

Structural Design-1 (TH-1)

4th Sem., Civil Engg.

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Important Questions :-

*02 marks :-

Q.No.

- 1 - Calculate the value of neutral axis constant for M20 grade of concrete and mild steel reinforcement in WSM.
- 2 - Write down two advantages of R.C.C over other materials.
- 3 - What do you know by M-15 grade of concrete?
- 4 - What is limit state design?
- 5 - Define balanced section.
- 6 - What is the value of modulus ratio for M20 grade concrete & Fe415 steel?
- 7 - Define characteristic strength of concrete?
- 8 - Mention two advantages of a doubly reinforced beam?
- 9 - Define development length.
- 10 - Write the IS code provision for effective width of flange for an isolated T-beam.
- 11 - Define moment of resistance.
- 12 - What is meant by side face reinforcement?

- 13 - Explain one-way & two-way slab.
- 14 - Explain the beam splicing.
- 15 - What should be the minimum diameter of bars to be used in slab?
- 16 - What is the function of bend up bars in a simply supported slab?
- 17 - What is stair case?
- 18 - How can you find out the effective length of a simply supported beam?
- 19 - Define slenderness ratio?
- 20 - Why lateral ties are provided in column?
- 21 - What are the different types of column?
- 22 - Explain braced & unbraced column?
- 23 - What is the minimum number of bars for circular & square column?
- 24 - What is bond stress?
- 25 - Write down the expression for minimum depth of foundation.
- 26 - What is the minimum thickness of footing as per code provision?
- 27 - What are the different types of footing?

*05 marks :-

Q.No:-

- 1- Difference between working stress method and limit state method.
- 2- What are the advantages & dis-advantages of WSM.
- 3- Find out the design constants of a rectangular section by taking M15 grade of concrete & Fe415 grade of steel.
- 4- Write down the assumption made for flexure in limit state of design.
- 5- Derive the stress block parameters for limit state analysis for flexure.
- 6- Short notes on assumption in working stress method.
- 7- A single reinforced rectangular beam 250mm width is reinforced 4 bars of 25mm diameter at an effective depth of 460mm. If M20 grade concrete & Fe415 reinforcement are used. Compute ultimate moment of resistance of the section in LSM.
- 8- Find the ^{depth of} neutral axis of a singly reinforced RC beam of 230mm width & 450mm effective depth. It is reinforced with 4 no. of 16mm dia. bars. Use M20 grade concrete & Fe415 reinforcement. Use WSM.

- 9 - A steel bar of 20mm diameter of Fe415 grade is embedded in M25 concrete. Calculate the development length in tension & compression.
- 10 - Draw the reinforcement details for R.C.C. lintel with sunshade.
- 11 - A beam of size (230mm x 500mm) overall depth is reinforced with 4 nos of 12mm dia. bars. Find the safe u.d.l on the beam in addition to its self weight on a span of 4.5m. Materials are M20 & mild steel.
- 12 - Short notes on torsion reinforcement in two-way slab.
- 13 - Short notes on bond & anchorage.
- 14 - Design a cantilever slab to carry a live load of 3 kN/m². The overhang of slab is 1.25m. Use M20 & Fe415.
- 15 - A short RCC column 450mm x 450mm is provided with 8 bars of 16mm diameter. If the effective length of column is 2.5m, find ultimate load for the column. Use M20 grade & Fe250. Use LSM.
- 16 - Differentiate between one-way slab & two-way slab.

* 10 marks :-

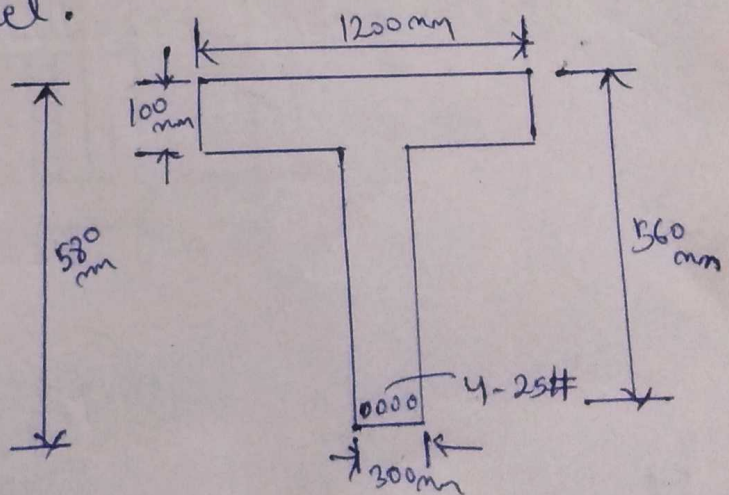
Q.No:-

1- A R.C.C beam 250mm wide x 600mm effective depth is reinforced with 4 nos of 20mm diameter bars in tension. Find the moment of resistance by working stress method. Also state whether the beam is under reinforced or over reinforced. The materials are M20 grade concrete & HYSD steel reinforcement.

2- Find the factored moment of resistance of a beam section 250mm wide x 500mm effective depth reinforced with 2 no. of 20mm diameter bars as compression reinforcement at an effective cover 40mm & 4 no. of 16mm diameter bars as tension reinforcement. The materials are M20 grade concrete & HYSD reinforcement.

3- A simply supported rectangular beam (250 x 450) mm reinforced with 5 nos of 16mm dia. bars as tension reinforcement is subjected to an all inclusive load of 20 kN/m over a span of 3.5m. Design suitable shear reinforcement. The materials are M20 & Fe 415.

4- Calculate the moment of resistance of a T-beam as shown in figure. Assuming M20 & Fe 250 grade steel.



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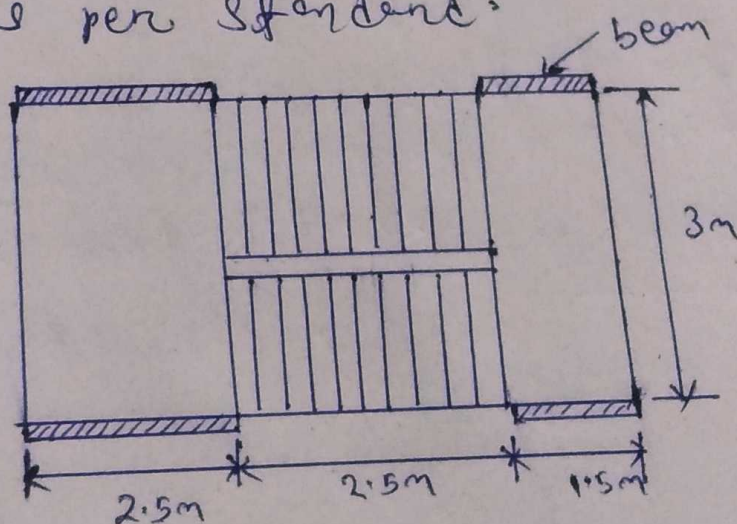
5- A RCC beam has an effective depth of 500mm & breadth of 350mm. It contains 4-25mm bars. Calculate the shear reinforcement needed for a factored shear force of 350kN for M25 min & Fe250 grade steel.

6- Design a simply supported one-way ^{roof} slab for a room 8m x 3.5m clear in size, if the superimposed load is 6.5 kN/m². Use M25 min & Fe415 grade steel.

7- Design a short column, square in section to carry an axial load of 2000kN using mild steel & M20.

8- Design a cantilever slab to carry a live load of 3 kN/m². The overhang of slab is 1.25m. Use M20 & Fe415.

9- Design a dog legged staircase of size as shown in figure. Take live load as 5 kN/m², floor finish as 1 kN/m², rise = 150mm, grade = 250mm, use M25 & Fe415. Take floor height as 3.0m. Assume any other data as per standard.



10- An R.C.C column of size $350\text{mm} \times 350\text{mm}$ reinforced with 8 no. of 16mm diameter bars carries a characteristic load of 800 kN . The allowable bearing pressure on soil is 200 kN/m^2 . Design an isolated square pad footing. The materials are grade M20 concrete & Fe415 reinforcement for both the column & the footing.

11- Design a footing for the foundation of a brick wall 250mm thick & transmitting a load of 280 kN/m of its length. The bearing capacity of the soil is 100 kN/m^2 . Use M20 & Fe415 .

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