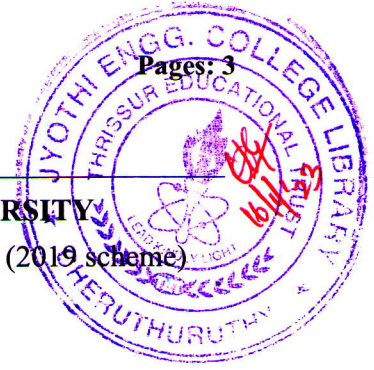Reg No.:_____   Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Examination December 2022 (2019 scheme)

Course Code: CET401

Course Name: DESIGN OF STEEL STRUCTURES

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

Use of IS-800, IS-875, SP6, Steel Tables is permitted
State and Assume suitable data wherever necessary.

PART A

Answer all questions, each carries 3 marks.   Marks

1	Differentiate between Lap joint and Butt joint.	(3)
2	List the various types of Structural steel sections available in the market.	(3)
3	Explain the failure modes of tension member.	(3)
4	What is lug angle? Explain the design criteria of lug angle.	(3)
5	What are the main purpose of lacings and battens?	(3)
6	Differentiate between Gusset base and slab base.	(3)
7	Explain web buckling and web crippling.	(3)
8	Sketch and explain different elements of a welded plate girder.	(3)
9	Sketch and explain different features of a roof truss.	(3)
10	Explain the material properties of steel at elevated temperatures.	(3)

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

Module I

11   Design a double cover butt joint between the two plates, each of thickness 14   (14)
mm. The joint has to transfer a working load of 300 kN. Assume cover plate of
thickness 8 mm. The plates are of Fe 410 grade. Use bolt of grade 4.6.

OR

12   A tie member consists of 2 ISMC 250.The channels are connected on either side   (14)
of a 12mm thick gusset plate. Design the welded joint to develop the full
strength of the tie, however the overlap is limited to 400mm. Use slot weld if
required.

Module II

13 A bridge truss diagonal carries a pull of 200 kN. The length of the diagonal is   (14)
3m. Design a suitable section. The member is connected to a gusset plate of 14
mm thick. Use bolt of grade 4.6 and steel Fe 410.

OR

14 Design a tie member to transfer a factored axial load of 300 kN, is to be welded   (14)
to a gusset plate of 10mm thick. Design the weld if the weld is provided on two
sides by overlapping the angle on the gusset plate at a shop. Also sketch the
connection showing the weld lengths.

Module III

15 Design a built-up column consisting of two channels placed back to back to   (14)
carry an axial factored load of 800 kN. Length of the column is 7m and the
column is restrained in position but not in direction at both ends. Provide batten
system with bolted connection. Use steel of grade Fe 410.

OR

16 A built-up column 10m long to carry a factored axial load of 1500 kN. The   (14)
column is restrained in position and direction at both the ends. Provide single
lacing system with bolted connection. Design the built up section as two
channels placed back to back. Use steel of grade Fe 410.

Module IV

17 A hall in a building is 15m x 18m is provided with a RCC slab over rolled steel   (14)
beams spaced 6m centre to centre. Design the simply supported main beam
supporting concrete floor slab if thickness of concrete slab is 150 mm and a
wearing coat of 40 mm thick is provided over the slab. Weight of concrete slab
and wearing coat is 24 kN/m^3 .

OR

18 A beam simply supported over an effective span of 9 m. The beam spacing is 3m   (14)
and beam carry a dead load of 5 kN/m^2 inclusive of its own weight. The imposed
load on the beam is 15 kN/m^2. The depth of the beam is restricted to 575 mm.
Design the beam, assuming that the compression flange of the beam is laterally
restrained by floor construction.

Module V

19 Design a purlin on a sloping roof truss with the dead load of 0.15 kN/m^2, a live   (14)

load of 2.5 kN/m^2 and a wind load of 0.6 kN/m^2 (suction). The purlins are 1.9 m centre to centre and a span of 4 m, simply supported on a rafter at a slope of 20^0.

OR

20 a) Determine the design wind pressure on a pitched roof near Delhi.   (8)

Given Structure: An industrial shed situated on flat terrain with sparsely populated buildings. The span of roof truss is 20 m and rise is 4 m Height of building at eaves: 10 m

   b) Explain various methods of fire protection.   (6)

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