm effective, reinforced with 6 bar of 16 mm diameter on tension side and 2 bar of 20 mm diameter on compression side with cover of 30 mm. Find udl supported by beam over clear span of 6 m. Use concrete M20 and steel Fe415. Take end bearing 250 mm **12**

d'/d	0.05	0.10	0.15	0.20
f_{sc} (N/mm^2)	355.1	351.9	342.4	329.2

3. **(a)** Design shear reinforcement for a beam having cross section 230 mm × 550 mm effective reinforced with 6 bar of 16 mm diameter. The beam carries factored shear force of 120 kN.at support Use concrete M20 and steel Fe415. **10**

100As/bd	0.25	0.50	0.75	1.0	1.25	1.5
τc (N/mm^2)	0.36	0.48	0.56	0.62	0.67	0.72

(b) A reinforced concrete beam 250 mm × 400 mm is reinforced with 4 bar 25 mm diameter on tension side with effective cover of 50 mm. Determine ultimate moment of resistance by ULM. Take fck =20 N/mm^2 and fy = 415 N/mm^2 **07**

(c) State the assumptions made in ULM in flexure. **03**

[TURN OVER

4. (a) Design a simply supported slab over room of 3.0 m × 8.0 m. carrying imposed load of 3 kN/m^2 and floor finishing load of 0.75 kN/m^2.Also check the slab for shear. Use concrete M20 and steel Fe415. Draw sketch of reinforcement detail. **12**

(b) Design the circular column to carry an axial load of 900 kN. The length of column is 4.2 m. both ends of column are restrained against rotation. Also design lateral reinforcement. Use concrete M20 and steel Fe415. **08**

5. (a) A rectangular beam 250 mm × 600 mm (overall) is subjected to a sagging bending moment of 50 kN-m, shearing force 25 kN and twisting moment of 12 kN-m. Design the reinforcement .Take load factor 1.5, and effective cover 50mm. Use concrete M20 and steel Fe415. **12**

(b) Find moment of resistance of Tee beam having flange width 1500 mm, width of rib 300 mm, thickness of slab 120mm, effective depth of T beam is 550 mm. The beam is reinforced with 6 bar of 20 mm diameter. Use concrete M20 and steel Fe415. **08**

6. (a) Design a slab RC slab over a room of 4 m × 6 m. slab carries live load of 4 kN/m^2 and finishing load of 1 kN/m^2. The slab is supported on all four wall having thickness 250 mm. Use concrete M20 and steel Fe415. Draw the reinforcement details. **12**

ly/lx	1.0	1.1	1.2	1.3	1.4	1.5	1.75
α_x	0.062	0.074	0.084	0.093	0.099	0.104	0.113
α_y	0.062	0.061	0.059	0.055	0.051	0.046	0.037

(b) State the IS specification for minimum and maximum area of tensile steel in beam and slab. **04**

(c) Classify the column. State maximum and minimum area of compressive steel to be provide in column. **04**

7. Design sloped footing for a square column to carry an axial load 1000 kN at working condition. SBC of soil is 200kN/m^2. Use concrete M20 and steel Fe415. Draw neat sketch showing reinforcement details. Check the depth by two way shear and one way shear. **20**
