

Roll No. ....

**3081**

**B. Tech. 4th Semester (Civil)  
Examination – May, 2023**

**DESIGN OF CONCRETE STRUCTURE**

**Paper : PCC-CE-204-G**

*Time : Three Hours ]*

*[ Maximum Marks : 75*

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

*Note : Attempt five questions in all, selecting one question from each Section. Questions No. 1 is compulsory. All questions carry equal marks.*

1. Describe the following : 15
- (a) Slenderness ratio
  - (b) Assumption of limit state
  - (c) Water cement ratio
  - (d) Shrinkage and creep
  - (e) Factor affecting the strength of concrete

## SECTION – A

2. (a) Explain the principles of concrete mix design. What are the various factors governing the selection of mix proportion according to Indian standard? 7.5
- (b) Write the short note on the workability of concrete. 7.5
3. (a) Describe the stress strain relation of steel in detail. 7.5
- (b) Determine the moment of resistance of a singly reinforced 160 mm wide and 300 mm deep (effective) beam. The reinforcement consists of 4 bars of 16 mm diameter. The material used is M15 concrete and Fe 250 steel. Take  $m = 18$ . If the span of the beam is 5 m, find the maximum distributed load which the beam can carry, inclusive of its own weight. 7.5

## SECTION – B

4. (a) Write a short note on steel beam theory. 7.5
- (b) A rectangular beam section is reinforced on both side is 300 mm wide and having 550 mm depth. The centre of steel on both side is 50 mm away

from respective edges. Determine the steel area on both side for a bending moment of 90 KN. Solve by working stress method. 7.5

5. Design a simply supported beam to carry a load of 14500 N/m. The clear span of beam is 5.5 m. The bearing on each end is 300 mm. Assume permissible nominal shear stress as 0.3 N/mm<sup>2</sup>. Solve it by limit state. 15

## SECTION – C

6. (a) What are requirements of a good detailing in RCC? 7.5
- (b) Write a short note on spacing of reinforcement in slab. 7.5
7. Design a simply supported slab supported on masonry wall with following details : 15
- Clear span = 4 m
- live load = 3000 N/m<sup>2</sup>
- modification factor = 1.4
- nominal shear stress = 0.3 N/mm<sup>2</sup>.

## SECTION – D

8. A square column  $400 \text{ mm} \times 400 \text{ mm}$  supports a total load of  $1500 \text{ KN}$ . Design the column and a square footing for this column. The safe bearing capacity of soil is  $250 \text{ KNM/m}^2$ . 15

9. Determined the reinforcement for a short column for the following data : 15

Column size :  $450 \text{ mm} \times 650 \text{ mm}$

$P_u = 2600 \text{ kN}$

$M_{ux} = 175 \text{ Kn}$

$M_{uy} = 135 \text{ KN}$

Use M20 Concrete mix and Fe 415 Steel