B.E. (Civil Engineering) Seventh Semester (C.B.S.)

Advanced Concrete Structures

P. Pages : 4 **TKN/KS/16/7519**

Time : Four Hours * 0 8 8 2 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers wherever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.
12. Use of IS 456: 2000, IS 875-1987 IS 3370: 2009 is permitted.
13. Detailing carry marks.

1. Design the cylindrical Wall of a Circular Water Tank for a capacity of 400,000 liters. The tank is fixed at base and free at top. The depth of water is to be 4 m and take free board as 0.4m. Use M 25 Grade Concrete and Fe 415 types Steel. **14**
Design for Hoop Tension, Bending Moment, and provide requisite distribution steel. Design by using IS code or by approximate method.
Detail the design by neat Diagram.

OR

2. Design the wall of a Square Water Tank for a capacity of 75 m^3. The tank is fixed at base and free at top. The depth of water is 3m and the free board is 0.3 m. Use M25 Grade concrete and Fe 415 type Steel. **14**
Design the for both longitudinal and lateral bending, and provide required distribution steel.
Design by using IS Code or by approximate method.
Detail the design by neat diagram.

3. An RC Concrete Corner column 400 x 400 mm is subjected to a factored axial load of 1500 kN along with bending moments of 180 kNm and 120 kNm about its mutually perpendicular axes. The unsupported length of column with both ends are hinged is 3.5m. Use M25 grade concrete and Fe 415 type steel. **13**
Design the main reinforcement and transverse reinforcement.
Detail the design by a neat diagram.

OR

4. A RC column 300 x 500 mm is reinforced with 6 Nos. 25mm dia. Fe 415 type steel and grade of concrete is M25 as shown in figure1. Determine the design strength parameters in terms of its Axial force and Bending Moment corresponding to a neutral axis location given by xu/D as 1.2. Consider loading eccentricity is with respect to its major axis. Assume 40mm clear cover to the longitudinal reinforcement. Take the coefficients for Area of stress block and Distance of CG from highly compressed edge as 0.399 and 0.458. **13**

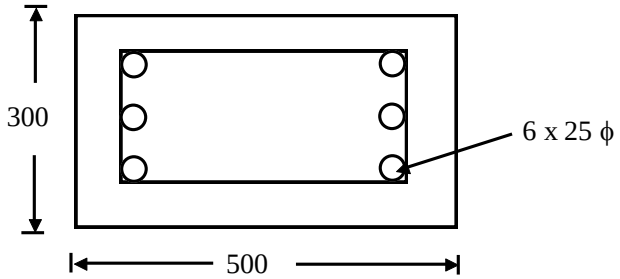


Figure 1

5. a) Describe about Moment curvature relationship, with respected to reinforced concrete sections. And draw the diagram. **5**

b) Draw Elastic Bending Moment diagram and Bending Moment diagram after 30 % moment redistribution for a two span continuous beam. It carries a characteristic udl over both the spans is 30 kN/m, Take partial safety factor for load as 1.5. Take each span as 6m. Draw the Diagram. **8**

OR

6. a) Explain the necessity of Moment Redistribution in design of RC structures. **5**

b) Draw elastic bending moment diagram and Bending moment diagram after 30 % moment redistribution for a fixed beam of span 6m supporting two characteristic point loads of 12kN each acting at third point. Take partial safety factor for load as 1.5. Draw the diagram. **8**

7. Design the stem of a cantilever retaining wall which is required to support a bank of earth 4m above the GL. Assume a hard strata for foundation is available at 1.3 m below GL. **13**

The Safe bearing capacity of soil is $170\ kN/m^2$, unit weigh of soil is $16\ kN/m^3$ and the angle of shearing resistance is 30º. Use M20 grade concrete and Fe 415 type steel.
Curtail the main reinforcement and design distribution reinforcement also.
Detail the Design by a neat Diagram.

OR

8. Design the stem of a Counter-fort retaining wall which is required to support a backfill of 7.5m above the GL. Assume a hard rock for foundation is available at 1.5m below GL. The counter forts are 500mm thick and the clear distance between the counter forts is 3.2m. **13**

The safe bearing capacity of soil is $170\ kN/m^2$, unit weigh of soil is $16\ kN/m^3$ and the angle of shearing resistance is 30º.
Use M20 grade concrete and Fe 415 type steel.
Design distribution reinforcement also.
Detail the design by a neat diagram.

9. Design Beam and column of an intermediate single bay - single storey portal frame. The center line dimensions of the bay and storey are 6m and 4.5m respectively. [The height of the bay is measured above the top of the footing which is assumed to be fixed]. **13**
The center to center distance of frames is 3.6m. Total service load inclusive of its self weight and finishes from the 125 mm deep slab is 10 kN/m^2. Use M20 grade concrete and Fe415 type steel.
Detail the design by a neat diagram.

OR

10. Design only the waist slab of a dog legged stair case shown in figure 2. The service live load is 5 kN/m^2 and finishes are 1.75 kN/m^2 (Projected area). The Rise and Tread of each step are 160mm and 280mm respectively and each flight is having 11 numbers of steps. The width of flight and landing are 1.25m. The landing and flight are spanning at right angles to each other. Use M25 grade concrete and Fe415 type steel. **13**
Detail the design by a neat diagram.

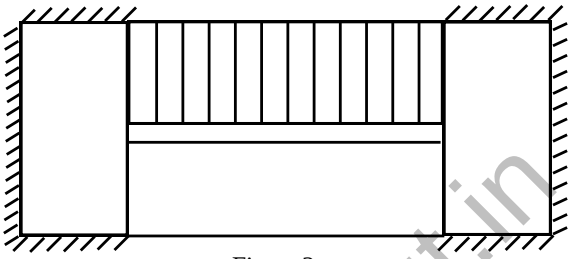


Figure 2

11. Design a combined footing and its main reinforcement for two columns 400 x 400 and 500 x 500 supporting the service loads of 900 kN and 1600 kN respectively and the center to Centre distance between them is 4.5m. The width of combined footing is restricted to 1.8m. the allowable safe bearing capacity of soil is 200 kN/m2. Use M25 grade of concrete and Fe 415 type steel. **14**
Detail the design by a neat diagram.

OR

12. Design the raft beam for two columns 400 x 400 and 500 x 500 supporting the service loads of 900 kN and 1600 kN respectively and the Centre to Centre distance between them is 4.5m. The total width of raft slab is 2m. The offsets from the Centre lines of columns are 0.72m and 1.98m as shown in figure3. Use M25 grade of concrete and Fe 415 type steel. Provide the raft beam over the entire length of the raft slab. Design of raft slab is not required and assume its thickness as 300mm. **14**
Detail design by a neat diagram.

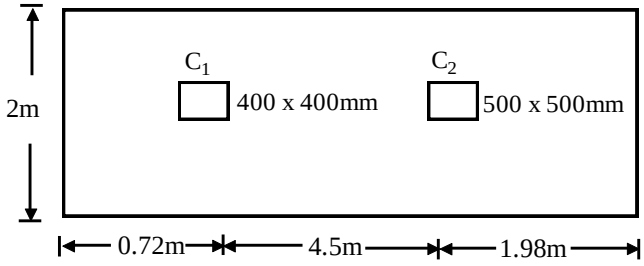
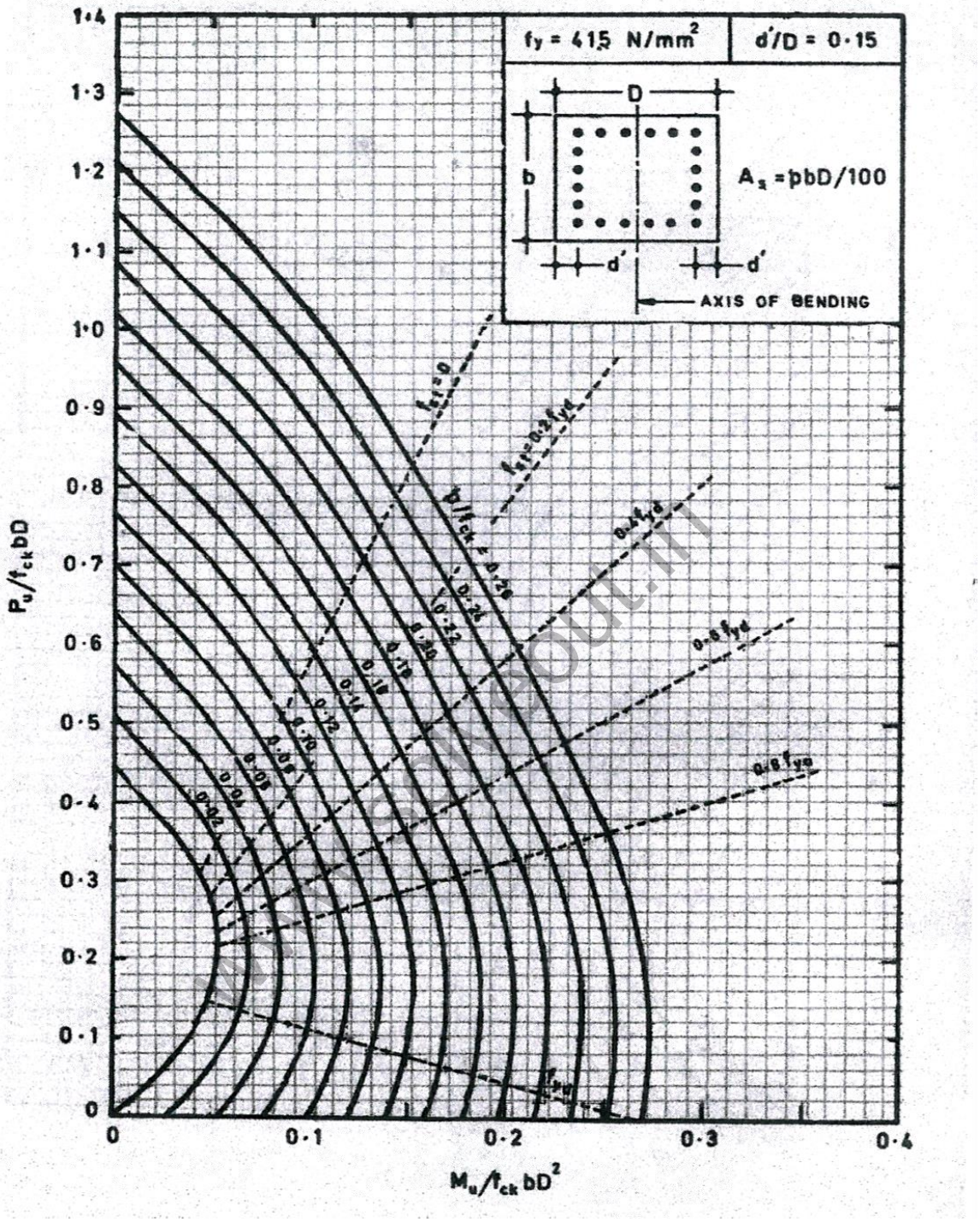


Figure 3

chart

COMPRESSION WITH BENDING — Rectangular Section — Reinforcement Distributed Equally on Four Sides



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