



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:2023
Name of Course:Design of Reinforced Concrete Structures	Course Code:2304302
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.

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: (16) CO4
- 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

OR

- 3 b) Design a simply supported reinforced concrete floor beam **B10** as shown in **Figure 1** for flexure and shear with following data: (16) CO4
- i) Effective Span of beam = 4.13 m
 - ii) Width of supporting columns = 300mm

- iii) Beam width $b = 230\text{mm}$; slab thickness= 120mm
- iv) Live load= 3kN/m^2 ; Floor finish= 1.5 kN/m^2
- 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. (16) CO5
 $AB=BC=CD=DE=5.0\text{m}$. 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.

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 $300 \times 600\text{mm}$ 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

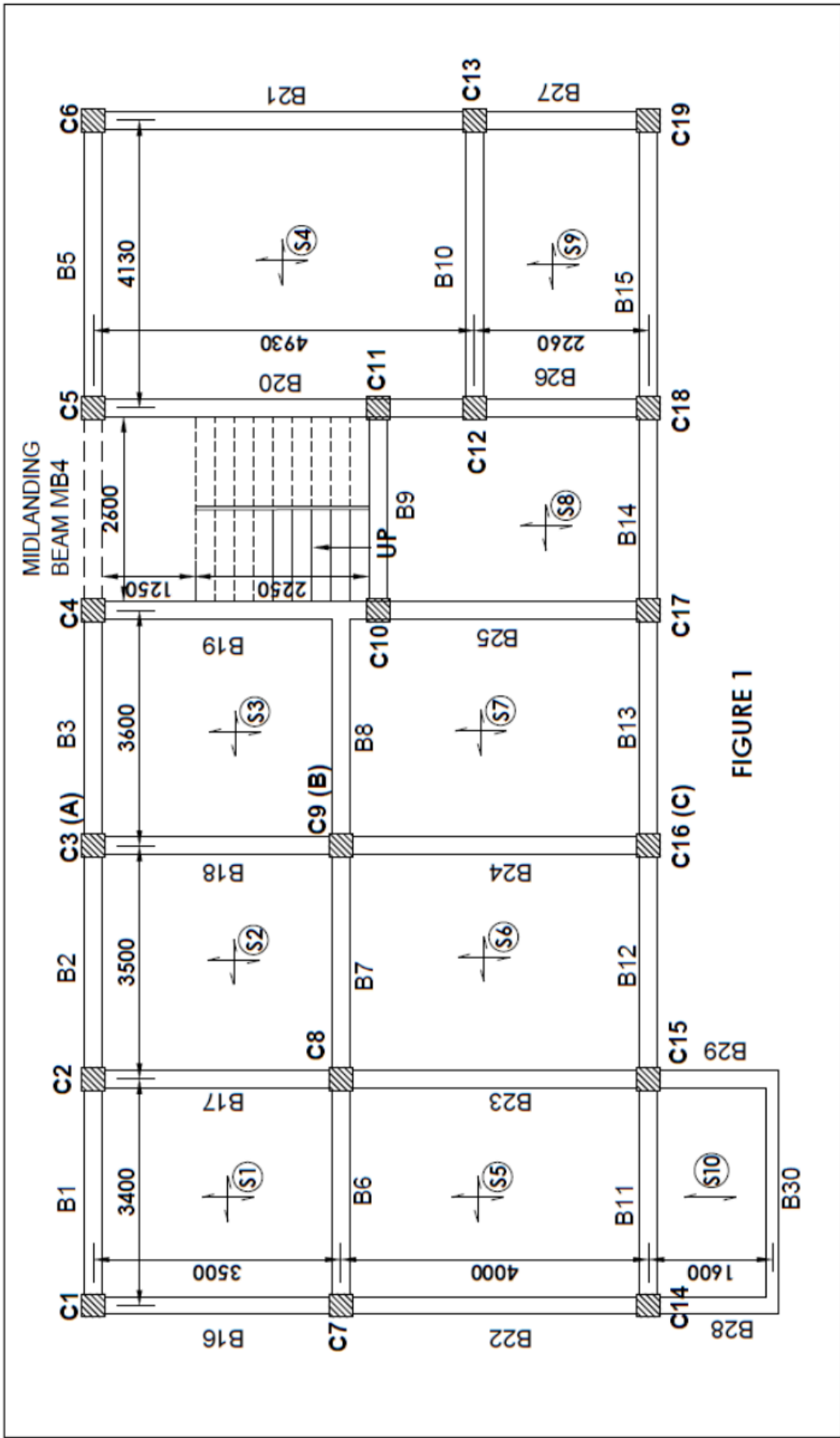


FIGURE 1

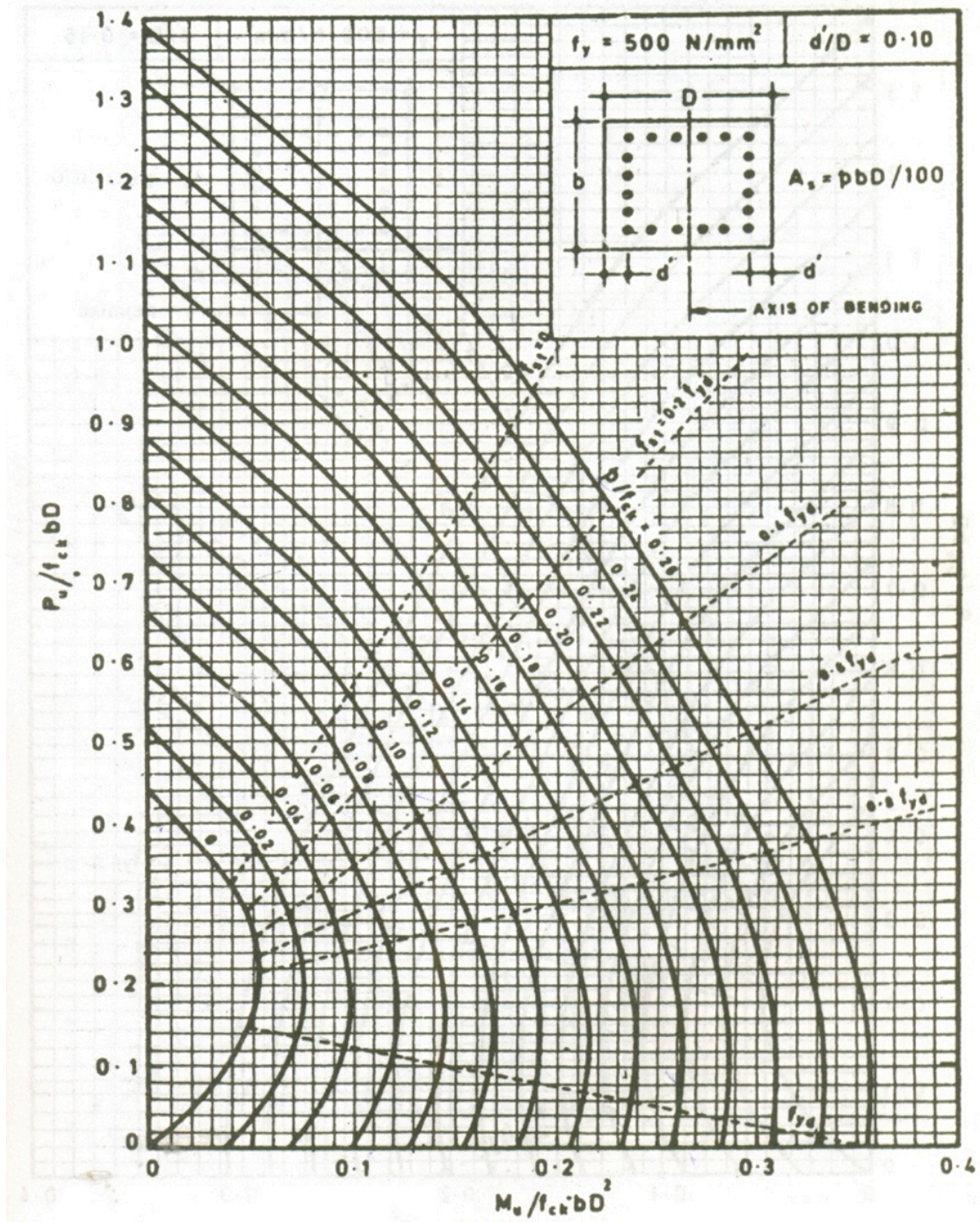


Chart No 1: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

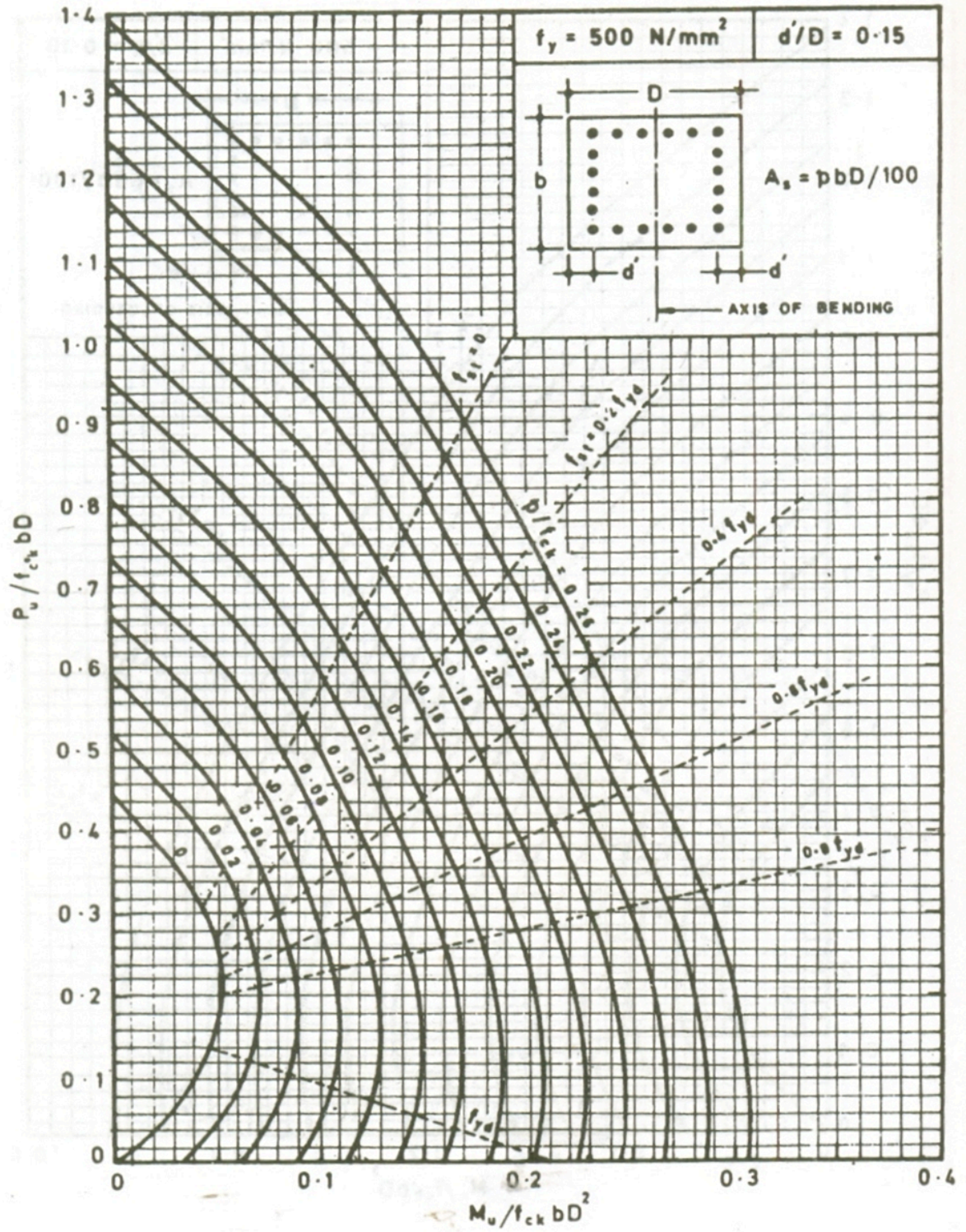


Chart No 2: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

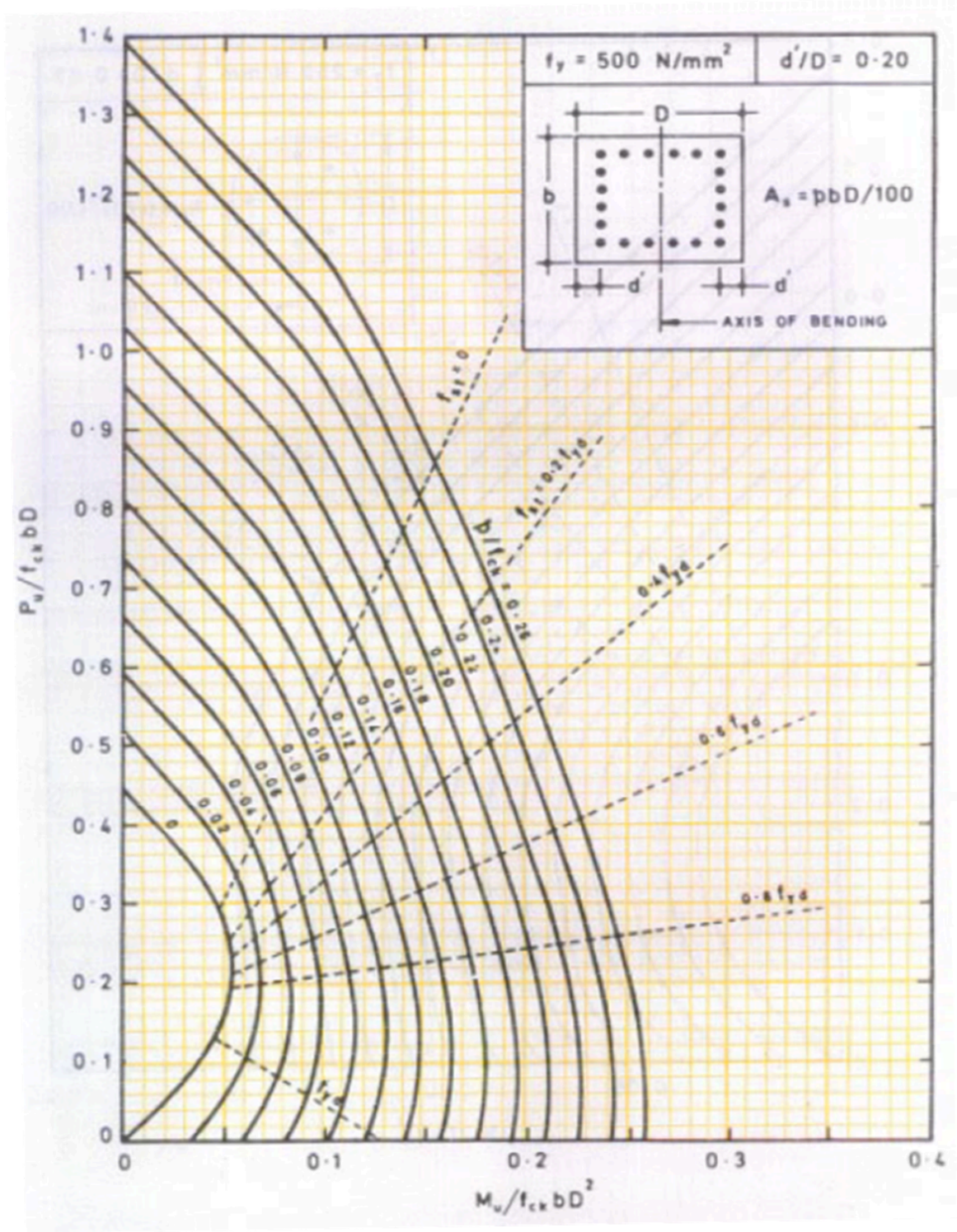


Chart No 3: Interaction chart for combined bending and compression on rectangular section with equal reinforcement on all sides

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