	ADAMAS UNIVERSITY		
	END-SEMESTER EXAMINATION : JANUARY 2021		
	(Academic Session: 2020 – 21)		
Name of the Program: (Example: B. Sc./BBA/MA/B.Tech.)	B.Tech.	**Semester:** (I/III/ V/ VII/IX)	V
Paper Title :	Design of RC Structure - I	**Paper Code:**	ECE43101
Maximum Marks :	40	**Time duration:**	3 Hrs.
Total No of questions:	09	**Total No of Pages:**	02
(Any other information for the student may be mentioned here)	IS:456-2000 & SP:16 allowed in examination hall for students.		

Answer all the Groups
Group A
Answer all the questions of the following   5 × 1 = 5

1.   **a)** Find out the modular ratio of M30 grade of concrete
b) What is the maximum compressive strain in concrete as per limit state of collapse?
c) What is the name of the portion between two landings in staircase design?
d) Mention the minimum percentage of steel of column as per IS:456-2000.
e) Area of tensile reinforcement in the isolated footing is calculated in which type of structural components among short columns or long columns or slabs or beams?

GROUP –B
Answer *any three* of the following   3 × 5 = 15

2.   Find the moment of resistance of a R.C.C beam 300 mm wide and 500 mm effective depth is reinforced with 3 bars of 16 mm. Use M20 grade of concrete and Fe415 steel. Apply Working Stress Method.

3.   An R.C.C T-beam is reinforced on tension side. Find the neutral axis depth and area of steel if b_f = 1.3m, D_f = 0.08m, d = 0.6m, σ_{cbc} = 7 MPa, σ_{st} = 140 MPa and m = 13.33. Apply Working Stress Method.

4.   A simply supported R.C.C beam 250mm wide and 450mm deep (effective) is reinforced with 4-18mm diameter bars. Design the shear reinforcement if M20 grade concrete and Fe415 steel is used and beam is subjected to a shear force of 150 kN at service load. Apply limit state method design.

5.   Determine the moment of resistance of a R.C beam of 250 mm x 350 mm. The area of steel consists of 3-12 mm diameter placed at a distance of 40 mm from bottom of beam. Use M20 grade of concrete and Fe415 steel. Apply limit state method design.

GROUP –C

Answer *any two* of the following $2 \times 10 = 20$

6. Design a short column of size 400 mm x 500 mm subjected an ultimate (i) axial load, 1600 kN, (ii) biaxial bending moments $M_{ux} = 200$ kNm and (iii) $M_{uy} = 150$ kNm. Use M25 concrete and Fe415 steel. Use limit state method as per IS:456-2000. Use any other standard data if required.

7. Design a square footing with uniform depth for an axially loaded column with 750 kN load. Size of column is 300 mm x 300 mm and safe bearing capacity of soil is 150 kN/m². Use Use M20 grade of concrete and Fe415 steel. Apply limit state method design. Use any other standard data if required.

8. Design a R.C slab (corners are held down) for a room using the following data: Clear dimensions = 4m x 5m, slab is supported on walls of width 0.3m, slab is subjected to a live load of 4 kN/m², floor finish of 1 kN/m² and use M20 grade of concrete and Fe415 grade of steel. Apply limit state method design. Use any other standard data if required.

9. Design a dog-legged staircase with the following parameters: Width of stair = 1.2m, floor to floor height = 3m, size of stair hall = 3m x 6m, thickness of walls on the ends of landing = 230 mm on each side and materials used are – M20 concrete & Fe415 steel. Apply limit state method design. Use any other standard data if required.

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