

Total No. of Questions : 12]

SEAT No. :

**P3533**

**[4858]-1009**

[Total No. of Pages : 6

**T.E. (Civil) (Semester - II)**  
**STRUCTURAL DESIGN - II**  
**(2012 Pattern) (End Sem.)**

*Time : 3 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, Q.7 or Q.8, Q.9 or Q.10, Q.11 or Q.12.*
- 2) Figures to the right indicate 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) Why L.S.M. is more desirable than WSM
- b) Explain Ultimate load theory

OR

**Q2)** A simply supported beam AB of span 4 with effective size 230 mm × 565 mm provided With 12 # 4 no's on tension side, Calculate its depth of neutral axis, type of section, Moment of resistance and UDL in addition to its self weight using WSM, use M20 and Fe415.

**[6]**

**Q3)** Calculate Moment of resistance by LSM for flanged section with following details :

**[8]**

- a) Width of rib = 230 mm,
- b) effective flange width = 1300 mm
- c) flange thickness = 120 mm
- d) Total depth = 575 mm
- e) clear cover = 25 mm
- f) Tension steel = 6 # 20 mm
- g) Material = M 25 and Fe 500

**P.T.O.**

OR

**Q4)** A Doubly reinforced beam of size 230 mm × 540 mm over all reinforced with 12 # 2 No's on compression side and 20 # 4 No's on tension side if the effective cover on both sides is 40 mm by using LSM and M 20 and Fe 415 find M.R. of section. [8]

**Q5)** Design a simply supported one way slab over a room 2.8 m × 6 m effective, carrying L.L of 4 KN/m<sup>2</sup> and F.F. of 1.5 KN/m<sup>2</sup> use M 20 and Fe 500, Draw details of Reinforcement LSM is recommended. [6]

OR

**Q6)** Design a Cantilever slab for effective span of 1.3 m carrying L.L of 3KN/m<sup>2</sup> and F.F of 1 KN/m<sup>2</sup> use M20 and Fe 415 Draw details of reinforcement LSM is recommended [6]

**Q7)** Design a Continuous beam ABCD (AB = BC = CD = 3.5 m) for flexure and shear using I.S Code method for following data Use M20 and Fe415 [16]

a) Dead load = 12 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 R.C.C. beam of 230mm × 550mm over all with clear cover of 30mm is reinforced With 3 no's of 16 # on tension side at support section find shear strength of support section if 8 mm # 2 legged stirrups are provided at 175 mm c/c use M20 and Fe415 use LSM. [8]

b) A rectangular R.C.C. beam 300×700mm with effective cover 40mm is subjected to following actions. [8]

i) Factored B.M. = 190 KN-m

ii) Factored S.F. = 50 KN

iii) Factored Torsional moment = 20 KN-m

Design the beam for flexure and shear using M20 and Fe 415.

**Q9)** A R.C. Beam ABC of rectangular section is simply supported at A and C, and Continuous over support B, Span AB = BC = 3.8m the beam carries dead load (including self weight) of 20KN/m and L.L of 25 KN/m. Calculate design moments at central support B and near midspan of AB and BC after 15% redistribution of moments. Draw the design moment envelopes and design the beam for flexure only Use M20 and Fe415. [18]

OR

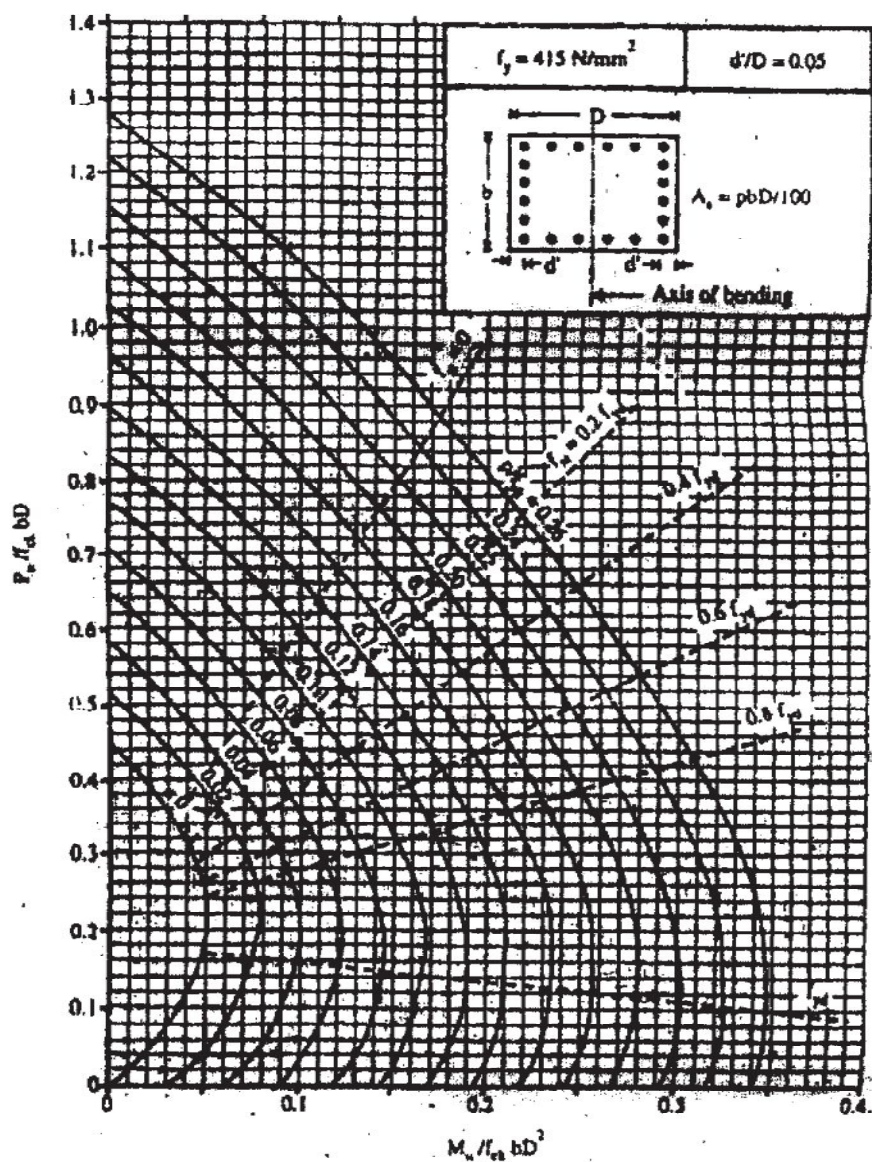
**Q10)** Design a short RC Column by LSM using M20 and Fe 415 to carry a working load 900 KN and working moment of 100 KN-m about major axis bisecting the depth of column, assuming unsupported length of column as 4.2 m and both ends are fixed, also design the footing for this column Take SBC of soil as 210 KN/m<sup>2</sup> show detail design calculations and reinforcement details in plan and sectional elevation. [18]

**Q11)** Design a short column to carry working axial load of 800 KN and working moment of  $M_x=55$  KN-m and  $M_y=25$ KN-m acting about axis bisecting the depth and width of column respectively, the effective length about X-axis is 4.5 m and about Y-axis is 3.5 m. The unsupported length about both axis is 4.0m. use M20 and Fe415 steel show detailed design calculations and reinforcement details. [16]

OR

**Q12)** Design a short axially loaded Short column and its footing for a residential apartment G+2 with floor to floor height 3.20 m which carries working load of 800KN, Assume SBC of Soil as 200 KN/m<sup>2</sup> use M20 and Fe 500. [16]

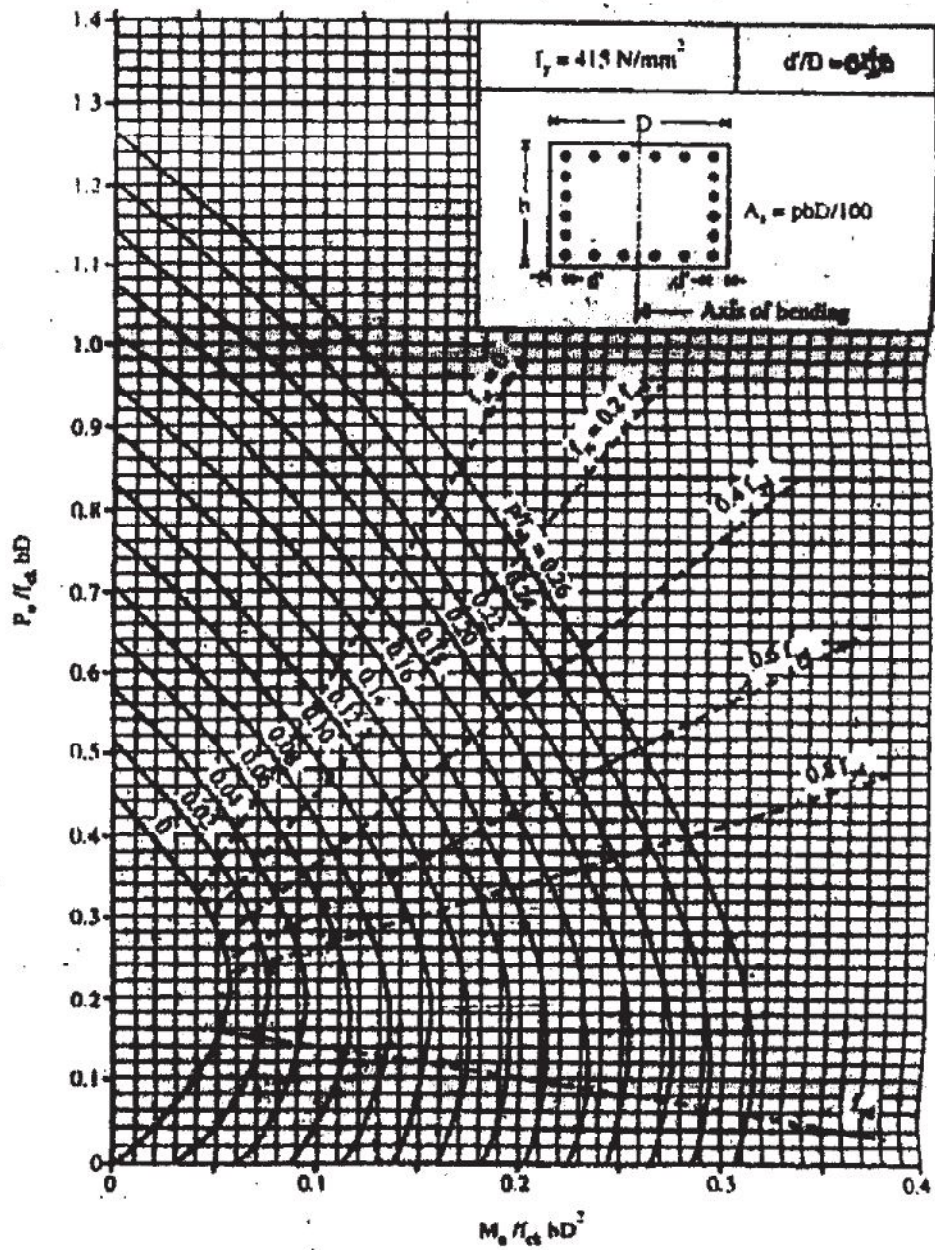
**Chart 5 : Interaction Diagram for Combined Bending and Compression Rectangular Section-Equal Reinforcement on All Sides**



**Chart 5**

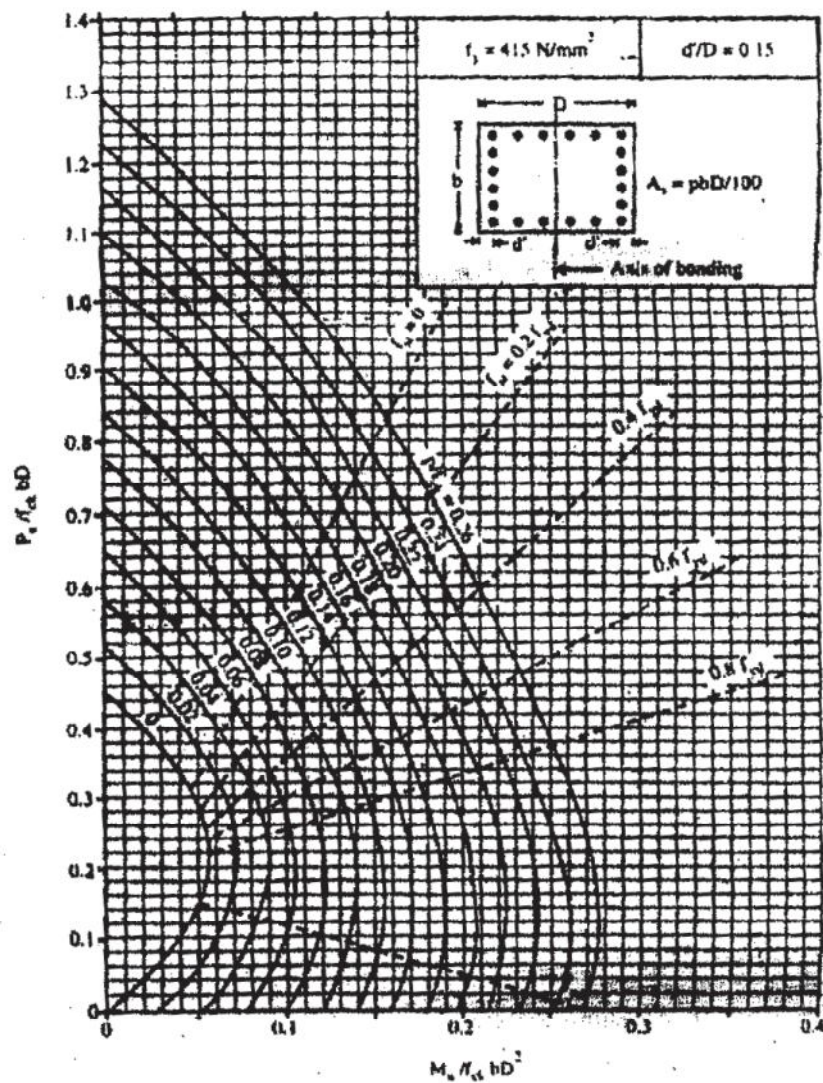


**Chart 6 : Interaction Diagram for Combined Bending and Compression Rectangular Section-Equal Reinforcement on All Sides**



**Chart 6**

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



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