

Total No. of Questions :12]

SEAT No. :

P2837

[4958]-1009

[Total No. of Pages :7

T.E. (Civil)

STRUCTURAL DESIGN -II

(2012 Course) (Semester - II) (End - Semester) (301010)

Time : 3 Hours]

[Max. Marks :70

Instructions to the candidates:

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8 and Q9 or Q10, Q11 or Q12.*
- 2) Figures to the right indicate full marks.*
- 3) Use of IS 456-2000 and non programmable calculator is allowed.*
- 4) Neat diagrams must be drawn wherever necessary.*
- 5) Mere reproduction from IS code as answer, will not be given full credit.*
- 6) Assume any other data, if necessary.*

Q1) a) Explain the meaning of balanced section with respect to WSM and LSM. **[3]**

b) Describe modes of failures of concrete beam. **[3]**

OR

Q2) Design a R.C.C Beam subjected to bending moment of 75 kN-m, using M20 and Fe415. Keep the depth of beam twice the width of beam. Use WSM. **[6]**

Q3) A simply supported beam over a span of 6 m carries a UDL of 40 kN/m throughout if the size of the beam is restricted to 230 x 525 overall and effective cover for reinforcement is 40 mm using M20 and Fe 415, design the suitable reinforcement for the beam using LSM. **[8]**

OR

Q4) A T-Beam has the following details **[8]**

- a) Width of flange = 1150 mm
- b) Depth of flange = 110 mm

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- c) Width of rib = 300 mm
- d) Effective depth = 500 mm
- e) Tension steel - 4 No's 25 mm dia

Material - M20 and Fe 500 Using LSM, Find

- i) Position of neutral axis
- ii) Type of section
- iii) Ultimate flexural strength

Q5) The center line plan of a typical floor of residential building is as shown in Fig.1. Design the cantilever slab panel S3 only for flexure by L.S.M. [6]

Draw neat sketches showing details of reinforcement.

- a) Take live load = 4 kN/m^2
- b) Floor finish = 1.5 kN/m^2
- c) Materials: M25 and Fe 415

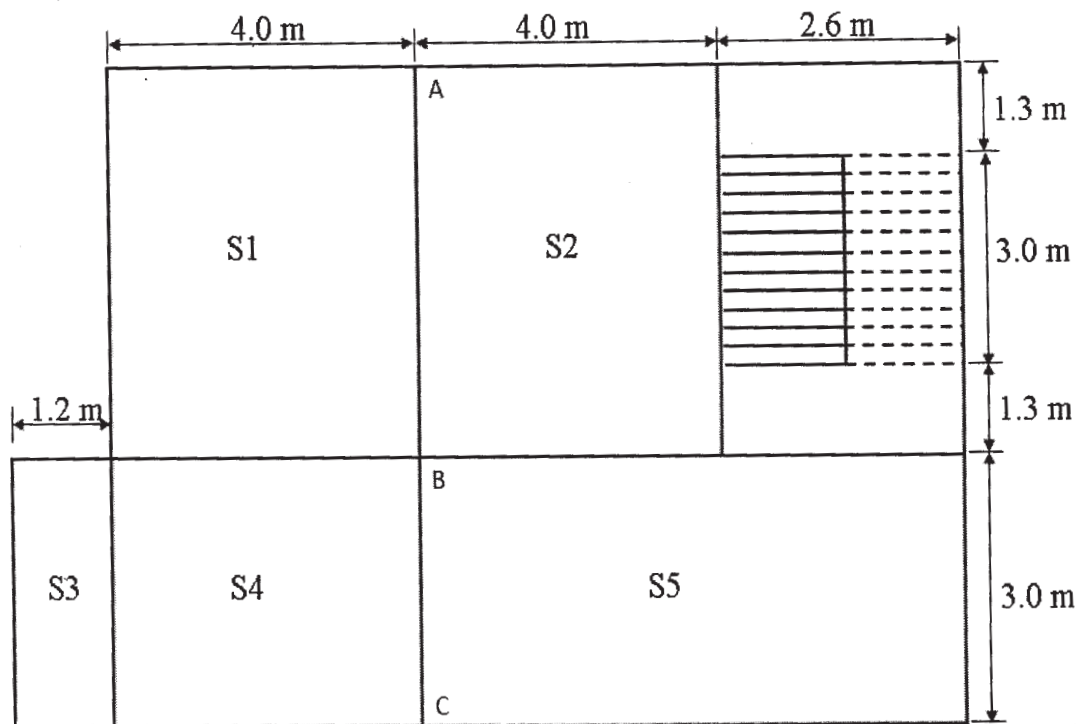


Fig 1: Center line plan of a typical floor of building

OR

Q6) Design slab panel S4 as shown in Fig. 1 only for flexure. Use same data in Question 5. Draw neat sketches showing details of reinforcement. Use LSM.[6]

Q7) Design a continuous beam ABCDE ($AB = BC = 3.25$ m and $CD = DE = 3.5$ m) for flexure and shear using IS code method for following data: LSM is recommended [16]

Dead load = 18 kN/m

Live load = 12 kN/m

Grade of concrete = M 20

Grade of steel = Fe 415

Draw details of reinforcement at mid span and at continuous support.

OR

Q8) a) Design reinforcement required for a rectangular RC beam section for following data: [10]

Size of beam ($b \times D$) = 300 mm X 450 mm

Factored shear $V_u = 50$ kN.

Factored bending moment $M_u = 85$ kN -m

Factored torsional moment $T_u = 35$ kN -m

Grade of concrete = M 20 Grade of steel = Fe 415

Draw the detail of reinforcement

b) A RCC beam of size 230 x 525 mm overall having clear cover of 25mm is reinforced with 3 no's 16 mm dia bars throughout and 2 no's of 12 mm dia curtailed is provided over a span of 5 meter along with 8 mm dia two legged stirrups about 175 mm c/c throughout by using M20 and Fe 415 calculate what ultimate UDL the beam can carry including self weight. [6]

Q9) Design a continuous floor beam ABC as shown in Fig. 1 for flexure and shear using 15% redistribution of moments using LSM. Thickness of the all floor slab is 150 mm; live load and floor finish load on all slabs are 4.0 kN/m^2 and 1.5 kN/m^2 , respectively. The wall on this beam is 230 mm thick and 2.75 m high. Use M 20 and Fe 415 steel. Show details of load calculations, bending moment envelop and main and shear reinforcement. **[18]**

OR

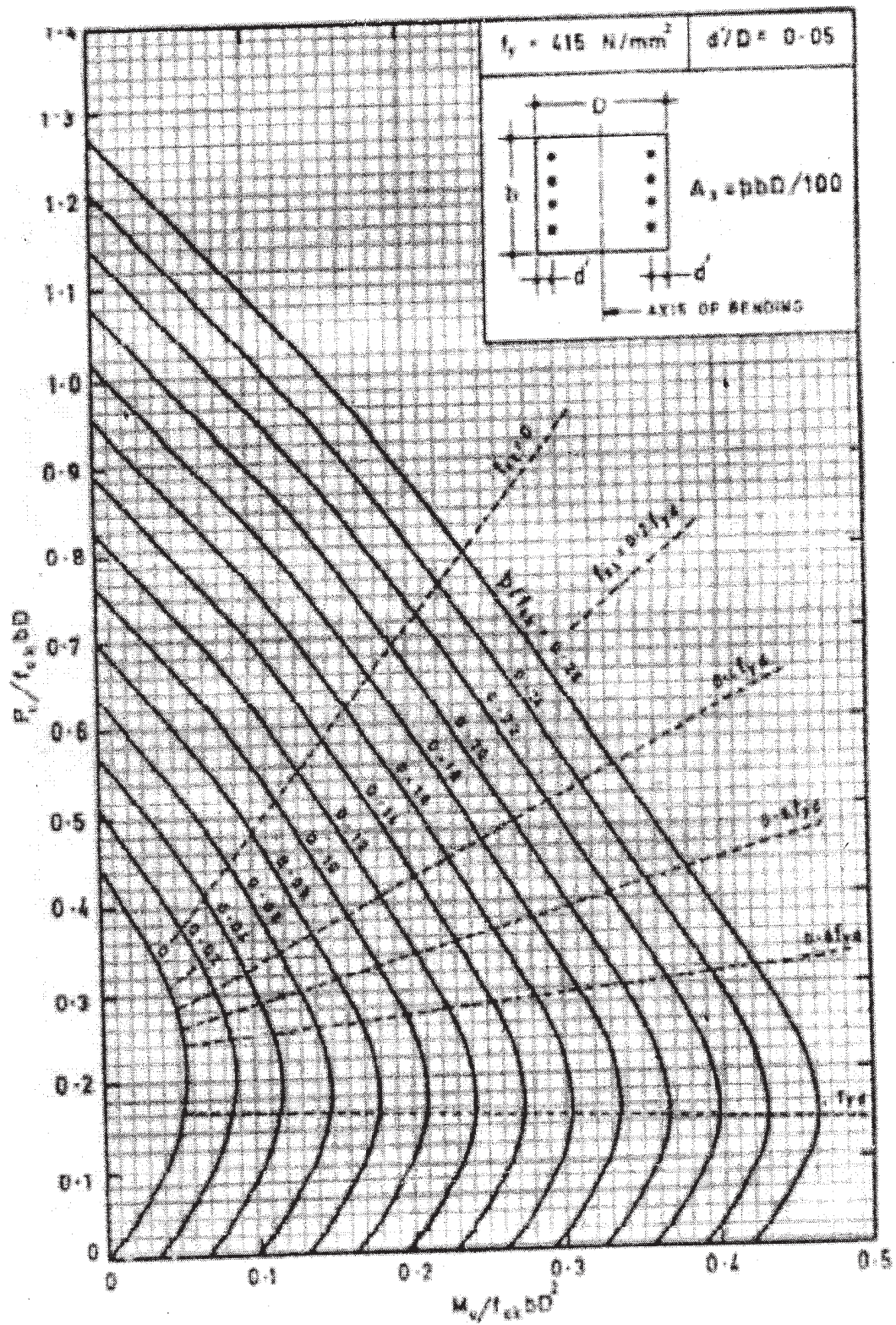
Q10) Design a rectangular column and its footing subjected to working axial load of 700 kN, along with a working moment of 75 kN -m about an axis bisecting the depth. The unsupported length of column is 3.5 m. Assume column is effectively held in position and restrained against rotation. Grade of concrete is M 20 and steel as Fe 415. Take SBC of strata as 200 kN/sq-m . Use charts for column design. **[18]**

Q11) Design an axial loaded short column and its Isolated footing carrying axial load of 1200 kN, the column is having unsupported length as 3.3 m and both ends hinged assume M20 and Fe500 and SBC of soil as 200 kN/sq-m . **[16]**

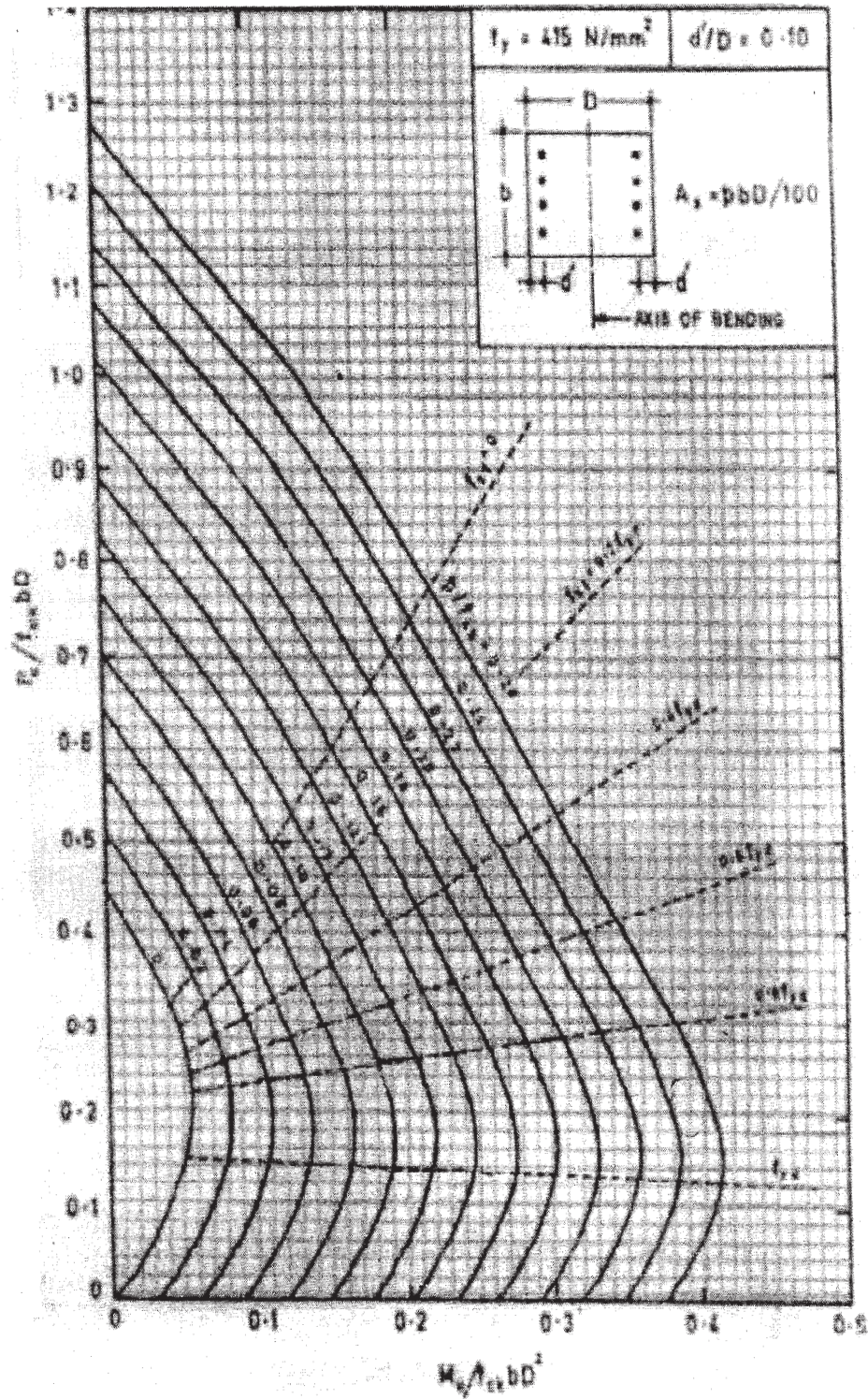
OR

Q12) Design a short column to carry working load of 1000kN and working moment of $M_x = 100 \text{ kN-m}$ and $M_y = 25 \text{ kN-m}$ acting about axis bisecting the depth and width of column respectively the unsupported length of column is 4.5 m assuming both ends of columns are fixed. Also design the footing considering axial load and moment about major axis only. Take SBC of soil as 210 kN/sq-m . Use M 20 and Fe415. Show detail calculations and details of Reinforcements. **[16]**

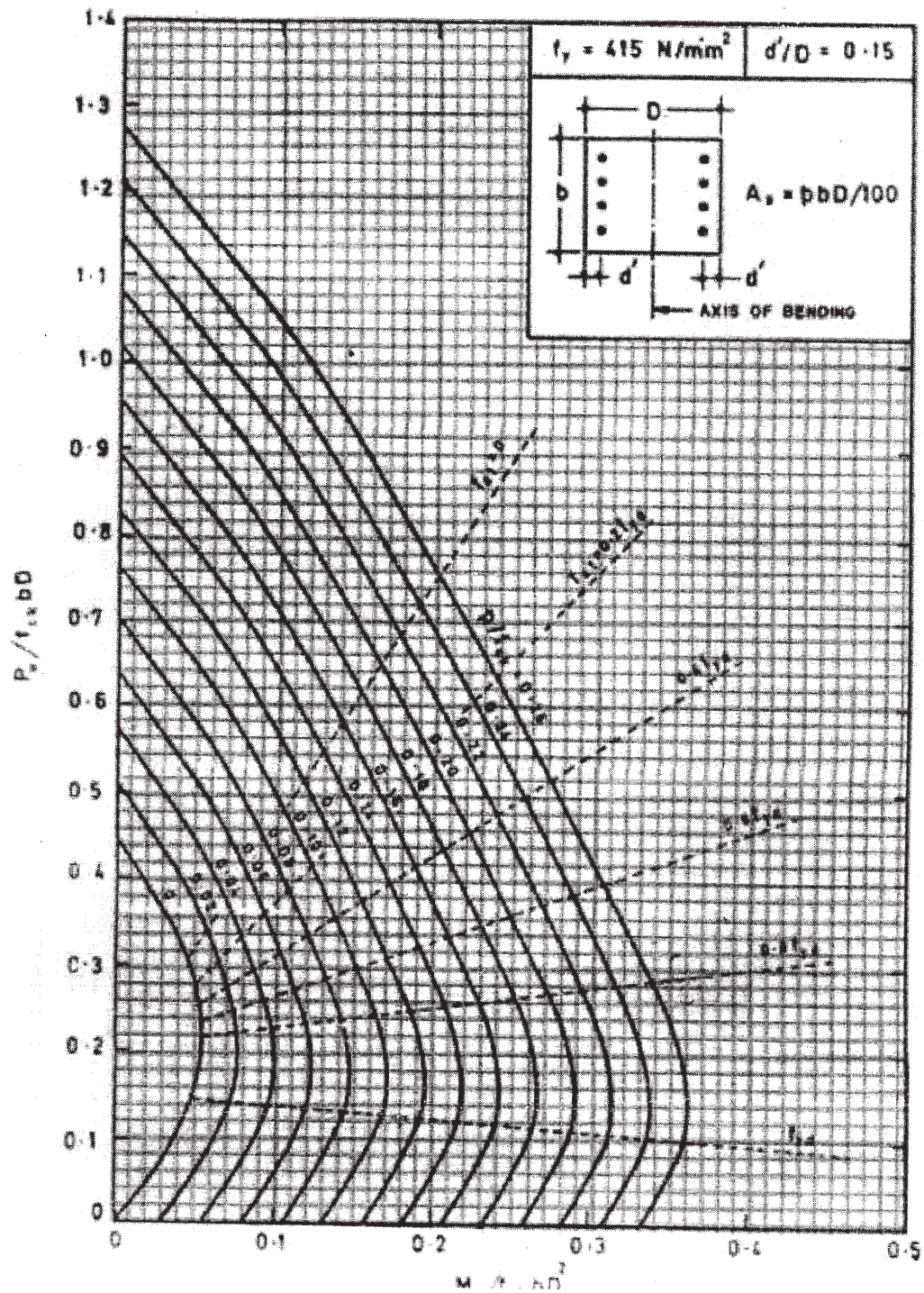
SP 16 Chart 31 COMPRESSIONS WITH BENDING – Rectangular Section – Reinforcement Distributed Equally on Two Sides



SP 16 Chart 32 COMPRESSIONS WITH BENDING – Rectangular Section – Reinforcement Distributed Equally on Two Sides



SP 16 Chart 33 COMPRESSIONS WITH BENDING – Rectangular
Section – Reinforcement Distributed Equally on Two Sides



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