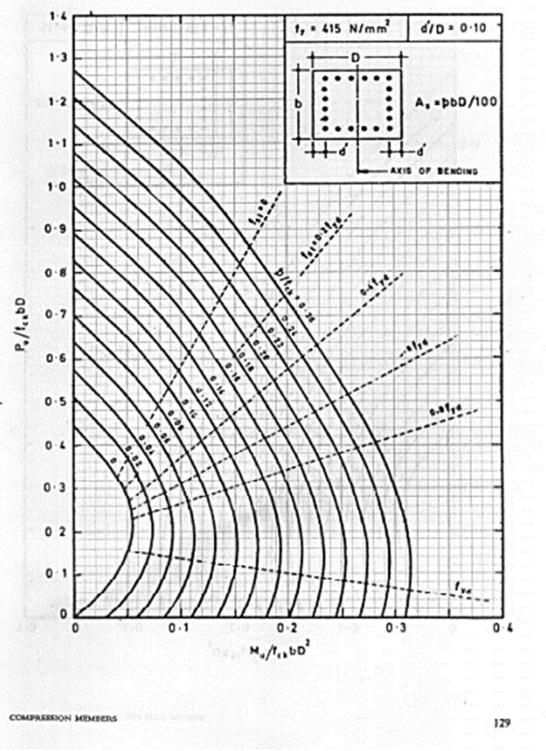
BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI (END SEMESTER EXAMINATION)

(END SEMESTER EXAMINATION)			
CLASS: BRANCH	B.TECH/B.ARCH I: CIVIL/ARCHITECTURE	SEMESTER : V SESSION : MO/2022	
SUBJECT: CE301 STRUCTURAL DESIGN I			
TIME:	3:00 Hours	FULL MARKS: 50	
<ul> <li>INSTRUCTIONS:</li> <li>1. The question paper contains 5 questions each of 10 marks and total 50 marks.</li> <li>2. Attempt all questions.</li> <li>3. The missing data, if any, may be assumed suitably.</li> <li>4. Before attempting the question paper, be sure that you have got the correct question paper.</li> <li>5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.</li> </ul>			
Q.1(a) Q.1(b) Q.1(c)	Mention various loads which are required to be considered in design of structures. What do you mean by limit state of serviceability? What are balanced sections, under-reinforced sections and over-reinforced section Method of design? Explain with strain diagram.	ons in Limit State	[2] [3] [5]
Q.2(a)	A 250 mm wide rectangular singly reinforced concrete beam is subjected to a m bending moment of 300 kNm. Grade of concrete is M20 and grade of steel is Fe415. mm. Determine the depth of the beam.		[2]
Q.2(b) Q.2(c)	Design the longitudinal reinforcement for the beam mentioned in Q.2(a). The beam mentioned in Q.2(a) is subjected to a factored shear force of 150 kN. reinforcement for the beam.	Design the shear	[3] [5]
Q.3(a)	An interior panel of size 4m x 6m of a concrete slab is carrying an imposed load of due to finishes of 1.0 kN/m2. Calculate the factored load for design of the slab assurslab.		[2]
Q.3(b)	Calculate factored bending moments at mid-span and continuous edges of the s Q.3(a).	lab mentioned in	[3]
Q.3(c)	Check the adequacy of the assumed thickness of 150mm for bending mom reinforcements for the slab in Q.3(a). Assume M20 concrete and Fe415 steel. Consi 20mm.		[5]
Q.4(a)	A rectangular RCC column is having the following data: Size of column: 500mm x 650mm, Unsupported length, lo = 9m Effective length in both the direction = 8.5m, Factored Axial Load, Pu = 1500 kN Factored Moment about major axis, Mux = 225 kNm, Factored Moment about minor axis, Muy = 80 kNm, Grade of Concrete: M25, Grade of Steel: Fe415, Clear cover: 40mm Check whether the column is to be designed as short column or as long column.		[2]
Q.4(b) Q.4(c)	Calculate the moments for design of the column mentioned in Q.4(a). Design the longitudinal reinforcement using design chart and lateral ties for the col Q.4(a).	umn mentioned in	[3] [5]
Q.5(a)	Check for bearing pressure on soil from a concentrically loaded footing for a squa 500mm x 500mm, supporting a service load of 2000 kN with the following data: Size of the footing: 3.5m x 3.5m, Depth of footing below ground level: 2m, Gross Safe Bearing Capacity of soil: 250 kN/m2, Thickness of footing: 700mm, Unit weight of soil: 18 kN/m3.	re column of size	[2]
Q.5(b)	Check the footing of Q.5(a) for two-way shear. Use M25 concrete and Fe415 stee clear cover.	l. Consider 40mm	[3]
Q.5(c)	Check for one-way shear and design the reinforcement of footing of $Q.5(a)$ .		[5]





## Chart 44 COMPRESSION WITH BENDING - Rectangular Section - Reinforcement Distributed Equally on Four Sides

:::::21/11/2022::::M