K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:V
Class:TY	Program:B.Tech
Branch Code:CIV	Pattern:2022
Name of Course:Design of Reinforced Concrete Structures	Course Code:CIV223002
Max. Marks:60	Duration:3.0 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 06 pages.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.
6. Use of IS 456 is allowed

		Marks	CO
Question No. 1			
1 a)	What do you meant by doubly reinforced section? Under which circumstances doubly reinforced sections are needed. Draw cross section of doubly reinforced section at support.	(6)	CO2
Question No. 2			
2 a)	Design a simply supported slab **S10** as shown in **Figure 1.** The slab is supported by beams of width 230mm along three edges and 150 mm along one edge. The slab is subjected to floor finish of 1.5 kN/m² and live load 5 kN/m². Use Concrete of grade M25 and Fe 500 reinforcement with mild exposure condition. Draw details of reinforcement. Design the slab for flexure only.	(6)	CO3
Question No. 3			
3 a)	Design the intermediate flight of a staircase as shown in **Figure 1** for the following data: i) Clear dimensions of staircase room = 2.6 m × 3.5 m; ii) Floor to floor height 3.5m; iii) Rise 175 mm; Tread = 250 mm; iv) Width of landing and stair = 1.25 m; v) Live load 4 kN/m² and Floor Finish = 1 kN/m²; vi) Material M 25, Fe 500. Moderate Exposure condition. Draw details of reinforcement for both flights	(16)	CO4
	OR		
3 b)	Design a simply supported reinforced concrete floor beam **B10** as shown in **Figure 1** for flexure and shear with following data: i) Effective Span of beam = 4.13 m	(16)	CO4

ii) Width of supporting columns = 300mm

iii) Beam width b = 230mm; slab thickness=120mm

iv) Live load=3kN/m²; Floor finish= 1.5 kN/m²

vi) The wall on this beam is 150 mm thick and 3.0 m high.

vii) Material-M25, Fe 500, Moderate Exposure Condition.

viii) Details of reinforcement **are not** expected.

Question No. 4

4 a) Design a continuous beam ABCDE for flexure and shear using IS Code coefficients. AB=BC=CD=DE=5.0m. The beam supports 120mm slab on both sides. The beam carries total working dead load of 16 kN/m (including its self-weight) and live load of 10 kN/m. Consider material M30, Fe 500 and Severe exposure condition. Design shear reinforcement only for the span which carries maximum shear force. Show the reinforcement detail in longitudinal section and cross-section at continuous supports and at mid spans. (16) CO5

OR

4 b) Design a continuous floor beam B18-B24 (A-B-C) as shown in **Figure 1** using moment redistribution method. Thickness of the all floor slab is 120 mm, live load and floor finish load on all slabs are 3.0 kN/m^2 and 1.5 kN/m^2, respectively. The wall on this beam is 150 mm thick and 2.7 m high. Calculate design moment for **span AB and support B** after 18 % redistribution of moments. Design span AB and support B for **flexure only**. Draw the reinforcement details. (16) CO5

Material- Concrete of grade M30, Fe 500 reinforcement. Severe exposure condition.

Question No. 5

5 a) Design a bi-axial short column by limit state method to carry Ultimate load of 1500 kN. Ultimate moment of 150 kN-m about major axis and 30 kN-m about minor axis. The unsupported length of column is 4.8m. The column is fixed at both the ends. Show details of reinforcement in plan and sectional elevation. Use M30 concrete and Fe 500 steel. Consider moderate exposure condition. (16) CO6

OR

5 b) Design an isolated rectangular pad footing for a column of size 300 x 600mm subjected to axial load of 1600 kN. SBC of soil is 350 kN/m^2. Show detailed design calculations and reinforcement details in plan and sectional elevation. Use M30 concrete and Fe 500 steel. Consider moderate exposure condition. (Neglect check for one way shear). (16) CO6

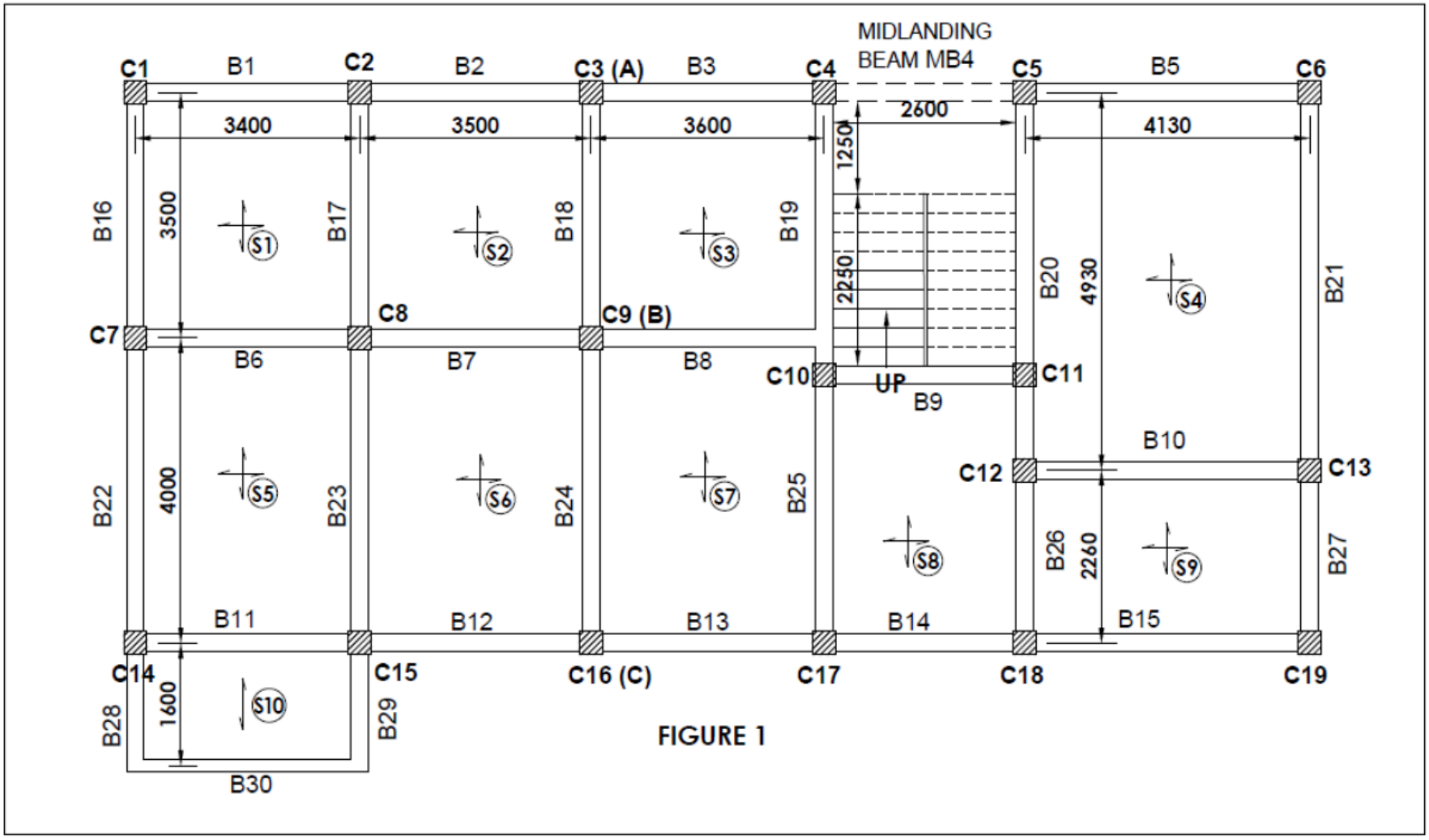
MIDLANDING
BEAM MB4
C1
B1
C2
B2
C3 (A)
B3
C4
C5
B5
C6
3400
3500
3600
2600
4130
1250
B16
3500
B17
B18
B19
2250
B20
4930
B21
S1
S2
S3
S4
C7
C8
C9 (B)
B6
B7
B8
C10
C11
UP
B9
B10
C12
C13
B22
4000
B23
B24
B25
B26
2260
B27
S5
S6
S7
S8
S9
B11
B12
B13
B14
B15
C14
C15
C16 (C)
C17
C18
C19
1600
S10
B28
B29
B30

FIGURE 1

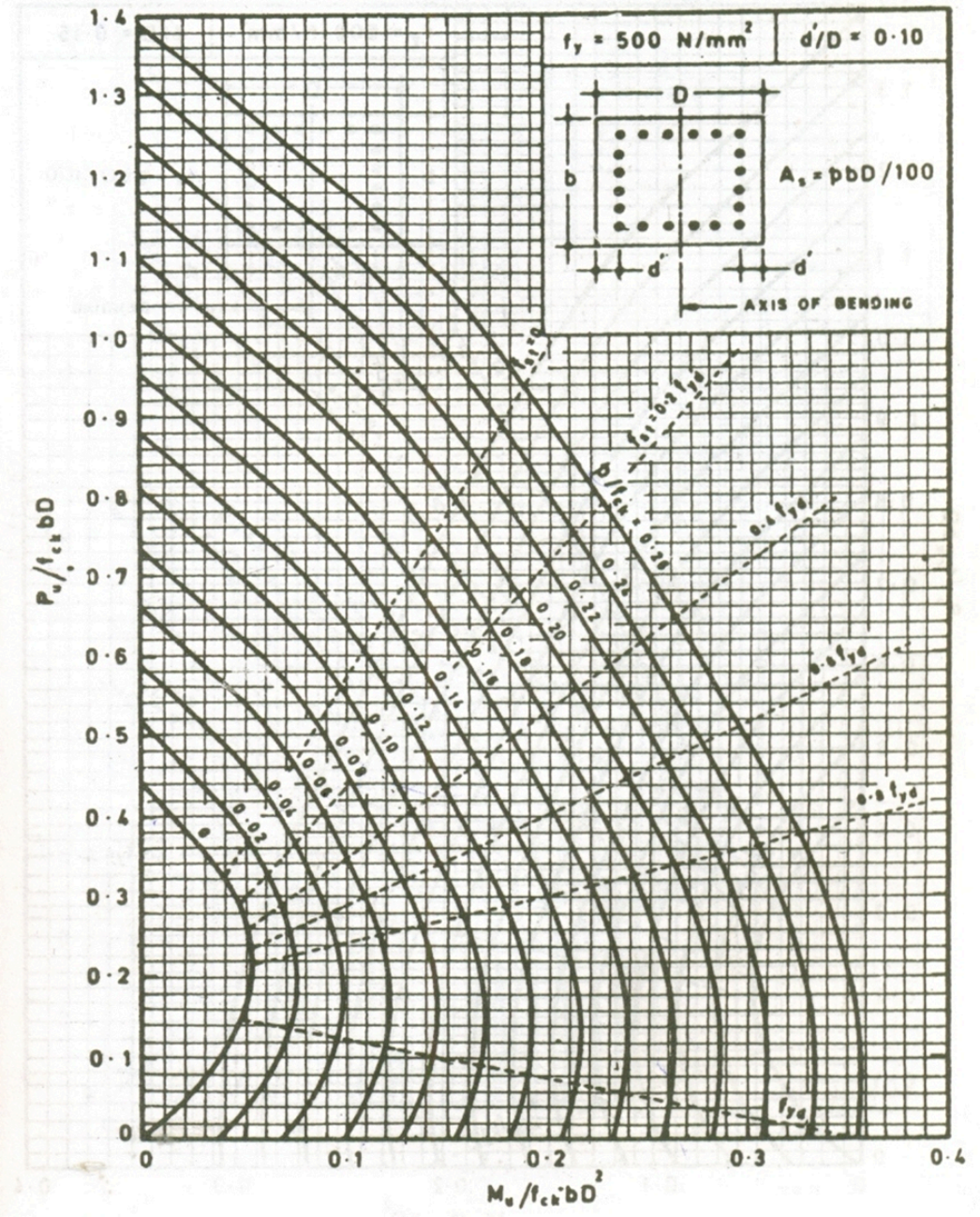

Chart No 1: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

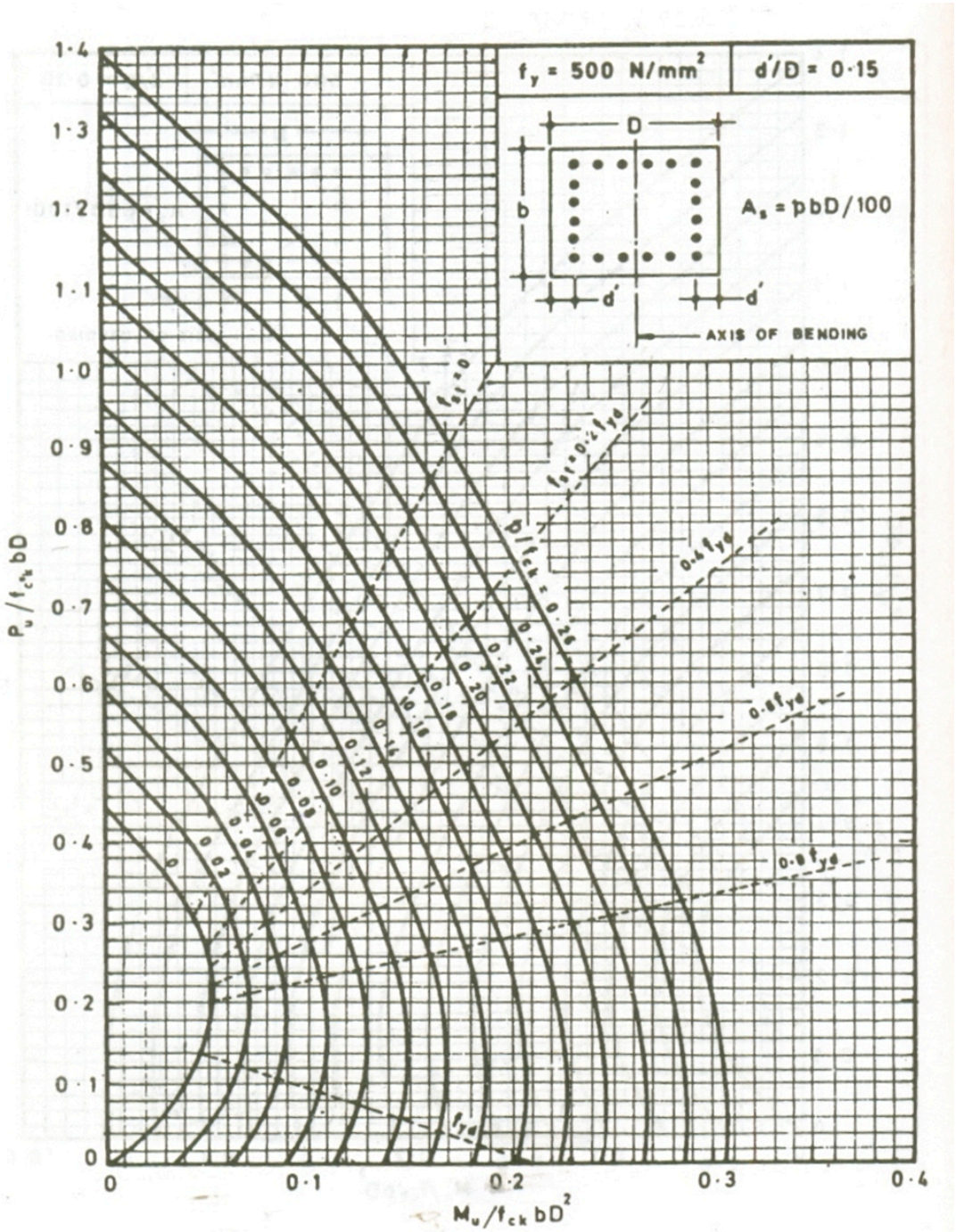

Chart No 2: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

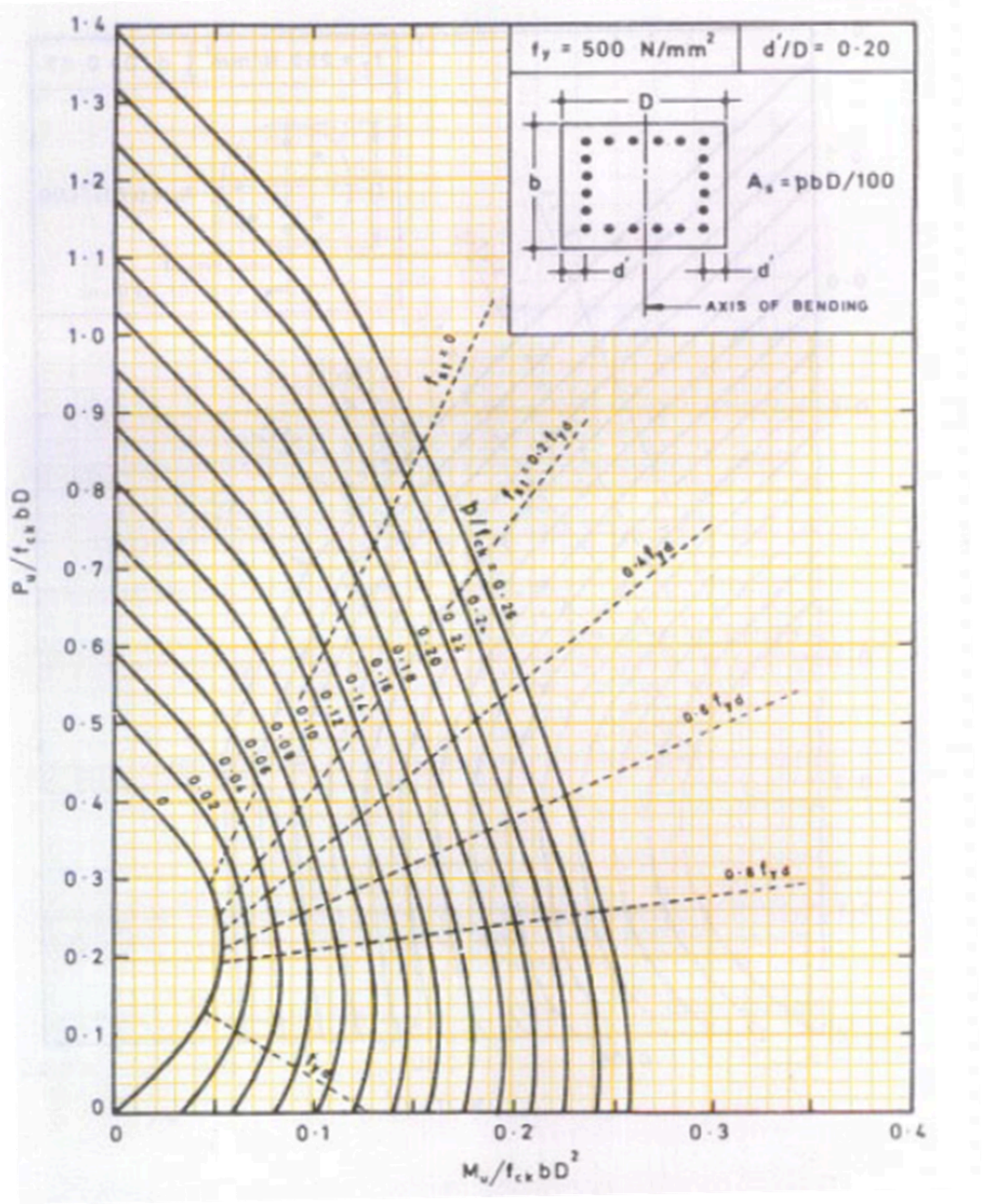

Chart No 3: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

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