

Register No.: Name:

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

SEVENTH SEMESTER B.TECH DEGREE EXAMINATION (R), DECEMBER 2023

CIVIL ENGINEERING

(2020 SCHEME)

Course Code: 20CET401

Course Name: Design of Steel Structures

Max. Marks : 100

Duration: 3 Hours

Use of Codes IS 800, IS 875, IS 883 and steel table permitted

Assume suitable data wherever necessary

PART A

(Answer all questions. Each question carries 3 marks)

1. Explain the failures of bolted joint.
2. Illustrate the IS 800 codal provision to determine pitch, end distance, edge distance in a bolted connection.
3. Explain the need for providing a lug angle in steel sections.
4. Explain splice plate and shear lag effect.
5. Determine the buckling class of ISA 100×100×6 given height of column as 3m and with pin ends.
6. Differentiate between Lacings and Battens with figures .
7. Explain the necessity of stiffeners in steel sections.
8. Illustrate the conditions to be satisfied for a ISLB 200 section to be plastic (Class 1). Take $f_y=250\text{MPa}$.
9. Enlist any three general fire safety requirements for a building.
10. Find the design wind pressure in Chennai for a general building, with Terrain Category 1 and a height of 10m. Building is located in a levelled surface.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. An ISMC 250 of Fe 410 grade is used as a tie member to transmit a factored load of 800 kN. The channel section is connected to a gusset plate of 10mm thickness. Design a fillet weld if the lap length is limited to 300mm. Assume slot weld. (14)

OR

12. Design a double cover butt joint between two plates of width 350 mm. The thickness of plates are 22mm and 14mm. Cover plates are 8mm thick. (14)

MODULE II

13. Design a suitable angle section to carry a factored tensile force of 200 kN assuming a single row of M22 bolt. The yield strength and ultimate strength of material is 250 MPa and 410 MPa. Length of member is 3.5 m (14)

OR

14. A single unequal angle ISA 100×75×8 of Fe 410 grade is connected to a 12 mm thick gusset plate with 6 numbers of M20 bolts of Grade 4.6 to transfer tension. Determine the design tensile strength of the angle if the gusset is connected to the 100 mm leg. (14)

MODULE III

15. Design a built-up column 7m long to carry a factored axial compressive load of 2000 kN. The column is restrained in position but not in direction at both ends. Use channels placed back-to-back. Also design lacings for the column. (14)

OR

16. Design a slab base for a column ISHB 400 to carry a factored axial load 1500kN. Load is transferred through welded connection. Use M20 grade concrete. (14)

MODULE IV

17. A conference hall is 8 m × 12 m is provided with a 12 cm RCC slab over rolled steel I beams spaced 4m c/c. The Live load is 4kN/m² and floor finish is 1.5 kN/m². Design one of the beam as laterally supported. (14)

OR

18. Design a simply supported beam of span 6.65 m subjected to uniformly distributed service loads of 42 kN/m. The beam depth is restricted to 375 mm. The compression flange is laterally supported. Assume stiff bearing as 100 mm. (14)

MODULE V

19. Design an I section purlin for an industrial building to support GI sheet roof. Spacing of purlin is 2 m and span 12 m. Slope of rafter is 30°. Spacing of truss is 5 m. Wind pressure is 2 kN/m². (14)

OR

20. Explain the different fire-resistant design approaches used in steel structures. (14)
