

Total No. of Questions : 12]

SEAT No. :

P3669**[4758] - 509**

[Total No. of Pages :7

T.E. (Civil)**STRUCTURAL DESIGN - II****(2012 Pattern) (Semester - II) (301010) (End-Sem.)***Time : 4Hours]**[Max. Marks : 70**Instructions to the candidates:*

- 1) *Answer Q.1 or Q.2, Q3 or Q.4, Q.5 or Q.6, Q7 or Q.8, Q.9 or Q.10, Q.11 or Q.12*
- 2) *Figures to the right indicates full marks.*
- 3) *Use I.S. 456-2000 and non programmable calculator is allowed.*
- 4) *Neat figures must be drawn wherever necessary.*
- 5) *Mere reproduction of IS Code as answer will not be considered.*
- 6) *Assume Suitable data if required.*

Q1) Answer the following:**[6]**

- a) Compare LSM and WSM with respect to material behavior.
- b) In what proportion f_{ck} is utilized in WSM and LSM?

OR

Q2) A simply supported beam AB of span 4.5 m carries UDL of intensity 25 KN/m Including self weight, Design suitable Singly reinforced rectangular section for flexure Only using WSM, use M20 and Fe 415. **[6]**

Q3) For an assembly hall of size 16m × 8.5m floor beams are spaced at 4 m C/C and have a Simply supported span of 8.5 m, these beams supports a floor slab of 140 mm thick, the size of the beam is 230 mm × 500 mm overall design the intermediate flanged section for flexure for the following data, use LSM. **[8]**

- a) Live load on slab = 4KN/m²
- b) Floor finish = 1.5 KN/m²
- c) Wall on beam = 230 mm thick and 3 m height
- d) Effective cover = 50 mm
- e) Material - M20 and Fe 415

OR

P.T.O.

Q4) A Simply supported RCC beam 230×375 overall is simply supported over a span of 5 m carries a UDL of 33.33 KN/m throughout design the section using M20 and Fe 415 LSM is recommended. [8]

Q5) Design a simply supported two way slab over a room $4.8 \text{ m} \times 4 \text{ m}$ effective with corners are free to lift carrying L.L of 4 KN/m^2 and F.F of 1.5 KN/m^2 use M20 and Fe 500. Draw details of reinforcement LSM is recommended. [6]

OR

Q6) Design a Cantilever slab for effective span of 1.5 m carrying L.L of 3 KN/m^2 and F.F of 1.5 KN/m^2 use M20 and Fe 500. Draw details of reinforcement LSM is recommended. [6]

Q7) Design a Continuous beam ABCD ($AB = BC = CD = 4.2\text{m}$) for flexure and shear using I.S Code method for following data. Use M20 and Fe 415 [16]

a) Dead load = 24 KN/m

b) Live load = 16 KN/m

Show details of reinforcement in L-Section and cross section at continuous support and at mid span.

OR

Q8) a) A rectangular R.C.C. beam simply supported over a span of 5 m is $230 \text{ mm} \times 450 \text{ mm}$ Effective is reinforced with 0.75% tension steel; Design the shear reinforcement using 6 mm diameter two legged vertical stirrups use M20 and Fe 415. [8]

b) A rectangular R.C.C beam $230 \times 500 \text{ mm}$ with effective cover 40 mm is subjected to following actions

i) Factored B.M. = 90 KN-m

ii) Factored S.F = 50 KN

iii) Factored torsional moment = 60 KN-m

Design the beam for flexure and shear using M20 and Fe 415 [8]

Q9) A R.C Beam ABC of rectangular section is simply supported at A and C, and

Continuous over support B, Span $AB = BC = 4.25$ m the beam carries dead load (including self weight) of 18 KN/m and L.L of 23 KN/m. Calculate design moments at central support B and near midspan of AB and BC after 20% redistribution of moments. Draw the design moment envelopes and design the beam for flexure only Use M20 and Fe415. [18]

OR

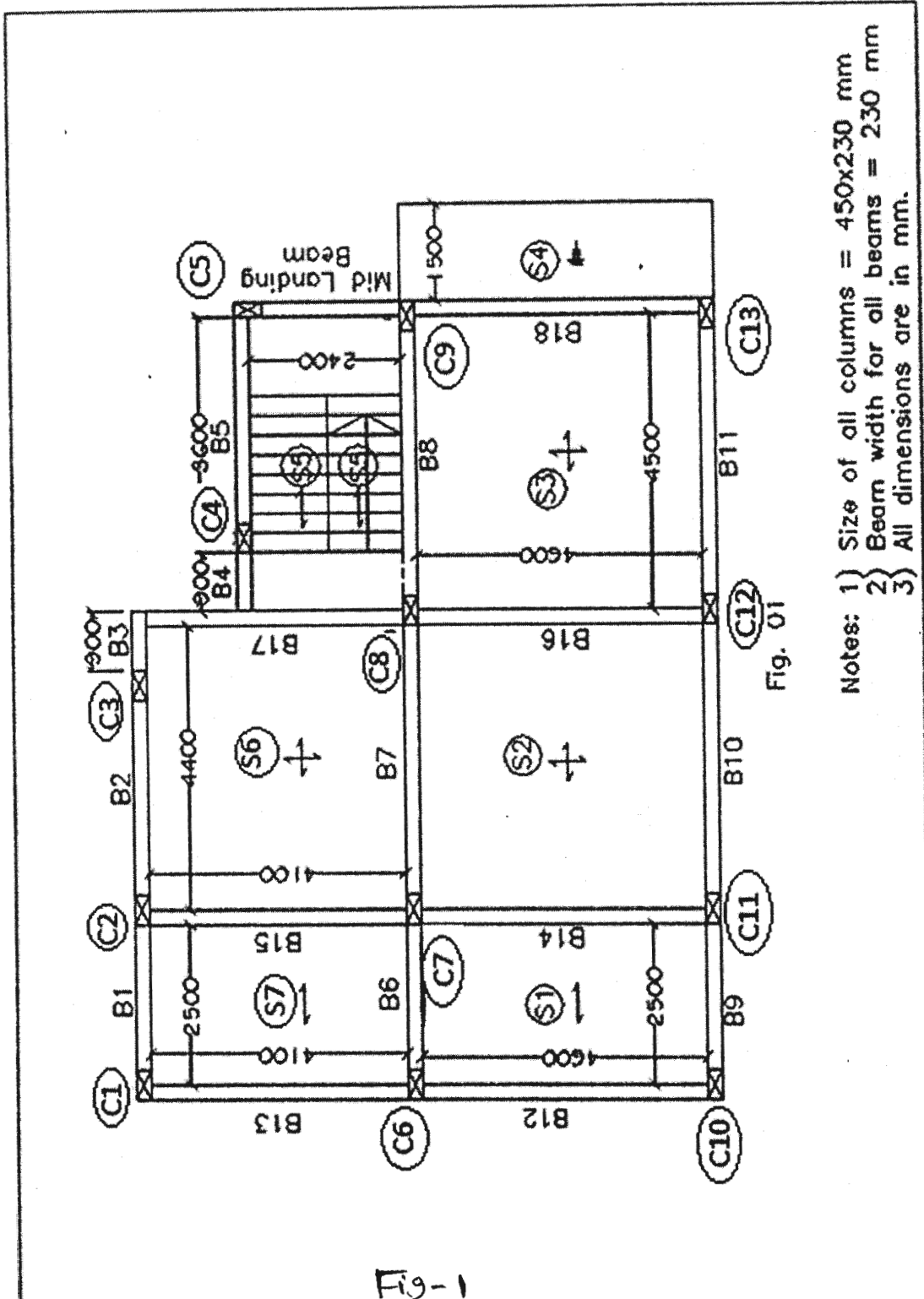
Q10) Design a short RC Column by LSM using M20 and Fe 415 to carry a working load 750 KN and working moment of 90 KN-m about major axis bisecting the depth of column, assuming unsupported length of column as 4.5 m and both ends are fixed, also design the footing for this column. Take SBC of soil as 210 KN/m² show detail design calculations and reinforcement details in plan and sectional elevation. [18]

Q11) Design a short column to carry working axial load of 900 KN and working moment of $M_x = 65$ KN-m and $M_y = 15$ KN-m acting about axis bisecting the depth and width of column respectively, the effective length about X-axis is 4.6 m and about Y-axis is 3.2 m. The unsupported length about axis is 3.8 m, use M20 and Fe 415 steel show detailed design calculations and reinforcement details. [16]

OR

Q12) Design Column C-7 as axially loaded short column along with its footing for G+2 Building for the following data refer fig - 1 [16]

- a) Floor to floor height ---- 3.15 m
- b) Height of plinth above G.L ---- 1.0 m
- c) Depth of foundation below G.L. ---- 1.5 m
- d) Live load on all slabs ---- 4 KN/m²
- e) Floor finish load on all slabs ---- 1.5 KN/m²
- f) Thickness of slab ---- 130 mm
- g) Thickness of wall ---- 230 mm
- h) Height of parapet wall ---- 1 m
- i) Size of beam ---- 230×450 mm
- j) SBC of soil ---- 200 KN/m²
- k) Material ---- M20 and Fe415



- Notes:
- 1) Size of all columns = 450x230 mm
 - 2) Beam width for all beams = 230 mm
 - 3) All dimensions are in mm.

Chart 5 : Interaction Diagram for Combined Bending and Compression Rectangular Section-Equal Reinforcement on All Sides

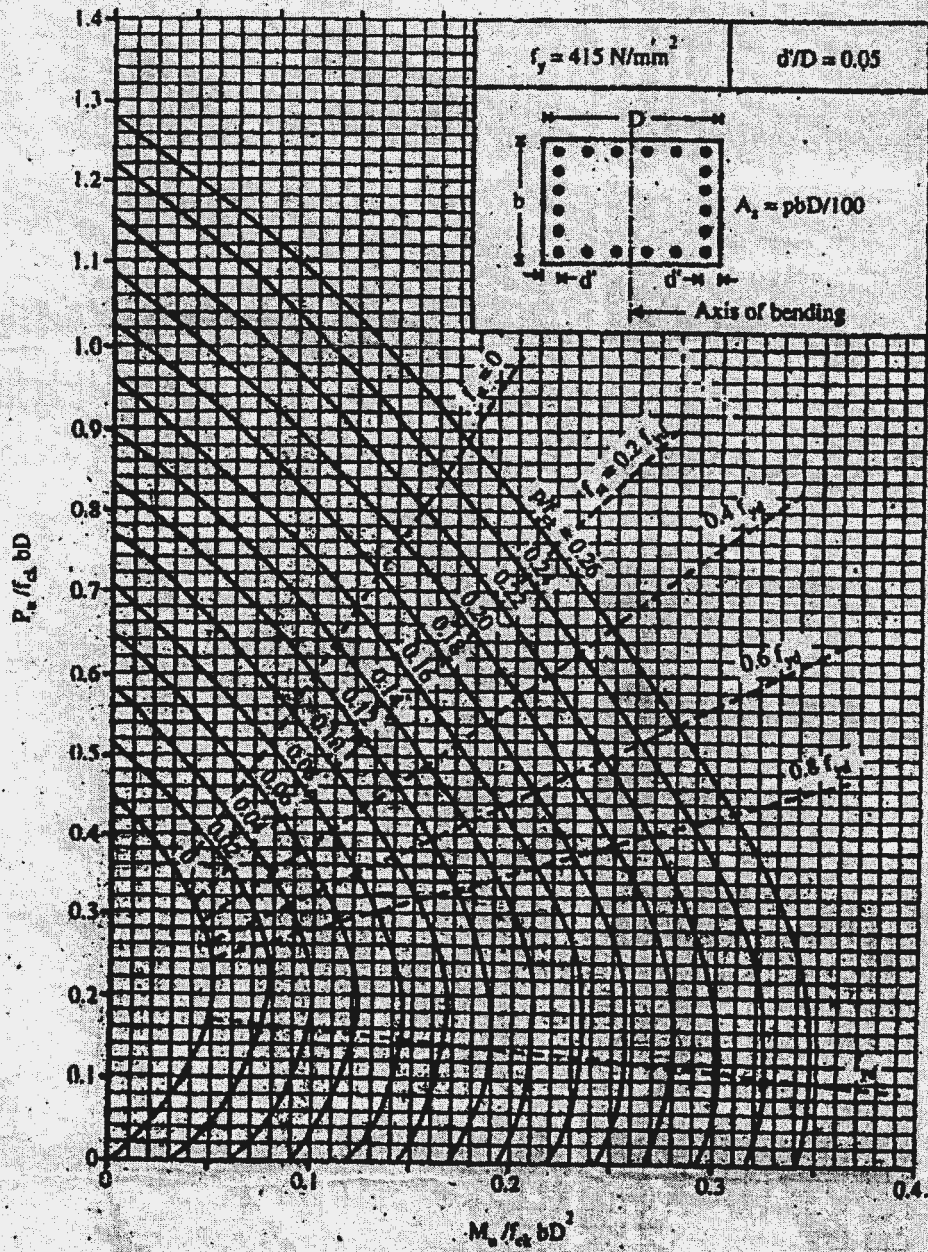


Chart 5

Chart 6 : Interaction Diagram for Combined Bending and Compression Rectangular Section-Equal Reinforcement on All Sides

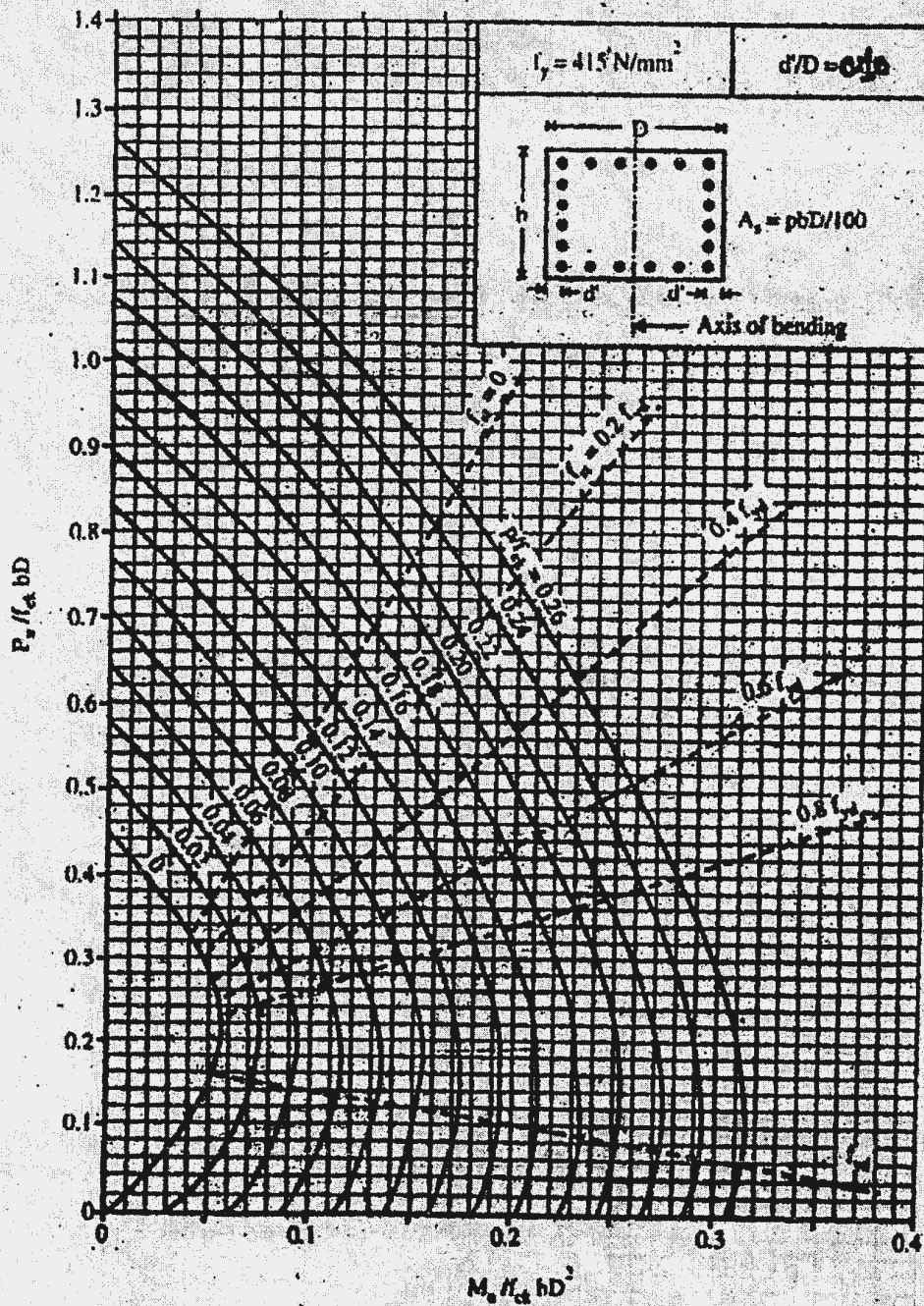


Chart 7 : Interaction Diagram for Combined Bending and Compression Rectangular Section-Equal Reinforcement on All Sides

