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**Question Paper Code : 52778**

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Sixth Semester

Civil Engineering

CE 6603 — DESIGN OF STEEL STRUCTURES

(Regulation 2013)

(Common to PTCE 6603 — Design of Steel Structure for B.E. (Part-Time)  
Fourth Semester – Civil Engineering Regulation 2014)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Determine the bolt value of 16 mm diameter bolt connecting 10 mm plates and is in double shear.
2. List the advantages of welded joints.
3. Write the use of lug angle.
4. What is tension splice.
5. Compare lacing with battens.
6. Define slenderness ratio.
7. Write the function of a bearing stiffener in a plate girder.
8. What is meant by built-up beams?
9. Name the loads to be considered in the design of gantry girder.
10. List the various types of roof trusses.

PART B — (5 × 13 = 65 marks)

11. (a) An angle section ISA 80 mm × 50 mm × 8 mm is welded to a 12 mm thick gusset plate at site. Design the weld to transmit the load equal to the strength of the members. Grade of steel Fe 410.

Or

- (b) Two flats of size 220 mm × 10 mm each are to be connected using 20 mm diameter bolt of grade 4.6 by lap joint to carry a force of 300 kN. Design the joint. Take steel of grade Fe 410.
12. (a) A tension member consists of two angle sections and carries a load of 210 kN. Design the member when both the angles are connected on the same side of the gusset plate.

Or

- (b) Design a 8m long tension member subjected to a factored tensile load of 1500 kN. Use channel sections and flange plates. Take steel of grade Fe 410 and bolts of grade 4.6.
13. (a) A column ISHB 400 @77.4kg/m carries an axial load of 1200 kN and a bending moment of 100 kN-m in the plane of the web. Design a suitable base for the column with the provision of anchor bolts. Take permissible bearing pressure of concrete as 5MPa.

Or

- (b) Design of laced column 10 m long to carry a factored load of 1000 kN. The column is restrained in position but not in direction at both ends. Provide single lacing system. Design the column with two channels placed back to back.
14. (a) A simply supported welded plate girder of effective span 16 m is subjected to a uniformly distributed load of 30kN/m excluding of its own weight. Design a welded plate girder.

Or

- (b) A simply supported beam has an effective span of 6m and carries a udl of 30 kN/m. Design the beam if it is lateral unsupported.
15. (a) Design the section of the gantry girder with the following data  
Spacing of columns = 8 m  
Center to center distance between gantry girders = 18 m  
Crane capacity = 300 kN  
Weight of crane = 200 kN

Weight of trolley 50 kN  
Minimum hook approach = 1.1 m  
Spacing of wheels = 3.5 m  
Steel grade Fe 410

Or

- (b) Design an I — section Purlin for an industrial building to support a galvanized corrugated iron sheet roof for the following data :

Spacing of the truss = 5 m  
Span of truss = 12 m  
Spacing of purlins c/c = 1.5 m  
Intensity of wind pressure = 1.8 kN/m<sup>2</sup>  
Weight of galvanized sheets = 130 N/m<sup>2</sup>  
Grade of steel Fe 410.

PART C — (15 × 1 = 15 marks)

16. (a) Design a bridge compression member of two channels connected toe to toe. The length of the member is 8 m. It carries a load of 1250 kN. The width over the backs of channel is 40 cm. If the channels are connected by battens. Design a suitable section.

Or

- (b) A principal rafter in a roof truss has an effective span of 2 m. It has to support a compressive force of 60kN due to dead load, a compressive force of 70 kN due to live load and a tensile force of 120 kN due to wind load. Design the rafter.