Total No. of Questions : 12]

SEAT No. :

P3669

[Total No. of Pages :7

[4758] - 509
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/m^2

b) Floor finish = 1.5 KN/m^2

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 m × 4 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 = 4.2m) 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 mm × 450 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 × 500 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 envelops 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/m^2 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 3.8m, 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 ---- 1.0m

c) Depth of foundation below G.L. ---- 1.5m

d) Live load on all slabs ---- 4KN/m^2

e) Floor finish load on all slabs ---- 1.5 KN/m^2

f) Thickness of slab ---- 130mm

g) Thickness of wall ---- 230 mm

h) Height of parapet wall ---- 1m

i) Size of beam ---- 230 × 450 mm

j) SBC of soil ---- 200 KN/m^2

k) Material ---- M20 and Fe415

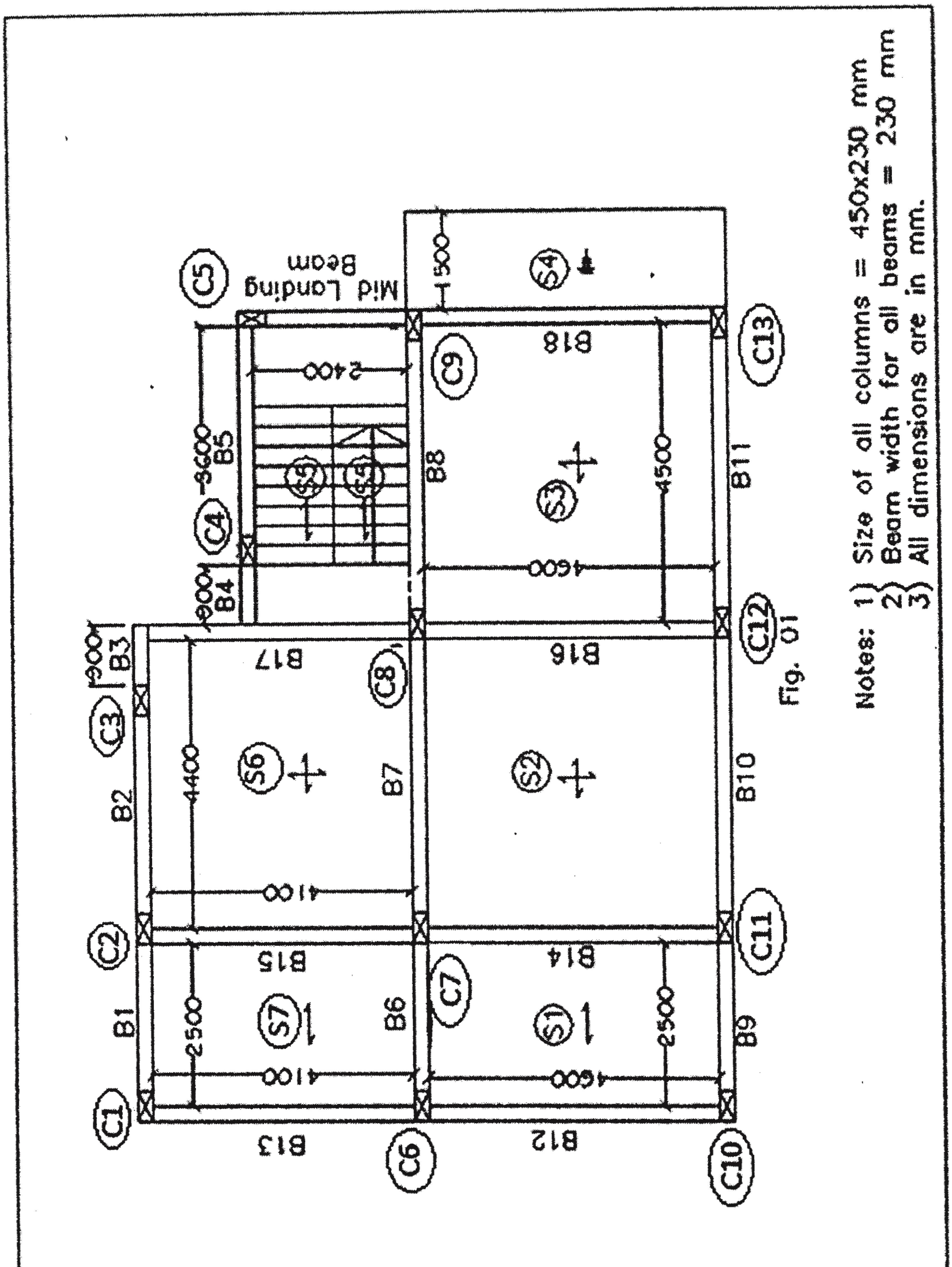
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
B1
B2
B3
B4
B5
B6
B7
B8
B9
B10
B11
B12
B13
B14
B15
B16
B17
B18
S1
S2
S3
S4
S5
S6
S7
Mid Landing Beam
4100
4600
2500
4400
4500
2400
3600
900
1500
Fig. 01
Notes: 1) Size of all columns = 450x230 mm
2) Beam width for all beams = 230 mm
3) All dimensions are in mm.

Fig-1

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

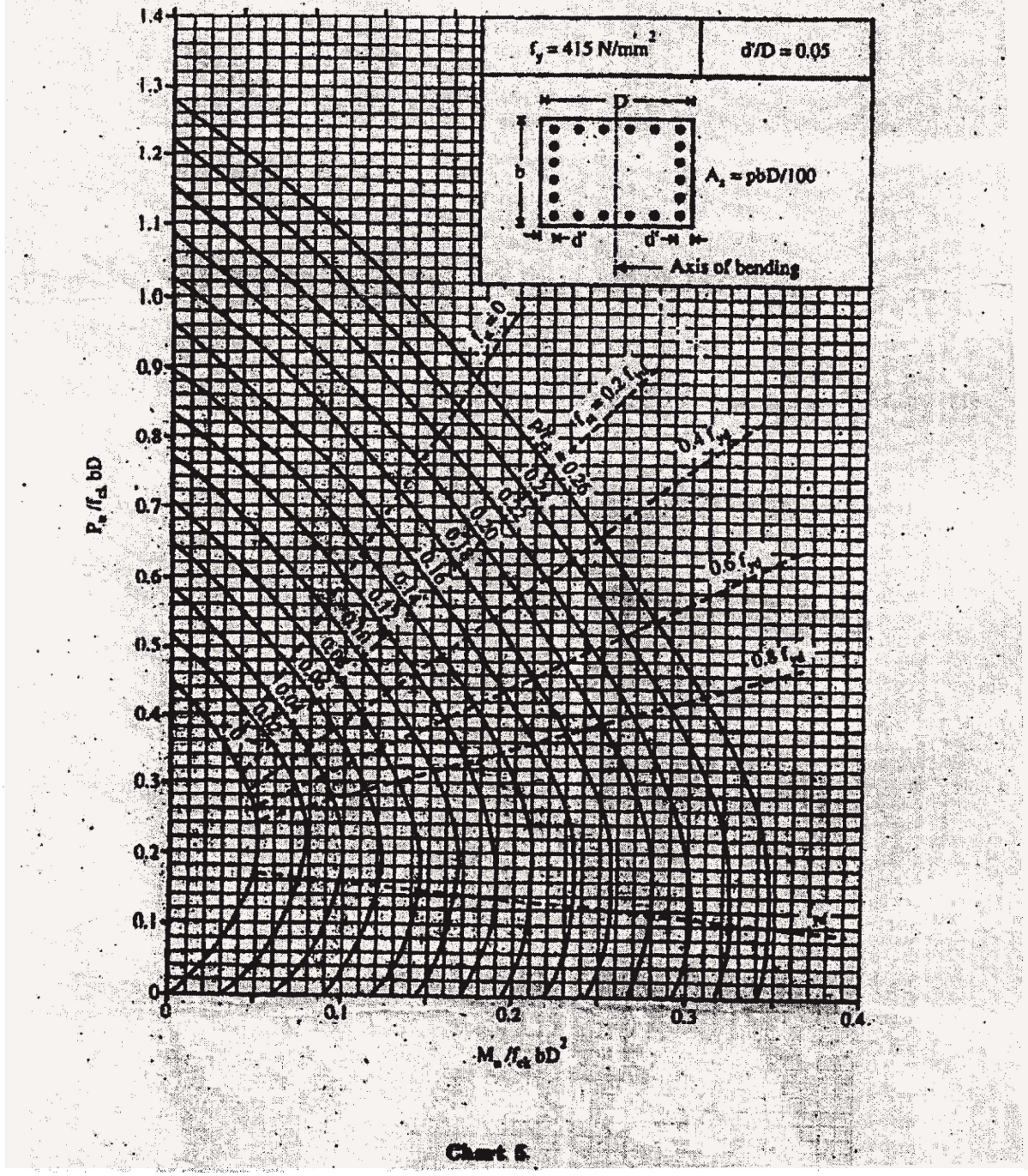

Chart 5

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

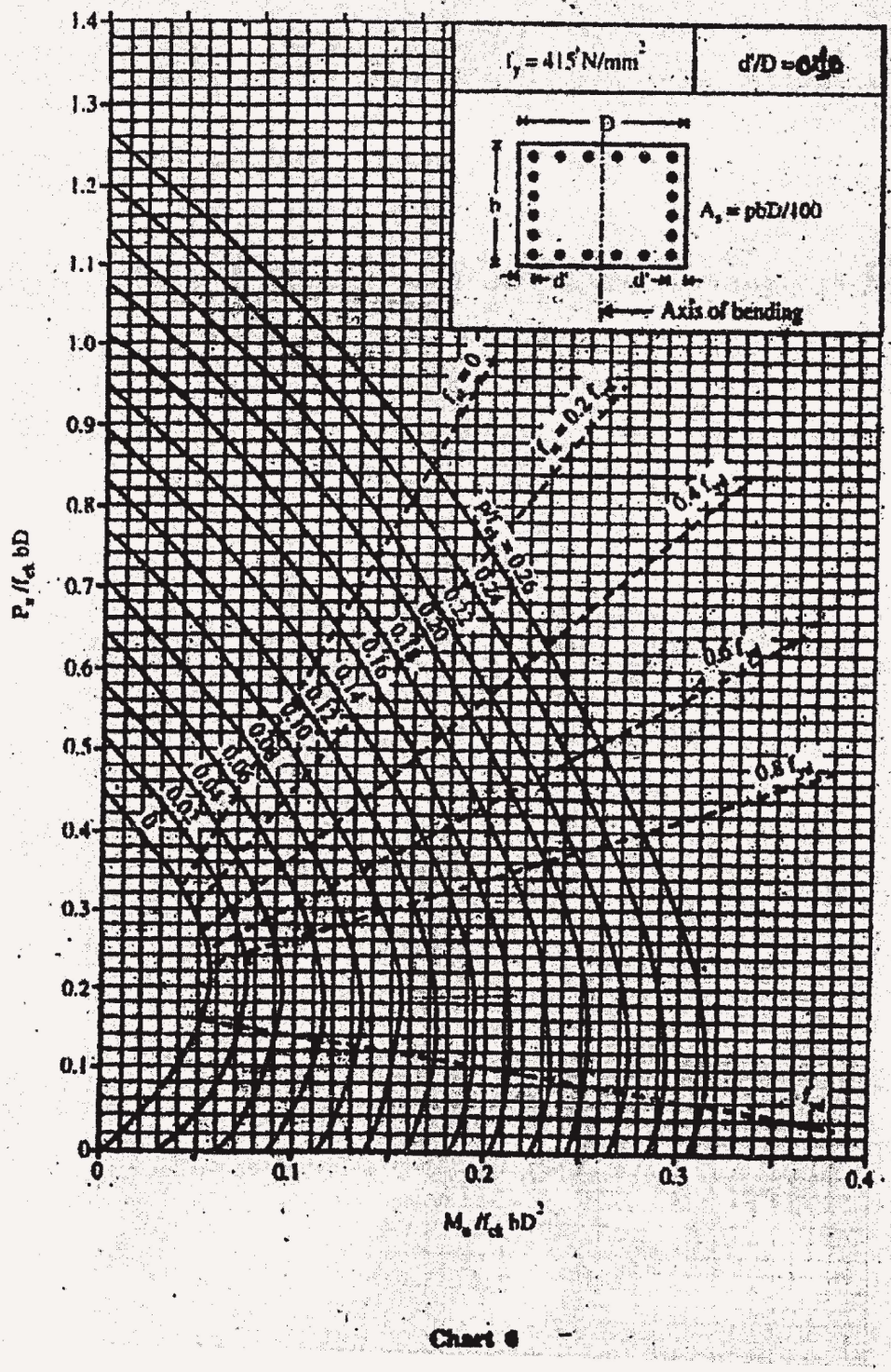

Chart 6

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