Question Bank

4th Semester

Structural Design - I (Th. 1)

(2 marks Questions)

MODULE 1:- (Working Stress Method)

Qn 1. Write down the values of partial factor of safety for concrete and reinforcing steel adopted in working stress method of design?

2. Why the partial factor of safety for concrete is greater than that for reinforcing steel in the consideration of working stress method?
3. Define modular ratio?
4. What are the disadvantages of WSM?
5. What do you mean by a transformed section?
6. What do you mean by grade of concrete and grade of steel?
7. Write down the expression to calculate the balancing depth of the Neutral Axis?
8. Write down the expression to calculate the moment of resistance of an under reinforced section in working stress method of design?

MODULE 2:- (Philosophy of Limit State Method)

Qn 1: What are the values of partial factor of safety for concrete & steel used in LSM?

2. What are the different types of limit state?
3. Define characteristic strength of concrete?
4. Define characteristic load and design load?
5. What do you mean by effective span of beam?
6. Write down the values of minimum cover to reinforcement in slab, beam, column & footing?
7. What do you mean by effective depth, clear cover & effective cover?

MODULE 3:- (Analysis and design of single & double reinforced sections using LSM).

Qn 1. Draw the stress-strain relationship for concrete & steel in LSM?

2. Draw stress-block diagram for singly reinforced section in LSM?

MODULE 4:- (Shear, Bond and Development length)

Qn 1. Write down the importance of providing shear reinforcement?

2. What are the different methods of providing shear reinforcement?
3. How minimum shear reinforcement is provided?

4. What is the criteria for providing maximum shear reinforcement?
5. What is bond stress?
6. What do you mean by the term 'anchorage'?
7. What is development length?
8. What is the anchorage value for shear reinforcement with 90°, 135° & 180° bend?
9. Write down the expression for calculation of development length?

MODULE-5 (Analysis & design of T-beams):-

Qn 1. Write down the advantages of T-beam?
2. Write down the codal prorision for effective width of flange for an isolated T-beam & L-beam?
3. Write down the expression for effective width of flange for a continuous T-beam & L-beam?

MODULE-5 (Analysis and Design of Slab & Staircase):-

Qn 1. Explain one-way & Two-way slab?
2. Write down the basic values of span to depth ratio for spans upto 10m for a cantilever, simply supported, continuous slab for controlling deflection?
3. What are the different types of staircases?

MODULE-7 (Design of Axially loaded Columns & Footings):-

Qn 1. What are the different types of columns?
2. What do you mean by effective length of column?
3. Define slenderness-ratio?
4. What is the minimum number of bars for a square column & circular column?
5. Why lateral ties are provided in columns?
6. What are the different types of footings?
7. Write down the expression for minimum depth of foundation?
8. What is the minimum thickness of footing as per codal provisions and what is the value of minimum nominal cover for a footing.

Question Bank.

Structural Design – I (Th 1).

(05 marks Questions).

MODULE 1 :- Working Stress Method.

Qn 1. Explain the Principle of Working Stress method of design?
2. What are the fundamental assumptions used in working stress method?
3. Differentiate between working stress method of design & Limit state method?
4. What are the advantages & disadvantages of working stress method?

MODULE - 2 :- Philosophy of Limit State Method

Qn 1. Write a short note on Limit state method of design?
2. What are the advantages & disadvantages of LSM?

MODULE 3 :- Analysis of Single & Double r/f sections using LSM :-

Qn 1. Write down the assumption made in the analysis of RC sections using LSM?
2. Write short notes on under reinforced section & over reinforced section?

MODULE 4 :- Shear, Bond and Development length :-

Qn 1. Why Shear reinforcement is necessary & what are the different forms of providing shear reinforcement?
2. A steel bar of 20mm diameter of Fe415 grade is embedded in M 25 concrete. Calculate its development length in tension and compression?

MODULE 5 :- Analysis and Design of T-beams :-

Qn 1. Draw a typical cross-section of T-beam & show its components? Also draw its stress distribution diagram & Strain profile?

MODULE 6 :- Analysis and Design of Slab & Staircase :-

Qn 1 :- Differentiate between ~~two~~ one-way slab & two-way slab?
2. Design a cantilever slab to carry a live load of $3 KN/m^2$. The overhang of slab is 1.25m. Use M20 & Fe415?

MODULE 7:- Design of Axially loaded columns & footings?

Qn 1. Write down assumptions in limit state of collapse for compression?

2. A short RCC column 450mm x 450mm is provided with 8 bars of 16 mm diameter. If the effective length of column is 2.5m, find the ultimate load for column. Use M 20 & Fe 415. Use LSM?

Question Bank. 4th Semester

Structural Design-I (Th.1)

(10 marks Questions).

MODULE 1:- Working Stress Method.

Qn 1. Write short notes on under reinforced section, balanced section and over reinforced section? and Why is it undesirable to design over reinforced sections?

2. A singly reinforced beam section having breadth 300mm, effective depth 550mm and effective cover 50mm is reinforced with 4nos. of 25mm diameter bars. Assuming M20 & Fe415 steel, find the allowable moment of resistance of the section? Also to resist a moment of 100KNm design the section?

MODLE 2:- Philosophy of Limit State Method.

Qn 1. A RC rectangular beam is 230mm wide and overall 400mm Deep. It is reinforced with 4nos of 12mm dia bars of Fe415 at an effective cover of 30mm. The beam is simply supported over a span of 3.5m. Calculate the M.O.R of the beam and maximum super-imposed load uniformly distributed over the beam that can carry? Use M20 concrete.

2. Design a RC beam of 230mm x 400mm to resist an ultimate moment of 50KN.m. Use M20 concrete & Fe500 steel?

MODULE 3:- Analysis and Design of Double Reinforced sections Using LSM:-

Qn 1. Find M.O.R of a doubly r/f beam of size 300mm x 450mm. It is reinforced with 6-20ϕ bars in tension side and 4-20ϕ bars in compression side. Use M20 & Fe 250 steel?

Qn 2:- Design a RC beam of span 8m which is being subjected to a Live load of 30KN/m. Overall depth of the beam is limited to 650mm. Use M20 & Fe 415 steel?

MODULE 4:- Shear, Bond & Derelopment length:-

Qn 1:- A simply supported beam (260mm x 440mm) reinforced with 4nos of 16mm diameter bars as tension reinforcement, is subjected to an inclusive load of 20KN/m over a span of 3m. Design suitable shear reinforcement? Materials are M20 & Fe415.

MODULE 5:- Analysis and Design of T-beams:-

Qn 1:- A T-beam of effective flange width of ~~800~~ 1000 mm, thickness of slab 100mm, width of web 300mm and effective depth of 500mm is reinforced with 4nos. of 25mm diameter bars. Calculate the factored moment of resistance using LSM if M20 & Fe415 is used?

MODULE 6:- Analysis and Design of slab & Staircase:-

Qn 1. Design a one-way slab with a clear span of 4m, simply supported on 230mm thick masonry walls, and subjected to a Live load of 4KN/m^2 and a surface finish of 1KN/m^2. Assume Fe 415 steel? Assume that the slab is subjected to moderate exposure conditions?

2. Design a dog-legged staircase for an office building, given the following data:-

height of in-between floors = 3.2m
Riser = 160mm, Tread = 270mm
width of flight = landing width = 1.25m
Live load = 5KN/m^2
finishes load = 0.6KN/m^2

Assume the stairs to be supported on 230mm thick masonry walls at the outer edges of the Landing parallal to the risers. Use M20 & Fe415 steel. Assume Mild exposure conditions.

MODULE-7:- Design of Axially loaded columns & Footings:-

Qn 1: Design a short column of size 400mmx550mm using M20 grade concrete & Fe 415 steel. The column is subjected to an axial load of 1500KN under service and usual conditions of live loads. The effective length of column is 3.1m and is braced against side sway in both the directions?

Qn 2:- Design a footing for the foundation of a brick wall 250mm thick and transmitting a load of 200KN/m of its length. The bearing capacity of the soil is 160KN/m^2. Use M20 & Fe415.

Qn 3:- Design an isolated footing for a square column of 450mmx450mm size reinforced with 8 nos. of 25mm diameter bars, and carrying a service load of 2300KN. Assume soil with gross safe bearing capacity of 300KN/m^2 at a depth of 1.5m below ground. Assume M20 & Fe415?