Fifth Semester B. E. (Civil Engg.) (CBS) Examination

REINFORCED CEMENT CONCRETE STRUCTURES

Time : Four Hours] [Max. Marks : 80

N. B. : (1) All questions carry marks as indicated.
(2) Due credit will be given to neatness and adequate dimensions.
(3) Assume suitable data wherever necessary.
(4) Diagrams should be given wherever necessary.
(5) Illustrate your answers wherever necessary with the help of neat sketches.
(6) I.S.I. Hand Book for structural steel section, I.S. 456 (Revised), I.S. 875 may be consulted.

1. (a) State the drawbacks and limitations of working Stress Method. 3

(b) A RCC beam 230 x 500 mm effective depth, is reinforced with 4 x 16 mm dia bars. Calculate moment of resistance and safe working load using working stress method. Assume effective cover to reinforcement is 45 mm and effective span is 3·5 m. Use M 20 grade concrete and Fe415 steel. Use W.S.M. 10

OR

2. (a) Differentiate between working stress method and limit state method. 3

(b) Explain in detail using stress diagram, balanced section, under – reinforced section and over – reinforced section. Also give the drawbacks of the over – reinforced section. 10

3. (a) Explain concept of prestressed concrete with the help of stress diagram. 6

(b) Explain in brief, various pre – tensioning and post tensioning losses encountered in prestressed conc. 7

OR

4. Explain in detail various systems of prestressing with neat sketches. 13

5. (a) A RCC Beam 230 x 500 mm is reinforced with 3 x 16 mm dia bars. Find the moment of Resistance if effective cover is 40 mm and effective span 3 m. Use M 20 concrete and Fe 415 steel. (Use L. S. M.) 6

(b) A simply supported beam of 4·5 m span carries a udL of 30 kN/m inclusive of self wt. The width of beam is 230 mm and is reinforced on tension side only. Design the smallest section, calculate depth of section and reinforcement.
Use M 20 concrete and Fe 250 steel. (Use L. S. M.) 7

OR

6. (a) Calculate the moment of resistance of a doubly reinforced R.C. beam of Rectangular section of

size 300X450mm. reinforced with 6–20mm dia bars on tension side and 4 -20mm dia bars on compression side.
Use M20 grade concrete and Fe250 grade steel. Assume eff. cover of 35mm on both sides. (Use L.S.M.) 6

(b) A doubly reinforced beam of size 250mm X 600mm deep is required to resist on ultimate moment of 310kNm. Using concrete M20 and mild steel reinforcement, Calculate the amount of steel required. The effective cover to tension steel is 55mm while that for compression steel is 40mm. (Use L.S.M.) 7

7. Design a short axially loaded circular column with helical rings. The diameter of column is 400mm and axial service load on column is 800kN.
Use M20 concrete and Fe415 steel.
Draw a neat reinforcement sketch. 13

OR

8. Design a pad footing for column 400X600mm carrying an axial load of 1000kN.
S.B.C. of soil is 200kN/m^2. Use M20 concrete and Fe415 steel. Draw a neat reinforcement sketch. 13

9. A R.C. beam 300 mm X 500 mm is reinforced on tension side with 3 X 20 mm dia. bars of grade Fe 250 with an effective cover of 50 mm. The beam is subjected to a shear of 150kN. Design the shear reinforcement using vertical stirrups with 1 bar of 20mm dia. bent up at an angle of 45^0. Use M20 grade concrete and Fe 250 steel. 14

Contd.

OR

10. A rectangular beam 230 x 550 mm is subjected to a sagging BM of 40 kN.m, SF of 30 kN and a twisting moment of 12 kNm at a given section. Design the reinforcement at the given section.
Use M 20 grade concrete and Fe 250 steel.
Assume eff. cover = 45 mm. 14

11. Design a one way slab for a clear span of 4 m with 300 mm bearing. The slab carries live load of 3.5 kN/m2. Use M 20 grade concrete and Fe 415 steel. Draw neat reinforcement sketch. 14

OR

12. Design a R.C. slab for a room measuring 6·5 m x 5 m c/c. The slab is to be cast monolithically over the beams with corners held down.
The width of the supporting beams is 250 mm.
The slab carriers superimposed load 3·5 kN/m^2.
Use M 20 grade concrete and Fe 415 steel.
Draw neat reinforcement sketch. 14