R20

SET - 1

III B. Tech I Semester Supplementary Examinations, July -2023
DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Answer any **ONE** Question from **Part–A**, and any **THREE** Questions from **Part–B**
Please specify the IS codes to be allowed to the student in the Examination hall.
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	PART–A	**(1x28=28 Marks)**

1   Design a rectangular isolated footing of uniform thickness for reinforced concrete   [28M]
column bearing a vertical load of 600 kN, and having a base size of 400 x 600
mm. The safe bearing capacity of the soil may be taken as 120 kN/m^2. Use M20
concrete and Fe 415 steel. Draw a neat sketch detailing the reinforcement of
rectangular isolated footing.

(OR)

2   Design a continuous reinforced concrete slab for a hall 6.5 m and 13.5 m long. The   [28M]
slab is supported on R.C.C. beams each 240 mm wide which are monolithic. The
ends of the slab are supported on walls, 300 mm wide. Design the slab for a live
load of 2 kN/m^2. Assume the weight of roof finishing equal to 1.5 kN/m^2. Use
M20 concrete and Fe 415 steel.

	PART–B	**(3x14=42 Marks)**

3   A doubly reinforced concrete beam is 400 mm wide and 600 mm deep to the   [14M]
centre of tensile reinforcement. The compression reinforcement consists of 4 bars
of 16 mm diameter, and is placed with its centre at a depth of 40 mm from the top.
The tensile reinforcement consists of 4 bars of 20 mm diameter. The section is
subjected to a bending moment of 100 kN-m. Determine the stresses in concrete
and steel. Take m =16.

4   A T- beam has the following data: [14M]
Width of flange = 750 mm;   Breadth of beam = 250 mm;
Effective depth = 500 mm;   Thickness of flange = 90 mm;
Applied moment = 130 kN-m.
Design the beam. Use M20 concrete and Fe 415 steel.

5   Design of dog-legged stair for a building in which the vertical distance between   [14M]
floors is 3.6 m. The stair hall measures 2.5 m x 5.0 m. The live load may be taken
as 2500 N/m^2. Use M20 concrete and Fe 415 steel bars.

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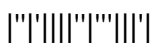
6.   A reinforced concrete beam 250 mm wide and 400 mm effective depth is subjected to ultimate design shear force of 150 kN at the critical section near supports. The tensile reinforcement at the section near supports is 0.5 percent. Design the shear stirrups near the supports. Also, design the minimum shear reinforcement at the mid span. Assume concrete of grade M20 and mild steel bars of Fe 250 grade.   [14M]

7.   Design the reinforcements in a column of size 400 mm x 600 mm subjected to an axial working load of 2000 kN. The column has an unsupported length of 3 m and is braced against side sway in both directions. Adopt M20 grade concrete and Fe 415 HYSD bars.   [14M]