

Register Number :

Name of the Candidate :

**3110**

**B.E.DEGREE EXAMINATION, 2010**

**(CIVIL AND STRUCTURAL ENGINEERING)**

**(FOURTH SEMESTER)**

**CLEC - 404.**

**STRUCTURAL ENGINEERING - I**

*( New Regulations )*

*( For the students joined during 2007 - 08  
and after )*

November ]

[ Time : 3 Hours

Maximum : 60 Marks

*Answer any ONE full question from each Unit.*

*Assume suitable data wherever necessary.*

*Use of IS 456, SP16, IS 800 and*

*Steel Tables are allowed.*

*ALL questions carry equal marks.*

**Turn Over**

## UNIT - I

1. Design a simply supported roof slab for a room  $8.5 \text{ m} \times 3.6 \text{ m}$  clear in size. The super imposed load is  $4.8 \text{ kN/m}^2$ . Concrete mix is M 20 and steel is Fe 415 steel grade. Check for shear and deflection. (12)

(OR)

2. Calculate the area of reinforcement required for a singly reinforced beam, 240 mm wide and 400 mm deep to resist an ultimate moment of resistance of 78 kNm. Given : Concrete M-20 mix; steel Fe -415. (12)

## UNIT - II

3. Design a column to carry a factored load of 1,500 kN. The dimension of one side is limited to 250 mm. The effective length of the column is 2.75 m, use M20 mix and Fe 415 steel. (12)

(OR)

4. Design a footing for the foundation of a brick wall 40 cm thick and transmitting a load of 100 kN/m of its length. The bearing capacity of the soil is  $60 \text{ kN/m}^2$ . The unit weight of earth is  $15 \text{ kN/m}^3$ . Use  $f_{ck} = 15 \text{ MPa}$  and load factor = 1.5. (12)

## UNIT - III

5. A longitudinal type of staircase spans a distance of 3.75 m centre to centre of beams. The rise  $R = 175 \text{ mm}$ , going  $G = 250 \text{ mm}$ , tread  $T = 270 \text{ mm}$ . The treads have 15 mm granolithic finish and consists of 15 steps. Assuming grade 25 concrete and Fe 415 steel, design the staircase for a liveload of  $5 \text{ kN/m}^2$ . Assume breadth of staircase as 1.5 m. (12)

(OR)

6. A dog legged staircase for a residential flat consists of 18 steps each 300 mm tread and 180 mm rise, with an intermediate landing 1.2m in width at the middle. The width of staircase is also 1.2 m. If the flights are of equal number of steps, design the staircase and sketch the detail.  $f_{ck} = 20 \text{ N/mm}^2$  and  $f_y = 415 \text{ N/mm}^2$ . (12)

## UNIT - IV

7. Design a simply supported plated rolled steel beam section to carry an UDL of  $50 \text{ kN/m}$  inclusive of self weight of the beam. The

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effective span of the beam is 10 m. The depth of the beam should not be more than 500 mm. The compression flange of the beam is laterally supported by the floor construction. (12)

(OR)

8. A plate girder has the following mild steel plate elements : each flange =  $400 \times 16$  mm and web =  $640 \times 12$  mm. Assuming the top flange is laterally restrained, determine the working moment capacity ( or moment resistance ) of the section. (12)

#### UNIT - V

9. A single riveted lap joint is used to connect plates of 12 mm thick. If 22 mm dia power driven field rivets are used at 70 mm, determine the strength of joint and its efficiency. (12)

(OR)

10. Design a build up column consisting of two channels connected by battens to carry an axial load of 800 kN. The effective length of column is 6m. (12)