Total No. of Questions : 8]

SEAT No. :

P-1412

[Total No. of Pages : 5

[6003]-338
T.E. (Civil)
DESIGN OF REINFORCED CONCRETE STRUCTURES
(2019 Pattern) (Semester - II) (301013)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.***
2) ***Figures in bold to the right indicate full marks.***
3) ***Neat diagrams should be drawn where ever necessary.***
4) ***IS. 456 is permitted in the examination.***
5) ***Additional data if needed, may be suitably considered and clearly mentioned.***

Q1) a) A stair hall of a building measures 3.0 m × 5.5 m. The floor to floor height is 3.4 m. Design a dog-legged stair case resting on beams of size 230 mm. The design load on the stairs may be considered as 4 kN/m^2. Adopt M-25 grade of concrete and Fe-500 grade of steel. Sketch the details of reinforcement. **[14]**

b) What are flanged sections? Explain how the flanged width is calculated. **[3]**

OR

Q2) a) Figure 1 shows the floor plan of a building. The beams are of size 230 mm × 450 mm. Beam B_1 is reinforced with 4-16# bars in tension and 2-10# in compression. The load on the slab is 6 kN/m^2. Design the beam for shear. Adopt M-25 grade of concrete and Fe-500 grade of steel. Sketch the details of reinforcement. **[14]**

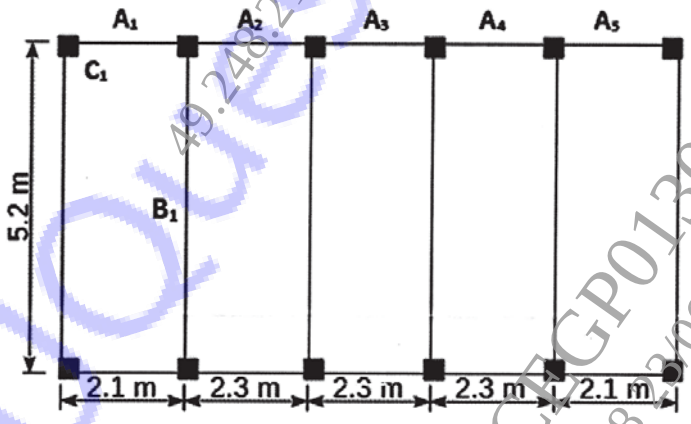

Fig. 1

b) What is torsion? List any three practical situations where concrete beam is subjected to torsion. **[3]**

P.T.O.

Q3) a) For the floor plan shown in Fig. 1, design the continuous beam A_1-A_2-A_3-A_4-A_5. The total load on the slab is 5.5 kN/m^2. Design the beam using M-20 grade concrete and Fe-500 grade of steel. Sketch the details of reinforcement. **[15]**

b) Explain the assumptions made in the IS code method of analysis of continuous beams. **[3]**

OR

Q4) Design the beam A-B-C shown in Fig. 2. The load on the beam may be considered as 12 kN/m. Design the beam using M-20 grade concrete and Fe-500 grade of steel. Sketch the details of reinforcement. **[18]**

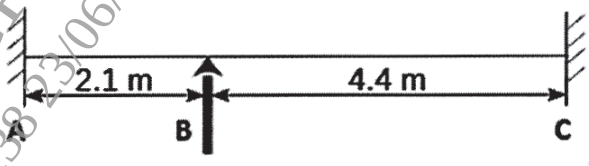

Fig. 2

Q5) a) How are reinforced concrete columns classified? Explain the modes of failure. **[3]**

b) For the floor plan shown in Fig. 1, design column C_1. Show how the column is oriented, The column is subjected to working load of 700 kN, working moment of 90 kN-m about major axis bisecting the depth of column. The unsupported length of column is 4.0m. The column is fixed at both the ends. Show detailed design calculations and reinforcement details. Use M-30 grade concrete and Fe-500 grade of steel. **[14]**

OR

Q6) a) What are interaction curves? Explain the characteristic of a typical interaction curve. **[5]**

b) Explain the design procedure for axial-loaded, uni-axial loaded, and bi-axial loaded columns. **[12]**

Q7) a) State and explain types of combined footing for two adjoining columns. How do you decide size and projections of combined footing? **[9]**

b) Explain one-way and two-way shear. Also, describe how are they calculated? **[9]**

OR

Q8) A column of size 350 × 600 mm is reinforced with 8-20#. The column supports a dead load of 700 kN and imposed load of 450 kN. The safe bearing capacity of the soil is 200 kN/m^2. Design the footing using M-30 grade concrete and Fe-500 grade of steel. Also, sketch the details of the reinforcement. **[18]**

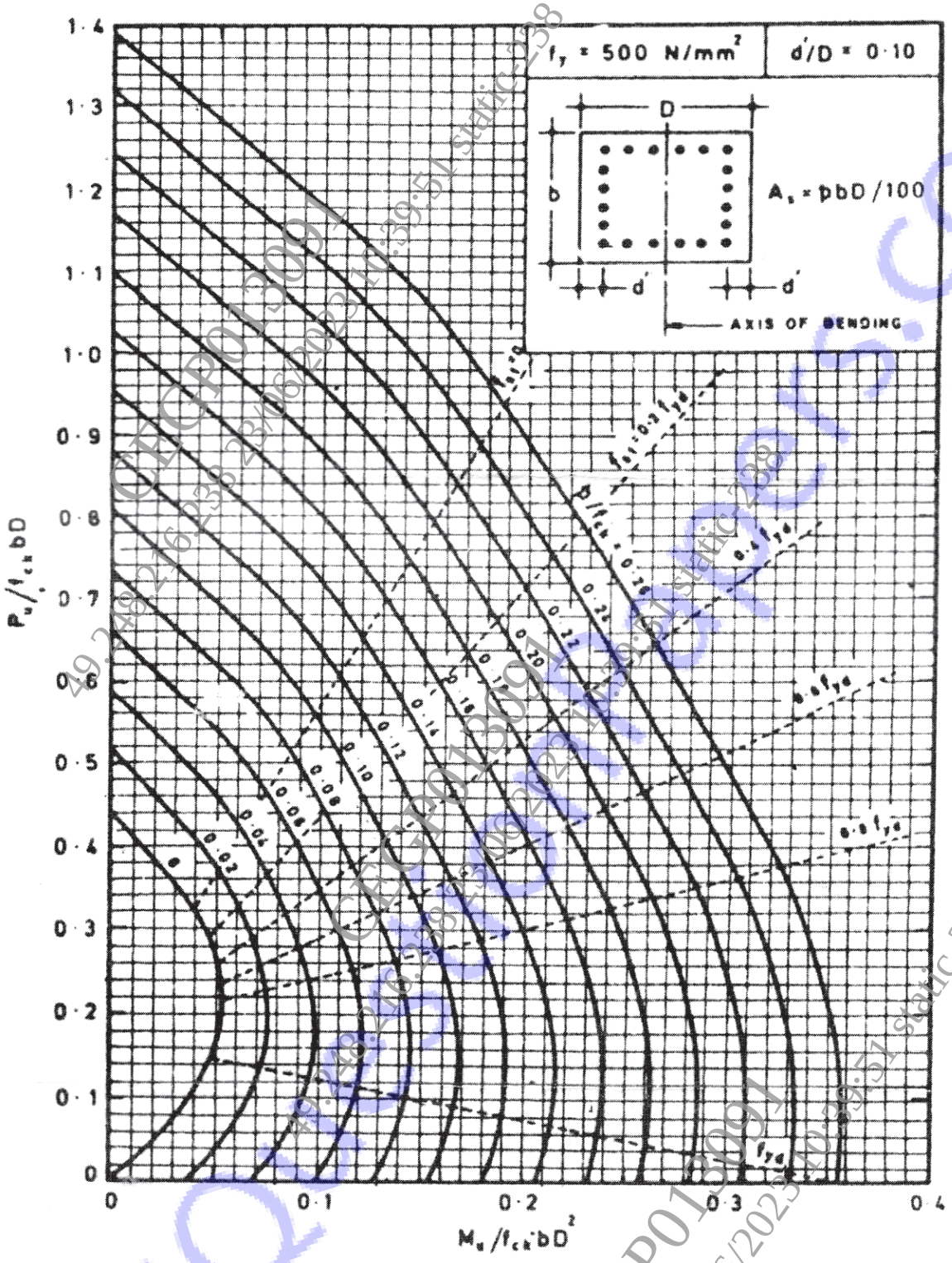

Chart No 1: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

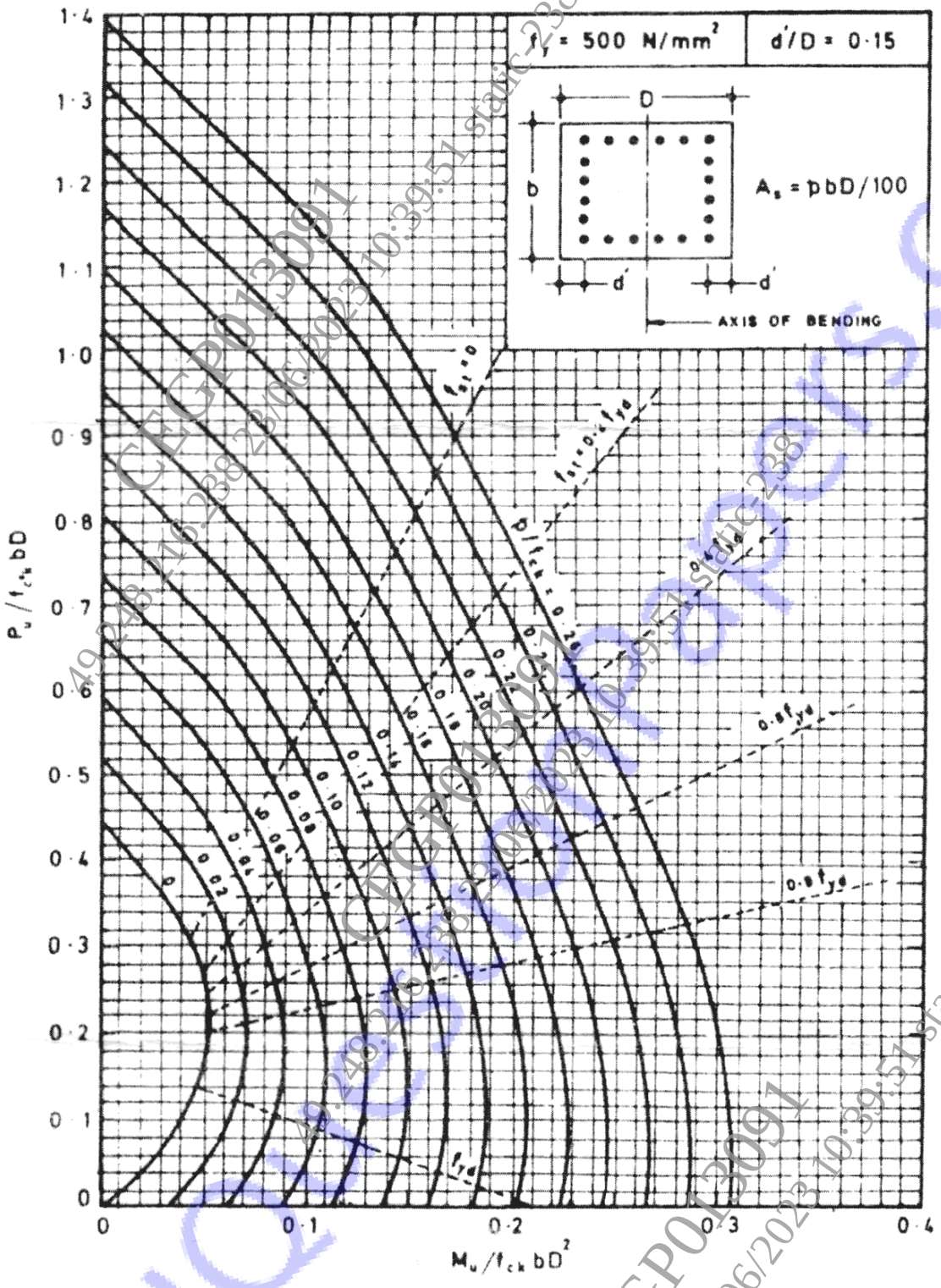

Chart No 2: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

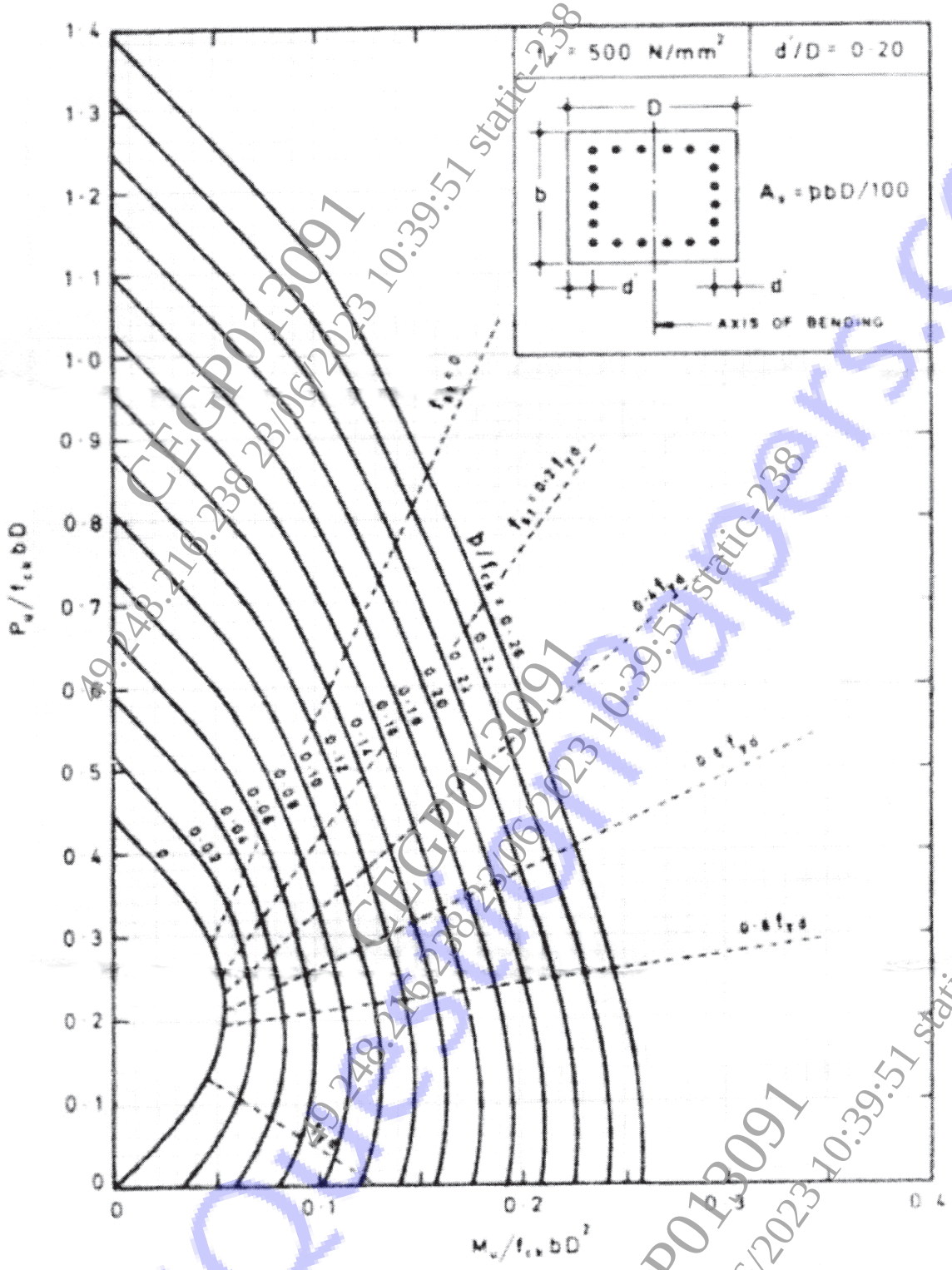

Chart No 3: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

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