Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree 7th semester (S,FE) (FT,PT) Exam April 2025 (2019 Scheme)

Course Code: CET401
Course Name: DESIGN OF STEEL STRUCTURES

Use of IS 800 -2007, SP6 (1), IS 875- part 1, part 2, part 3 permitted
Assume any missing data suitably

Max. Marks: 100 **Duration: 3 Hours.**

PART A

Answer all questions, each carries 3 marks. Marks

1	What does 4 and 6 imply for bolts of grade 4.6?	(3)
2	Elaborate on different types of failures in bolted connection.	(3)
3	Why are unequal angle with long leg connected more efficient for tension members?	(3)
4	Under what circumstances do we use lug angle?	(3)
5	Enumerate the various modes of failure of compression members.	(3)
6	With the aid of sketch elaborate on slab base.	(3)
7	Outline the design procedure for laterally supported beams.	(3)
8	Elaborate on the significance of web crippling and web buckling in the design of steel beams.	(3)
9	Explain the behaviour of steel at high temperature.	(3)
10	Sketch and explain different features of a roof truss.	(3)

PART B

Answer any one full question from each module, each carries 14 marks.

Module I

11	Design a lap joint between two plates of 10mm thickness so as to transmit a factored load of 75kN using M16 bolts of grade 4.6 and grade of plate is 410.	(14)

OR

12	A tie member of a truss consists of double angle section, each 80mm × 80mm × 8mm welded on the opposite side of a 12mm thick gusset plate. Design a fillet weld for making connection in the workshop. The factored tensile force is 300kN.	(14)

Module II

13 Design a double angle tension member connected on each side of a 10mm thick gusset plate to carry a factored load of 375kN. Use 20mm diameter bolts. Assume shop connection. (14)

OR

14 Design a tension member using unequal angle to resist a factored load of 250kN. Use weld connection with a gusset plate of 10mm thickness. (14)

Module III

15 Design a built-up column consisting of two channels placed back-to-back to carry an axial factored load of 1000k N. Length of the column is 5m and the column is restrained in position and but not in direction at both ends. Use steel of grade Fe410. Design the lacing system and required connections. (14)

OR

16 a) Design a slab base for a column ISHB350 @ 710.2N/m subjected to a factored load of 1500kN. The load is transferred to the base plate by shop welded connections; the column end and the base plate are not machined for bearing. (10)

b) With the aid of sketch elaborate on gusset base. (4)

Module IV

17 Design a laterally supported beam of effective span 6m for the following data (14)

Grade of steel: Fe410

Maximum factored bending moment; M = 150kN

Maximum factored shear force; V = 250kN

Check for deflection not required

OR

18 Design a steel beam section for supporting roof a big hall for the following data and apply the usual checks. Assume steel of grade Fe410 (14)

Clear span: 6.5m

End bearings :150mm

c/c spacing of beam: 3m

Imposed load on the beam: 10kN/m^2

Dead load (inclusive of self-weight): 4kN/m^2

Restriction on beam depth: 375mm

The compression flange of the beam is laterally supported throughout.

Module V.

19 Design an I-section purlin, for an industrial building, to support a galvanized iron sheet roof for the following data: (14)

Slope of truss = 30°

Spacing of truss c/c = 4.0 m

Span of truss = 12.0 m

Spacing of purlins c/c = 2 m

Wind speed = 39 m/s

Weight of galvanized sheets = 120 N/m^2

Grade of steel = Fe 410

OR

20 Design a bolted bracket connection for the load as shown in Figure 1. Use Fe410 and 4.6 grade bolts. The thickness of bracket plate may be 10mm. The column section is ISHB150 @ 300.19N/m. (14)

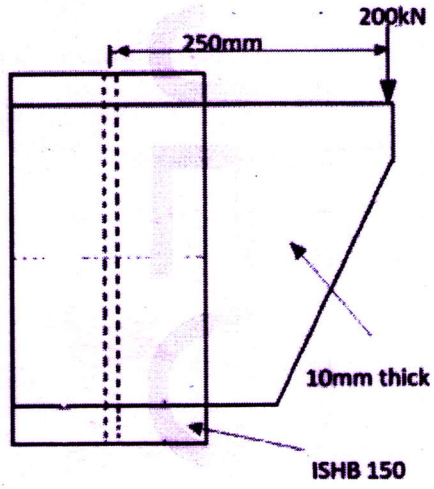

Figure 1

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