

Code.No: 07A50101

R07

SET-1

III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010
DESIGN OF REINFORCED CONCRETE STRUCTURES
(CIVIL ENGINEERING)

Time: 3hours**Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

Note: Use of IS 456-2000 is allowed. Any missing data may be assumed suitably.

- 1.a) Draw the stress strain curve for concrete and explain the salient features.
- b) A rectangular beam of size 250mm x 500mm overall consists of 4#18mm in tension zone. Determine the moment of resistance and the UDL the beam can carry over a span of 5m. Adopt Working stress method. Assume moderate exposure condition. Use M30 concrete and Fe 500 steel. [4+12]
2. Design a Singly reinforced beam to suit the following data, clear span = 4m, width of the supports = 300mm, service live load = 15kN/m. Assume severe exposure condition. Use M25 concrete and Fe 500 steel. [16]
3. Determine the ultimate moment of resistance of the beam section. Data given
 $B = 250\text{mm}$, $D = 400\text{mm}$, $A_{sc} = 3$ rebars of 22 mm dia, $A_{st} = 3$ rebars of 28 mm dia, clear cover = 30mm. Use M20 concrete and Fe 415 steel. [16]
4. A rectangular beam 230mm wide is subjected to the following at a section
 Sagging bending moment of 28kNm, Shear force of 25kN, Torsional moment of 35kNm. Design a suitable section and find the reinforcement required in the section. Assume mild exposure condition. Use M20 concrete and Fe 415 steel. [16]
- 5.a) Design a square column to carry a factored axial load of 1500kN.
- b) Design the longitudinal and lateral reinforcement in a rectangular RCC column of size 300mm x 400mm subjected to an ultimate load of 1500kN and ultimate moment of 20kNm. Assume moderate exposure condition. Use M25 concrete and Fe 415 steel.[8+8]
6. Design a square footing for a square column 300mm x 300mm subjected to an axial load of 1200kN the SBC of the soil is 150kN/m^2 . Assume severe exposure condition. Use M25 concrete and Fe 500 steel. [16]
7. Design a slab over a room of internal dimension 4m x 4m restrained on 230mm wall and corners are held down. Take Live load = 2kN/m^2 , floor finish = 0.5kN/m^2 . Assume mild exposure condition. Use M20 concrete and Fe 415 steel. [16]
- 8.a) What is deflection? List the factors affecting the deflections and bring out the codal provisions to control the deflection.
- b) Calculate the short term deflections of a simply supported beam of span 6m having 230 x 600mm overall cross section. It is reinforced with 3-20mm on the tension side with an effective cover of 40mm. the beam carries a load of 30kN/m excluding the self weight. Use M20 concrete and Fe 415 steel. [4+12]

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Time: 3hours**Max.Marks:80**

Answer any FIVE questions
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Note: Use of IS 456-2000 is allowed. Any missing data may be assumed suitably.

- 1.a) Distinguish between under reinforced and reinforced sections as per working stress method.
- b) A RCC rectangular beam of size 230mmx500mm is simply supported over an effective span of 6.0m. The tensile reinforcement in the beam consists of 1500mm^2 at an effective cover of 35mm. determine the maximum total uniformly distributed load that can be applied on the beam. Use M20 concrete and fe415 steel. [4+12]
2. Design flexural and shear reinforcement for a simply supported beam of size 230mmx450mm having a clear span of 3.6m with bearings of 300mm. The superimposed load on the beam is 10KN/m. Use M20 concrete and fe415 steel. Assume mild exposure condition. [16]
- 3.a) What is the necessity of torsional reinforcement in two-way slab?
- b) Design a slab for room of size 4mx5m supported on 230mm thick masonry walls all-round. The corners are free to lift. The live load and floor finish can be taken as 2 kN/m^2 and 1 kN/m^2 respectively. Use M20 concrete and Fe415 steel. Assume mild exposure condition. [4+12]
4. Design a stair case for an office building to be located in a room measuring 3.5mx5.5m. The vertical distance between the floors is 3.75m. The live load can be assumed as 4 kN/m^2 . Use M20 concrete and Fe500 steel. Take Rise=150mm, Tread=270mm. Assume moderate exposure condition. [16]
- 5.a) Design a RC Rectangular column to resist an axial load of 800 kN. Use M25 concrete and Fe415 steel. Assume moderate exposure condition.
- b) Design a short column of diameter 400mm to support a factored axial load of 900KN, together with a factored moment of 100 kNm. Adopt M25 concrete and Fe415 steel. Assume mild exposure condition. [6+10]
6. Design a square footing to carry a column load of 1100 kN from a 400 mm square column. The bearing capacity of soil is 180 kN/m^2 . Use M30 concrete and Fe500 steel. Assume severe exposure condition. [16]
- 7.a) Explain the details of reinforcement provided in case of two way slab with corners held down. Draw typical sketches necessary (Four Edges Discontinuous).
- b) With help of a neat sketch explain the details of reinforcement for a stair case and a circular column. [8+8]

8. Write short note on any FOUR:
- a) Advantages of limit state method.
 - b) Development length.
 - c) Limit state and serviceability.
 - d) Types of footings.
 - e) Stress blocks parameters.

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SET-3

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Time: 3hours**Max.Marks:80**

Answer any FIVE questions
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Note: Use of IS 456-2000 is allowed. Any missing data may be assumed suitably.

- 1.a) Define characteristic load and characteristic strength.
- b) A rectangular cross section of effective size 200mmx400mm is used as a simply supported beam over a effective span of 6m. The beam is provided with maximum percentage of steel on tension side only with M20 grade concrete and Fe 415 steel. Determine the following

i) Area of steel	ii) Compressive force	iii) Tensile force	iv) Lever arm
v) MR of the section	vi) Ultimate load	vii) working load.	[4+12]
- 2.a) What is deflection? List the factors affecting the deflection and bring out the codal provisions to control the deflection given by IS456-2000.
- b) Calculate the short term deflection of a simply supported beam of span 6m having 230x600mm overall cross section. It is reinforced with 3 rebars of 20mm on the tension side with an effective cover of 40mm. The beam carries a load of 30 kN/m excluding self weight. Use M20 concrete and Fe 415 steel. [4+12]
3. Design a rectangular beam for an ultimate BM and SF of 300 kNm and 180 kN respectively. The overall size of the beam is limited to 300mm x 550mm. Adopt M20 concrete and Fe415 steel. Sketch the reinforcement details. Assume mild exposure condition. [16]
4. Design an intermediate T beam for a floor slab with the following data: effective span=8m, c/c spacing of the beam=4m, live load=4 kN/m², slab thickness = 150mm. Use M25 and Fe 415 steel and sketch the reinforcement details. Assume moderate exposure condition. [16]
5. Design two way slabs for a hall measuring 5mx6m. the slab is supported all round on a wall of 300mm thick. All the edges are discontinuous and the corners are held down. The live load on the slab is 4 kN/m². Adopt M20 concrete and Fe415 steel. Sketch the reinforcement details. Assume mild exposure condition. [16]
- 6.a) Draw the isometric views of axially loaded, uniaxially and biaxially bending columns.
- b) A column of size 300x400mm is subjected to factored axial load of 1000KN and factored moment of 100KN-m. Design the column using M25 concrete and Fe 500 steel with 40mm cover. Sketch the reinforcement details. [4+12]
7. Design a rectangular footing for a column 200mmx400mm carrying a factored load of 1200 kN, using M30 concrete and Fe415 steel and sketch the reinforcement details. The SBC of the soil is 200 kN/m². Assume severe exposure condition. [16]

8. Write short notes on any **four**:
- i) Philosophy of limit state design
 - ii) Analysis of T beams using limit state method
 - iii) Design steps for two way slabs with comers held down
 - iv) Design checks for one way shear and two way shear
 - v) Serviceability design of beams and slabs.

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Time: 3hours**Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

Note: Use of IS 456-2000 is allowed. Any missing data may be assumed suitably.

- 1.a) What is stress block? With the usual notations derive the stress block parameters?
 b) The following data is given for a T beam: Width of the flange = 1200mm, Depth of the flange = 120mm, Width of the rib = 300mm, effective depth = 500mm, Reinforcement = 8bars of 20mm, M20 and Fe415. Determine the Moment of Resistance of the section. Adopt working stress method. [4+12]
- 2.a) Define the short term and long term deflections. Give the codal provisions for the long term deflections as given in IS 456 – 2000.
 b) Give the step by step procedure of calculating the crack width of a RC beam according to IS 456 – 2000. [6+10]
3. Design a slab for room of size 4mx5m supported on 300mm thick masonry walls all-round. The corners are free to lift. The live load and floor finish can be taken as 2.5 kN/m^2 and 1.6 kN/m^2 respectively. Use M25 concrete and Fe415 steel. Assume moderate exposure condition. [16]
4. Design a stair case for an office building to be located in a room measuring 3.5mx5.5m. The vertical distance between the floors is 3.8m. The live load can be assumed as 4 kN/m^2 . Use M25 concrete and Fe 500 steel. Take Rise=150mm, Tread=300mm. [16]
- 5.a) Design a RC Rectangular column to resist an axial load of 1200 kN. Use M20 concrete and Fe 250 steel. Assume mild exposure condition.
 b) Design a short column of diameter 400mm to support a factored axial load of 1200KN, together with a factored moment of 150 kNm. Adopt M25 concrete and Fe415 steel. Assume moderate exposure condition. [6+10]
6. Design a square footing to carry a column load of 1200 kN from a 500 mm square column. The bearing capacity of soil is 200 kN/m^2 . Use M25 concrete and Fe 500 steel. Assume moderate exposure condition. [16]
7. A rectangular beam 300mm wide is subjected to the following at a section Sagging bending moment of 40kNm, Shear force of 20kN, Torsional moment of 30 kNm. Design a suitable section and find the reinforcement required in the section. Assume severe exposure condition. Adopt M30 concrete and Fe 500 steel. [16]
8. Design an intermediate T beam for a floor slab with the following data: effective span=8m, c/c spacing of the beam=3m, live load= 3 kN/m^2 , slab thickness = 150mm. Use M30 concrete and Fe 415 steel. Assume moderate exposure condition. [16]

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