BE - sem-VII - Rev - Civil
LSM & C

27/5/15

QP Code : 8510

(3Hrs) Maximum Marks-**100**

N.B.-

1. Question no. 1 **is compulsory**. Attempt **any four** out of remaining **six** questions.
2. Assume suitable data **if necessary** but justify the same.
3. Draw neat sketches **wherever needed** to support your solution.
4. Figures to the right indicate full marks.

Q.1 (a) Explain the terms primary tension failure and primary compression failure. (4)
(b) State the limit state of serviceability for deflection and cracking. (4)
(d) Draw the stress distribution diagrams for concrete (in flexure) used in ULM and LSM. (4)
(c) Define the terms characteristic load and partial factor of safety. (4)
(e) Explain the procedure to design an axially loaded long RCC column using LSM. (4)

Q. 2(a) A RC beam section of size 250 mm x 500 mm is subjected to a factored moment of 135KNm. Determine 'A_{st}' that can be placed at an effective cover of 40 mm. Use LSM and Adopt M20 & Fe415. (8)
Q. 2(b) A RC beam of rectangular c/s 200 mm x 500 mm is reinforced with 3-20mm ϕ (Fe250) in compression zone. Calculate the amount of tension steel grade of Fe415 for the section to be fully effective. Adopt M20 concrete and effective cover to both steel as 50 mm.
Also find the safe UDL the beam can carry over a simply supported span of 5 m. (12)

Q.3 (a) What is Tee beam action? How will you find effective flange width 'b_f' for flanged beams? (5)
Q.3(b) Explain the concept of equivalent flange thickness as per LSM (5)
Q. 3(c) Find M_U moment and tension steel 'A_{st}' required for a RC T-beam section having following details-
Flange width (effective) =1000 mm, width of web = 300 mm, depth of flange =100 mm and effective depth of beam is 600 mm. Use M20 & Fe415. (10)

Q. 4(a) A RC beam of size 300 mm x 500 mm (overall) is reinforced with 3 bars of 20 mm dia (Fe250) out of which one bar is bent at 45^0 nearer to support and taken to the compression side. Design the shear reinforcement if the beam section is subjected to a working shear of 100 KN. Use M20 concrete. Refer table. (14)
Q.4 (b) Write the basic steps used in LSM to design a RCC beam section subjected to shear force, bending moment and torsional moment. (6)

TURN OVER

Q.5 (a) Using ULM find the moment capacity of a RC beam section of size 250 mm x 500 mm reinforced with 4 bars of 20 mm diameter and placed at an effective cover of 50 mm. Use M20 and Fe415. (7)

Q.5 (b) Design a simply supported RCC slab over a room of size 3 m x 7 m. The thickness of supporting wall is 300 mm and the slab carries 75 mm lime concrete at its top, the unit weight of which is 20 KN/m^3. The live load on slab may be taken as 2 KN/m^2.
Use M20, Fe415 &LSM. Apply necessary design checks and draw neat sketches showing details of reinforcement. (13)

Q. 6(a) A short column of size 230 mm x 350 mm is subjected to a factored load of 1500 KN. If the unsupported length of column is 3.2 m. find the design moment if any due to minimum eccentricity. Comment on the result you obtain. (8)

Q.6(b) Design a helically reinforced short circular column to carry an axial load of 1200 KN at service condition. Use concrete M20 and steel Fe415. Also design the helical reinforcement using Fe250 steel. (12)

Q. 7 Design a combined rectangular footing connecting two columns 'A' and 'B' 4 m c/c apart and carrying factored axial load 1200 KN & 1400 KN respectively. The property line is 400 mm away from the outer face of column 'A'. Sizes of columns A & B are 300 mm x 300 mm and 400 mm x 400 mm respectively. Use M20 and Fe415. Adopt SBC of soil as 150 KN/m^2.
Draw neat sketches showing details of reinforcement. (20)

Table for design shear strength 'τ_c' (N/mm^2) in concrete.

$p=100A_s/bd$	0.25	0.50	0.75	1.00	1.25
τ_c	0.36	0.48	0.56	0.62	0.67