



SIXTH SEMESTER B.TECH. (ENGINEERING)  
DEGREE  
EXAMINATION, JUNE 2011

CE 04 603—STRUCTURAL DESIGN—II  
(2004 admissions)

Time : Three Hours

Maximum : 100 Marks

*All designs shall be done as per IS: specifications.  
S.I. unit shall be followed.*

*Use of IS : 800, IS : 883, IS : 875 and SP6 shall be permitted in the examination hall.*

- I. (a) Name the types of welds. Explain in detail.  
(b) What are the advantages of bolted connections ?  
(c) What do you understand by built-up columns ?  
(d) What is the purpose of providing lacings ?  
(e) Write a short note on slab base.  
(f) Name the types of roof trusses.  
(g) What are the factors considered in the design of columns for timber structures ?  
(h) What are the various types of roof trusses ?
- (8 × 5 = 40 marks)
- II. (a) A double riveted double cover butt joint is used to connect plates 10 mm. thick. Determine diameter of rivet, rivet value, gauge and efficiency of joint. Adopt the following stresses :  
Working stresses in shear power driven rivets = 120 N/mm.<sup>2</sup>  
Working stresses in bearing in power driven rivets = 310 N/mm.<sup>2</sup>  
For plates working stress in axial tension is  $0.6 f_y$ ,  $f_y = 275$  N/mm.<sup>2</sup>
- Or
- (b) (i) Distinguish between Rigid and Semi rigid analysis. (7 marks)  
(ii) Distinguish between Welded and Bolted connections. (8 marks)
- III. (a) A steel column 12 m. long carries an axial load of 1100 kN column is hinged at both ends. Design an economical built-up section with double lacing. Design the lacing also.
- Or
- (b) ISMB 550 at 1.037 kN/m. has been used as a simply supported beam over a span of 5 m. Ends of beam are restricted against torsion but not against lateral bending. Determine safe uniformly distributed load per meters length which the beam can carry.
- IV. (a) A column section ISHB 300 at 0.63 kN/m. with one cover plate 350 mm. × 20 mm. on either side is carrying an axial load of 3500 kN inclusive of self weight of base and column. Design a gusseted base. The allowable bending pressure in concrete is 4 N/mm.<sup>2</sup> The allowable bending stress in base plate is 185 N/m<sup>2</sup>.

Or

Turn over

- (b) Design an angle iron purlin for a trussed roof from the following data :—

Span of roof truss = 1.1 m.

Spacing of roof truss = 4.8 m.

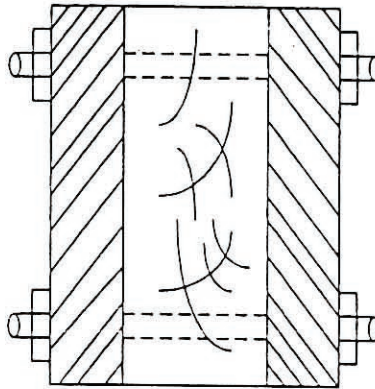
Spacing of purlins along slope of roof truss = 1.8 m.

Slope of roof truss = 1 vertical to 2 horizontal

Wind load on roof normal to roof =  $1150 \text{ N/m}^2$

Vertical load from roof sheeting etc. =  $200 \text{ N/m}^2$

- V. (a) A beam is simply supported at its both the ends. The effective span is 4.5 m. It consists of 200 mm.  $\times$  300 mm. teak wood with  $300 \times 12$  mm. steel plates to its sides as shown in the below figure. Determine the safe uniformly distributed load beam will support :



Or

- (b) A deodar timber beam carries u.d.l. of  $0.65 \text{ kN/m}$ . inclusive of self-weight of the beam. The beam is simply supported at both the ends. The clear span of the beam is 6 m. Design the timber beam.

[ $4 \times 15 = 60$  marks]