Question Bank (I scheme)

Name of Course: Design of Steel and RCC Structures **Subject code: 22502**

Semester: Fifth **Programme: CIVIL**

Unit test II

Unit 4- Design of shear Reinforcement and Bond (10marks)

2 marks question

1. Define: a) Nominal shear stress b) Maximum shear stress of concrete.
2. Write the entire procedure, step by step, for providing shear reinforcement in an RC beam according to limit state method.
3. State I.S specification for minimum shear reinforcement and maximum spacing of stirrups in beam.
4. State and explain types of bond.
5. Why the contribution of bent up bar is restricted to 50% in shear resistance.

4marks question

6. Write the expression for shear strength of concrete, shear force to be carried by shear reinforcement, spacing for the vertical stirrups and condition for redesign from shear point of view.
7. Design the shear reinforcement for a beam with b=350mm, d=550mm, Vu = 125KN, fck = 25 N/mm^2, fy = 415 N/mm^2 and percentage of steel is 1.67%.
8. A beam 250mm x 400mm deep effective is reinforced with 3 bars of 16 mm diameter of grade Fe415. The shear force at the support is 60KN. Design the shear reinforcement if grade of concrete used is M20. Use 6 mm diameter vertical stirrups.
9. Calculate the development length for a bar of 16mm diameter in compression. The grade of steel is Fe500 and design bond stress is 1.2N/mm^2, for plain bars in tension.

Unit 5-Design of Slabs (14 marks)

2 marks question

10. Enlist design steps for one way simply supported slab.
11. Define slab and explain classification of slab.
12. What are the types of supports of slab and explain distribution of steel.
13. Enlist design steps for two way simply supported slabs.
14. Draw detail diagram showing reinforcing details in case of cantilever slab.
15. Draw detail diagram showing reinforcing detail in case of one way and two way slab.

4 marks question

16. Design a cantilever chajja with following data:
    span = 1.2m, L.L. = 2 KN/m^2, floor finish = 1 KN/m^2, width of support = 230 x 400 mm beam. Draw the reinforcement details. Use 10 mm diameter bars Fe 415 and 6 mm diameter bars of Fe250. Use M 20 grade concrete.
17. A one way slab is to be designed for an effective span 3.3m. The super imposed load including finishing is 4 kN/m^2. Taking modification factor 1.2. Design the slab, sketch c/s. of slab showing reinforcement details. Use concrete M20 and steel Fe415.
18. Design simply supported R.C.C. slab over a passage of effective span 3.2m by using M25 concrete and Fe 415 steel .Assume super imposed load including floor finish as 3 KN/m^2 and M.F. = 1.4. Sketch the c/s.
19. A hall is 3m x 7m inside with walls 230mm thick. Design R.C. slab using M20 concrete and Fe 415 steel for total load of 5.5 KN/m^2. Check for shear and development length.
20. Design a slab for a hall of size 5.5m x 4m using M20 grade of concrete and Fe415 steel. Corners of slab are free to lift. Take live load of 2 KPa and floor finish load of 0.5KPa. Checks for shear, deflection and development length need not be taken. Use effective cover of 25mm. Take M.F. = 1.4.
21. Design a two way slab over a hall 4.5m x 5.5m effective. It is simply supported at from edges with corners held down. LL is 1.5 KN/m^2. Check for shear need not be given. Use M20 concrete and Fe415 steel. Use B.M. coefficients $\propto_x$ = 0.086 and $\propto_y$ = 0.058.

Unit 6- Design of Axially loaded short column (8 marks)

2 marks question

22. Write IS specifications for minimum eccentricity of an axially loaded short column.
23. State any four effective lengths of compression members as per clause E-3 along with this recommended values.
24. State any four functions of lateral ties in the column.
25. What are the assumptions made in limit state of collapse in compression?

4marks question

26. Design a RCC square footing for a column 400mm x 400mm to carry an axial load of 1200kN. Take SBC of soil as 200 KN/m^2 and density of soi as 18 KN/m^3. Use M20 concrete and Fe 415 steel. Check for punching shear and one way shear need not be given.
27. Design a column footing for following data. Load on column = 680 KN, size of column = 200mm x 300 mm, safe bearing capacity of soil = 150 KN/m^2. Concrete M20 and steel Fe 415.
28. Calculate load carrying capacity of column 300mm x 450mm in size reinforced with 4-16 mm ϕ bars and 4-12mm ϕ diameter bars. Use M20 and Fe45 steel.

29. Design a square column with the following data:

i. Factored load = 3000 kN
ii. Concrete grade = M20
iii. Steel = Fe415
iv. Unsupported length of column = 3m
v. %steel for main bars = 1%
Check for minimum eccentricity.