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**ET-508(B)**

# B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering)

## Term-End Examination

00177

## December, 2017

## ET-508(B) : STRUCTURAL DESIGN – II

*Time : 3 hours* *Maximum Marks : 70*

***Note :*** *Attempt any **four** questions. All questions carry equal marks. Use of steel tables, IS : 800 and calculator is allowed. Assume any missing data suitably.*

**1.** (a) Determine the load that a hand-driven rivet of 22 mm dia can safely carry if it connects plates 16 mm thick

(i) In single shear

(ii) In double shear

Take permissible stress in direct tension, shear and bearing as 80 MPa, 80 MPa and 250 MPa respectively. *10*

(b) What are the different types of forces acting on a gantry girder ? Also explain their effect on the gantry girder. $7\frac{1}{2}$

2. Design the bottom chord tension member of a steel bridge truss along with its riveted connections to carry a tensile force of 1500 kN (Allowable stress in steel $\sigma_{at}$ = 150 MPa). The effective length of member is 4 m ($f_y$ = 250 MPa). $17\frac{1}{2}$

3. Write various steps of designing a built-up column. Discuss how lacing flats resist horizontal shear forces applied on the column. $17\frac{1}{2}$

4. (a) A simply supported beam of span 10 m is carrying a uniformly distributed load of 30 kN/m. Design the beam using standard I-sections, if compression flange of the beam is laterally supported throughout its length ($f_y$ = 250 MPa). 10

   (b) What is a Bunker ? What are the components of a bunker ? $7\frac{1}{2}$

5. (a) A beam ISLB 400 @ 558 N/m is supported at the flange of a column ISHB 250 @ 537 N/m. The beam carries an end reaction of 100 kN. Design a suitable connection using 20 mm diameter power-driven rivets with $f_y$ = 250 MPa. 10

   (b) Discuss the role of web in a plate girder. $7\frac{1}{2}$

6. Design an angle iron purlin for a trussed roof for the following data : $17\frac{1}{2}$

Span of roof truss = 12 m

Spacing of roof truss = 5 m

Spacing of purlins along the slope of roof = 1·2 m

Slope of roof truss = 1 (V) : 2 (H)

Wind load on roof surface normal to roof = 1·04 kN/m$^2$

Vertical load from roof sheeting = 0·2 kN/m$^2$