C 1114 (Pages : 2) Name.....

Reg. No.....



# SIXTH SEMESTER B.TECH. (ENGINEERING) [09 SCHEME] DEGREE EXAMINATION, APRIL 2016

## CE/PTCE 09 602—STRUCTURAL DESIGN–II

Time : Three Hours Maximum : 70 Marks

*Use of IS 800, IS 875, IS 883 and Steel tables are permitted.*
*Assume suitable data if not given.*

### Part A

*Answer* **all** *questions.*

1. Define load factor.
2. How the effective throat thickness for weld is determined ?
3. What do you meant by laterally restrained beam ?
4. Why it is necessary to design the truss members for both compression and tension forces ?
5. What are the factors which affect the strength of timber ?

(5 × 2 = 10 marks)

### Part B

*Answer any* **four** *questions.*

6. Find the collapse load of fixed beam subjected to Uniformly Distributed load W.
7. Determine bolt value of M20 bolt of grade 4.6 , assume Mild steel plate.
8. In a truss, a strut 3 m long consists of ISA 90 × 90 × 6. Find the strength of the member if the angles are connected on both sides of 12 mm gusset plate by single bolt.
9. Explain the types of Column–Beam connections.
10. A roof truss shed is to be built in Coimbatore for an industry. The size of shed is 24 m × 40 m. The height of building is 12 m at the eaves. Determine the basic wind pressure.
11. Design a circular column of group A timber in an interior location carrying 300 kN axial load. The effective length of the column is 3.5 m.

(4 × 5 = 20 marks)

**Turn over**

## Part C

*Answer* **all** *questions*

12 (a) Determine the plastic section modulus $Z_{px}$ and $Z_{py}$ for ISMB 225 @ 306.07 N/m.

*Or*

(b) A 150 mm × 10 mm plate and a 180 mm × 10 mm plate are to be connected in a lap joint by shop weld. Design the connection for full strength of the 150 mm × 10 mm plate.

13 (a) A 5 m long column has to carry, a factored axial load of 1000 kN. Two ends of column is pinned. Design the column. Assume $f_y$ = 250 MPa, $f_u$ = 410 MPa, E = 2 × 105 N/mm$^2$.

*Or*

(b) Design a simply supported beam of effective span 1.5 m, carrying a factored concentrated load of 360 kN at mid span. Assume beam is laterally supported

14. (a) Design a gusseted base for a column ISHB 350 @ 710 N/m with two plates 450 mm × 20 mm carrying a factored load of 3600 kN. The column is to be supported on concrete pedestal to be built with M20 concrete.

*Or*

(b) Design an angle purlin for the following data : Spacing of trusses = 4 m, Spacing of purlins = 1.6 m c/c, Weight of A.C. sheets including laps and fixtures = 0.205 kN/mm$^2$, Live load = 0.6 kN/m$^2$ ,Wind load = 1 kN/m$^2$ , Inclination of main rafter of truss = 21°.

15. (a) A timber beam having clear span of 7 m carries an UDL of 20 kN/m including its self weight. Assuming the beam to be made of timber wood. Design the beam.

*Or*

(b) A timber beam 60 mm wide by 80 mm deep is to be reinforced by bolting on two steel flitches, each 60 mm × 5 mm in section. Find the moment of resistance in the following cases :

(i) Flitches attached symmetrically at top and bottom.

(ii) Flitches attached symmetrically at the sides. Allowable timber stress is 8 N/m$^2$, What is the maximum stress in the steel in each case ? Take E for steel = 2 × 10$^5$ N/mm$^2$ and for timber = 1.4 × 10$^4$ N/mm$^2$.

(4 ×10 = 40 marks)