INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
(Dundigal-500043, Hyderabad)

B.Tech V SEMESTER END EXAMINATIONS (REGULAR) - DECEMBER 2022
Regulation:UG20
REINFORCED CONCRETE STRUCTURES DESIGN AND DRAWING

Time: 3 Hours　　　　　　　　(CIVIL ENGINEERING)　　　　　　　　Max Marks: **70**

Answer ALL questions in Module I and II
Answer ONE out of two questions in Modules III, IV and V
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. (a) State four objectives of the design of reinforced concrete structure. Illustrate stress strain relationship for concrete and steel.　　　　　　[BL: Understand| CO: 1|Marks: 7]

   (b) Design the reinforcement for a reinforced concrete beam 300 mm wide and 400 mm deep of grade M 20, to resist an ultimate moment of 150 kN-m, using mild steel bars of grade Fe 250.
   　　　　　　[BL: Apply| CO: 2|Marks: 7]

MODULE – II

2. (a) Identify the different regions of cracks in the beam. Explain in detail about nominal shear stress and shear strength of concrete.　　　　　　[BL: Understand| CO: 3|Marks: 7]

   (b) A reinforced concrete beam 250 mm wide and 400 mm effective depth is subjected to ultimate design shear force of 150kN at the critical section near supports. The tensile reinforcement at the section near supports is 0.5 percent. Design the shear stirrups near the supports. Also, design the minimum shear reinforcement at the mid span. Assume concrete of grade M20 and mild steel bard of Fe 415 grade.　　　　　　[BL: Apply| CO: 3|Marks: 7]

MODULE – III

3. (a) Describe in detail about different types of analysis on two-way slabs. Summarize the difference in the behaviour of one-way and two-way slabs.　　　　　　[BL: Understand| CO: 4|Marks: 7]

   (b) Design a R.C. slab for a room measuring 5 m × 6 m size. The slab is simply supported on all the four edges, with corners held down and carries a superimposed load of $3000 N/m^2$ inclusive of floor finishes etc. Use M20 mix, Fe 415 steel and IS Code method.　　　　[BL: Apply| CO: 4|Marks: 7]

4. (a) Sketch the reinforcement detailing of one way slab. Write the procedure for design one-way simply supported slabs.　　　　　　[BL: Understand| CO: 4|Marks: 7]

   (b) Design a simply supported slab supported on masonry walls to the following requirements, Clear span 3m, Live Load 2000 N/m^2 and use M 20 concrete and Fe 415 steel.
   　　　　　　[BL: Apply| CO: 4|Marks: 7]

MODULE – IV

5. (a) Differentiate between short and long column. Outline the procedure for design of axially loaded reinforced concrete column. [BL: Understand| CO: 5|Marks: 7]

   (b) A short RCC column 450 mm × 450 mm is reinforced with 8 bars of 20 mm diameter. The effective length of the column is 2.75 m. Find the ultimate load for the column. Use M 20 concrete and Fe 250 steel. [BL: Apply| CO: 5|Marks: 7]

6. (a) Obtain the expression for the ultimate load for axially loaded short column.
   [BL: Understand| CO: 5|Marks: 7]

   (b) Design an axially loaded reinforced concrete column to carry an axial load of 1650kN. Use M 20 concrete and Fe 415 steel. [BL: Apply| CO: 5|Marks: 7]

MODULE – V

7. (a) Explain the terms i) Tread ii) Riser iii) Winders iv) Landing v) Nosing vi) Fight vii) Line of Nosing.
   [BL: Understand| CO: 6|Marks: 7]

   (b) A square column 500 mm × 500 mm carries an axial load of 1500 kN. Design the column and a square footing for the column. The safe bearing capacity of the soil is 225 KN/m^2. Use M 20 concrete and Fe 415 steel. [BL: Apply| CO: 6|Marks: 7]

8. (a) Name five types of staircases based on geometrical configurations. Interpret the procedure for one way and punching shear with necessary diagrams . [BL: Understand| CO: 6|Marks: 7]

   (b) The main stair of an office building has to be located in a stair measuring 3.5 m × 5.5 m. The vertical distance between the floor is 3.75 m. Design the stairs. Allow a LL of 2000 N/m^2. Use M 20 concrete, and Fe 415 steel [BL: Apply| CO: 6|Marks: 7]

$- \circ \circ \bigcirc \circ \circ -$