

Reg. No. :

**Question Paper Code : 20279**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Sixth Semester

Civil Engineering

CE 6603 — DESIGN OF STEEL STRUCTURES

(Regulations 2013)

(PTCE 6603 — Design of Steel Structures — for B.E. (Part – Time) Fourth Semester  
Civil Engineering — Regulations — 2014)

Time : Three hours

Maximum : 100 marks

(Use of IS 800 is permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define nominal diameter of rivet.
2. Define Poisson's Ratio.
3. What are stiffened seat connections?
4. Mention any two disadvantages of welded connection.
5. What is meant by short strut?
6. What is the purpose for providing anchors bolt in base plate?
7. Define shape factor
8. What is meant by limit state design?
9. What is meant by first yield moment?
10. Define shear lag.

PART B — (5 × 13 = 65 marks)

11. (a) A column ISHB 350 @ 661.2 N/m carries an axial compressive factored load of 1700 kN. Design a suitable bolted gusset base. The base rests on M 15 grade concrete pedestal. Use 24 mm diameter bolts of grade 4.6 for making the connections. (13)

Or

- (b) Design an I section purlin, for an industrial building situated in the outskirts of Allahabad, to support a galvanised corrugated iron sheet roof of the following data:

Spacing of the truss c/c = 6.0 m

Span of truss = 12.0 m

Slope of truss = 30°

Spacing of purlins c/c = 1.5 m

Intensity of wind pressure = 2 kN/m<sup>2</sup>

Weight of galvanised sheets = 130 N/m<sup>2</sup>.

Grade of steel = Fe 410. (13)

12. (a) Design a suitable bolted bracket connection of a ISHT-75 section attached to the flange of a ISHB 300 at 577 N/m to carry a vertical factored load of 600 kN at an eccentricity of 300 mm. Use M 24 bolts of grade 4.6. (13)

Or

- (b) A tie member consisting of an ISA 80 mm × 50 mm × 8 mm (Fe 410 grade steel) is welded to a 12 mm thick gusset plate at site. Design welds to transmit load equal to the design strength of the member. (13)

13. (a) Design the principal rafter of Pratt type roof truss for the following data. Design also its connection using 20 mm diameter bolts.

Design compressive load = 170 kN (due to D.L and L.L)

Design tensile load = 60 kN (due to D.L and L.L)

Length of rafter panel = 2.5 m

Grade of steel Fe 410

Grade bolts 4.6. (13)

Or

- (b) Design a single angle strut connected to the gusset plate to carry 180 kN factored load. The length of the strut between centre to centre intersections is 3 m. (13)

14. (a) A built-up I-section has the following dimensions : Flanges :  $250 \times 6$  mm;  
Web :  $300 \times 3$  mm. Calculate the plastic section modulus and plastic  
moment capacity of the section. Also find the shape factor. (13)

Or

- (b) An ISMB 400 transfers an end reaction of 160 kN to the flange of an  
ISHB 300 @ 577N/m. design an unstiffened welded seat connection. take  
 $f_b = 185$  N/mm<sup>2</sup>. (13)
15. (a) Design a column using a rolled steel I-section with cover plates to carry a  
factored axial load of 2000 kN. The effective length in both the planes is  
5m. Take  $f_y = 250$  MPa and  $E = 200$  GPa. (13)

Or

- (b) List out the various elements of the roof truss and mark all its  
significance. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Design a steel stanchion of effective length 5 m to carry a factored load of  
500 kN. (15)

Or

- (b) Explain the design principles of gantry girder. (15)