C 28731 (Pages 2) Name.....

Reg. No.....

# SIXTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION, JUNE 2012

CE 04 603—STRUCTURAL DESIGN—II

(2004 Scheme)

Time : Three Hours Maximum : 100 Marks

*(Use of IS 800, IS 883, IS 875, SP6 and steel table permitted)*

*(Assume suitable data if not given)*

## Part A

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

I. (a) State the merits and demerits of welded connection over bolted connections.

(b) Define semi-rigid connections.

(c) Define web crippling and web buckling in beams.

(d) Explain Latticed columns with neat sketch.

(e) Derive the equation for determining area of cover plates in a built up beam.

(f) Define Slab base with a neat sketch.

(g) Briefly explain different types of roof trusses.

(h) Explain flitched beam with neat sketch.

(8 × 5 = 40 marks)

## Part B

II. (a) Two ISF sections 200 mm × 10 mm each and 1.5 m long are to be jointed to make a member of length 3 m. Design a butt joint with the bolts arranged in diamond pattern and find the efficiency. The flats are supposed to carry a tensile force of 500 kN. Use 20 mm diameter bolts and steel plates of $f_y$ 250 N/mm$^2$.

*Or*

(b) Design a single angle discontinuous strut to carry a axial compressive load of 80 kN. The length of strut is 3.6 m between intersections and is to be connected to 12 mm thick gusset plate. Design the connections also.

III. (a) Design a simply supported laterally restrained beam of span 6 m subjected to u.d.l. of 10 kN/m and central concentrated load of 50 kN. Assume $f_y$ of steel 250 N/mm$^2$.

*Or*

(b) Design a built up column consisting of two channels placed toe to toe. The column carries an axial load of 1600 kN. The effective height of the column is 8 m. Design built up column using battens. Design the battens also.

**Turn over**

IV. (a) Design a gusseted base for a column ISHB 350 @ 710 N/m carrying a load of 3000 kN. The column is to be supported on a concrete pedestal. The allowable bearing pressure in concrete is 5 MPa.

*Or*

(b) Design channel section purlin for the following data: Distance between c/c of trusses – 5 m, Distance between c/c of purlins – 1.6 m, Inclination of the roof surface to horizontal – 30°, Weight of GI sheets – 135 $N/m^2$, Wind load normal to roof – 1.5 $kN/m^2$. Use steel of $f_y$ – 250 $N/mm^2$.

V. (a) Design a solid wood column for the following requirements: Load on the column – 450 kN, safe stress – 7 $N/mm^2$, Effective length of column- 3 m. Assume column situated at outside location.

*Or*

(b) A flitched beam is fabricated from two timber planks of size 100 mm × 300 mm and a steel plate 25 mm thick sand witched between the two. Find the depth of steel plate and also the moment of resistance of the flitched beam. Take $f_s$= 165 $N/mm^2$, $f_w$ = 13.5 $N/mm^2$, $E_s$= 20 $E_w$.

(4 × 15 = 60 marks)