

INTERNATIONAL CENTRE FOR APPLIED SCIENCES MAHE, MANIPAL B.Sc. (Applied Sciences) in Engg. End – Semester Theory Examinations – Nov./ Dec. 2020 III SEMESTER - BASIC REINFORCED CONCRETE DESIGN (ICE 231) (Branch: CIVIL)

Time	e: 3 Hours	Date: 19 November 2020	Max. Marks: 50	
~	Answer ALL the q	uestions.		
✓	Missing data, if any	ing data, if any, may be suitably assumed		
~	Draw neat sketches	s wherever necessary		

- 1A. Calculate the design constants for the following materials considering the balanced design for singly reinforced section. The materials are grade M20 concrete and mild steel reinforcement. (using WSM) (5 marks)
- 1B. An R.C.C beam 250mm X 550mm effective depth is reinforced with 3 no. 20mm diameter bars in tension. Find out the depth of neutral axis and state the type of beam. The materials are M20 grade concrete and HYSD reinforcement of Fe 415. (using WSM) (5 marks)
- 2A. A rectangular beam 250mm wide X 400mm effective depth is subjected to a moment of 50kNm. The effective cover of compressive reinforcement is 40mm. Find out the reinforcing steel. The materials are M20 grade concrete and HYSD reinforcement of grade Fe 415. (using WSM)

(5marks)

- 2B. A rectangular beam section of size 230mm X 450mm effective depth, reinforced with 2 nos. 16mm diameter bars in compression and 3 nos. of 16mm diameter bars in tension. The effective cover of compression reinforcement is 40mm. Find out the moment of resistance of the section. The materials are M20 grade concrete and mild steel reinforcement. (using WSM) (5 marks)
- 3A. Derive an expression for the depth of neutral axis and moment of resistance of the singly reinforced section using LSM. (5 marks)
- 3B. A singly reinforced rectangular beam is subjected to a factored bending moment of 54kN-m. The width of beam is 200mm. Find the balanced section and steel area. The materials are M20 grade concrete and mild steel reinforcement. (using LSM) (5 marks)
- 4A. Find the factored moment of resistance of beam section 230mm wide x 450mm effective depth reinforced with 2-16mm diameter bars as compression reinforcement at an effective cover of 40mm and 4-20mm diameter bars as tension reinforcement. The materials are M25 grade concrete and mild steel reinforcement. (using LSM) (5 marks)

4B. A T-beam of effective flange width 1200mm, thickness of slab 100mm, width of rib 300mm and effective depth of 560mm is reinforced with 6 no 28mm diameter bars. Calculate the factored moment of resistance. The materials are M20 grade concrete and HYSD reinforcement of grade Fe 415. (using LSM)

(5 marks)

5. A rectangular beam of size 230mm X 600mm overall depth is subjected to factored bending moment of 48kNm. Factored shearforce of 48kN & factored torsional moment of 18kNm. Design reinforcement at the section. Materials are M20 grade concrete and Fe415 grade steel.

(10 marks)
