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Department of Civil Engineering

Question Bank

Subject – BTCVC601_Design of concrete structure 1

Module 1

1. Differentiate between Limit state Method and Working stress method
2. State the different load combination
3. Explain the stress -strain behaviour of steel and concrete.
4. Explain the types of limit state method
5. State the advantages of limit state over working stress method.
6. Explain the design philosophies.
7. State the assumption in limit state method.
8. What is mean by modular ratio and what are its significance in design
9. Explain the structural properties
10. Enlist the types of loads acting on structure with there IS specification
11. State the different load combinations.
12. State the difference between factor of safety and partial factor of safety.

Module 2

13. Differentiate between the balanced section, under reinforced section and over reinforced section.
14. Define the doubly reinforced section and sate is necessity.
15. Explain the concept of balanced section, under reinforced section, over reinforced section
16. Draw the stress block diagram of balanced section, under reinforced section, over reinforced section
17. Derive the equation of moment of resistant of singly reinforced beam.
18. Differentiate between the one-way slab and two-way slab
19. An RC beam 230 mm wide and 700 mm deep overall, is reinforced with 20 mm diameter 3 bars. The Centre's of the bars are 50 mm from the underside of the beam. The maximum stresses are not to exceed 7 N/mm2 for concrete and 190 N/mm2 for steel (m=13.33). Find the moment of resistance and the safely distributed load, the beam carry. The span of beam is 6m and the weight of concrete is 25 kN/m^3.
20. The cross section of rectangular beam has to resist a bending moment of 75 kN-m. If the beam is 250 mm wide and the permissible stresses in steel and concrete are 190 N/mm^2 and 5 N/mm^2 respectively find the effective depth and tensile reinforcement required.
21. A cross section of an RC beam is doubly reinforced with four bars of 20mm diameter on tension and compression side. The section is 300 mm x 500 mm effective what will be the actual stress in concrete and steel if the beam is subjected to bending moment 120 kN-m. m = 13.33 and d` = 25mm.
22. Explain the IS specification of different support condition and effective span respectively.
23. Design the RCC slab of room having size 4m x 9m. The thickness of supporting wall is 300mm. The slab carries 100mm thick lime concrete at its top the unit weight which may be taken as 19 kN/m3. The live load on slab is taken as 3 kN/m2 assumes the slab is to be simply supported at the end. M20 grade concrete and fe415 steel.
24. Design the cantilever slab to carry a live load of 2.50 kN/m2 the projection of slab beyond the wall is 2m. use M20 grade concrete and mild steel.

25. An RC beam 230 x 600 mm effective has to resist a bending moment of 125 kN-m at a particular section. Reinforcement on tension site consists of 5-16 mm diameter and that on compression side 3-20mm diameter. Find the stresses in steel and concrete. m=18.66, d'=20mm.
26. Design the RC slab for a room of size 4m x 6m. The slab is simply supported on all the four edges and carries a live load of 2 kN/m2and finishing of 1 kN/m2 take M20 grade concrete and fe415 steel.

Module 3

1. What is the general requirement of good stair?
2. Write the design procedure of staircase.
3. Design a dog legged RC stair with following data.
4. Width of stair=1m, Tread=270mm (10 Nos. trades), Rise=150mm,
5. Landing on one side=1m, Live load=3kN/m^2, Concrete is M20 and Steel Fe415.
6. Design an RC column footing with the following data. Load on the column = 700 kN, Size of column 230 x 300 mm, Bearing capacity of soil=180 kN/m^2.Concrete M20 and Steel Fe415.
7. Design an RC column footing with the following data. Load on the column = 700 kN, Size of column 230 x 300 mm, Bearing capacity of soil=180 kN/m^2. Concrete M20 and Steel Fe415.
8. Design the dog legged staircase of space 2.5m x 2.5m for the residential building. The floor-to-floor height is 3m Take M15 and Fe250 grade of material
9. Explain the design procedure of axially loaded and eccentrically loaded column.
10. Design the isolated column 350 x 350mm carries the live load of 1000 kN The SBC of soil is120 kN/m^2. Use M15 concrete and mild steel reinforcement. Sketch the details of reinforcement.
11. Explain the different modes of failure in case of footing.
12. Explain the types of footing and its function.
13. Design the isolated footing of uniform thickness of RC column bearing a vertical load of 750 kN and having size of 400mm x 600mm Take the SBC of soil 150 kPa Use M20 grade of concrete and Fe415 grade of steel.

Module 4

1. Explain the Terms
    - Characteristic Strength
    - Characteristic Load
    - Partial Safety Factors
2. Distinguish Between
3. Factor of Safety and Partial safety factor
4. Characteristic Loads and Design Loads.
5. State the values of partial factor of safety for material and load.
6. How to calculate the design values of LSM as per Is.
7. Why do we provide the cover to RCC structure?
8. State the grade of steel and concrete.
9. Explain the characteristic strength in detail.

Module 5

10. Explain the concept of balanced section under reinforced section and over reinforced section in LSM.
11. State the equation of Xu limiting and Mu limiting for different grade of steel
12. State the advantages and disadvantages of flanged section.
13. Draw the stress strain block diagram of flanged section for different cases.
14. State the necessity of flanged section
15. Why the doubly reinforced section is used?
16. Calculate the moment of resistance of a RC beam of rectangular size

17. 250mm wide &500mm deep, if it is reinforced with 6-20mm diameter bars on tension side & 2-20 mm diameter bars on compression side. Assume steel of grade Fe250 & concrete of grade M20. effective cover provides dist. 40mm on both sides.
18. Determine the values of design parameter Ku_{max} Ru_{max} and Pt_{max} foe balanced section of grade M20 and Fe 415.
19. The beam 300mm wide and 600mm effective depth is reinforced with 4-a6mm diameter. Find the ultimate moment of resistance of beam s/c. Use M20 & Fe415.
20. Design the reinforcement of T-beam for the following data
    Width of flange= 900mm; Breadth of flange= 230mm
    Thickness of flange= 100mm; Effective depth = 500mm
    Applied the factored moment =250kN-m
21. A T-Beam of flange width 1200mm flange thickness 100mm width of rib 275mm as an effective depth of 600mm Use M20 grade and Fe500 grade of steel calculate the safe moment of resistance if the area of steel is 6-25mm dia.
22. Determine the moment of resistance of beam having the following data:
    b=350 mm; d=900mm; ′d =50mm. Tension reinforcement: 5-20mm HYSD bars (Fe 415); compression reinforcement 2-20 HYSD bars (Fe 415); grade of concrete M15.
23. A reinforced concrete beam is supported on two walls 250mm thick, spaced at a clear distance of 6m. The beam carries a super-imposed load of 9.8 kN/m. design the beam using M20 concrete and HYSD bars of Fe 415 grade.

Module 6

1. Define the bond state and explain the type of bond.
2. What do you understand by the development length of bar?
3. Why the bond stress is more in compression bond the tension bond?
4. What is the lap splice? Why the splicing is done? What are the IS code providing lap splice
5. Why the bends and hooks are provided in reinforcement?
6. Calculate the development length of 16mm diameter bar for bend of 90 degree and 180 degrees
7. Design the shear reinforcement for beam 230mm x 450mm with effective cover of 40mm of span 4.5m carries udl of 17.5KN/m including the self-weight of beam. The beam is reinforced with 3 bars of 16mm diameter. Use M20 grade of concrete and Fe415.
8. A reinforced concrete rectangular beam section 300 mm wide and 500 mm effective depth is subjected to a factored shear force of 40 kN at the support. The beam is reinforced with three bars of 20 mm diameter embedded at the support. Take concrete of grade M 20 and steel of grade Fe 415.
9. A rectangular beam is 230 mm wide and 450 mm effective depth is reinforced with 4 bars of 20 mm ϕ at the support. Design the shear reinforcement in the form of vertical stirrups at a distance of effective depth from the support, if the factored shear force is (i) 70 kN (ii) 150 kN (iii) 350 kN Take concrete of grade M 25 and steel of grade Fe 415.
10. A constant width 250 mm cantilever beam has an effective span of 2500 mm. The overall depth of beam at free end and fixed end are 250 mm and 500 mm respectively with an effective cover of 50 mm. The area of steel at support to 1.0% is available to resist the flexural capacity. The beam is carrying a total (dead load + superimposed load) uniformly distributed load 54 kN/m load Design the shear reinforcement for Fe 415 steel, and M25 concrete.
11. In reinforcement concrete tension member 16mm diameter bar has to be lap spliced with 20mm diameter bar. Assuming M20 concrete and Fe415 steel design a suitable lap splice.
12. Define development length and what is its significance?

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