

**D 90142**

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Name.....

Reg. No.....



**FIFTH SEMESTER B.TECH. (ENGINEERING) (09 SCHEME) DEGREE  
EXAMINATION, NOVEMBER 2015**

**CE/PTCE 09 502—STRUCTURAL DESIGN—I**

Time : Three Hours

Maximum : 70 Marks

**Part A**

*Answer all questions.*

1. Mention the merits of RCC structures.
2. Define partial safety factors.
3. Define the moment of resistance.
4. Define neutral axis and mention its importances.
5. Define slenderness ratio.

(5 × 2 = 10 marks)

**Part B**

*Answer any four questions.*

1. List out different grades of concrete and steel used in construction.
2. Write short notes on principles of working stress method of design.
3. Differentiate one-way and two-way slabs.
4. Write the design procedure for shear design.
5. Draw neat sketches of types of stairs.
6. Define modular ratio and eccentricity.

(4 × 5 = 20 marks)

**Part C**

1. Find the steel reinforcement required for a beam, 300 mm × 500 mm overall to resist a B.M. of 80 kNm. Use  $M_{15}$  concrete and  $Fe_{415}$  steel.

*Or*

2. A RC beam 250 mm wide has to carry a u.d.l. of 30 kN/m including self weight over an effective span of 5.5 m. The overall depth of the beam is limited to 500 mm. The effective cover to both tension and compression reinforcements from the outer surface is 40 mm. Find the area of compression and tension steel, if  $M_{20}$  and  $Fe_{415}$  are used.

**Turn over**

3. (i) Write a brief notes on flanged sections and their dimensions fixation as per code.  
(ii) Describe the importances of serviceability check for structures.

*Or*

4. (i) Under what circumstances doubly reinforced sections are used.  
(ii) Describe any *three* important properties of concrete structures.
5. By using working stress method, explain the design procedure for a one way slab.

*Or*

6. Design the flight slab for a room  $2.5 \text{ m} \times 4.5 \text{ m}$ . The live load is  $5 \text{ kN/m}^2$ . Tread is 250 mm and rise is 160 mm. Steps are of reinforced concrete.  $M_{15}$  and  $Fe_{415}$  are to be used. Landing slab and flight slab span in perpendicular direction. Height of floor is 3.2 m.
7. A  $600 \text{ mm} \times 400 \text{ mm}$  column 3 m long effectively held in position and restrained against rotation at both ends is provided with 6 bars of 22 mm dia of  $Fe_{415}$  steel. Find the strength of column, if  $M_{20}$  is used.

*Or*

8. Design a short circular axially loaded column with helical reinforcement to carry a load of 1000 kN using  $M_{15}$  and  $Fe_{415}$ .

(4 × 10 = 40 marks)