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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S7 (R, S) / S7 (PT) (R) Examination December 2023 (2019 Scheme)

Course Code: CET401

Course Name :DESIGN OF STEEL STRUCTURES

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

Use of IS 800, SP 6(1) and IS 875 is permitted

PART A

Answer all questions, each carries3 marks. Marks

1	What is meant by Factor of Safety in steel deign. Explain the concept of introducing factor of safety in design	(3)
2	Write any three advantages and disadvantages of welded connection	(3)
3	How does block shear affect the strength of a tension member	(3)
4	When plates under tension are connected by staggered bolts, how the design strength due to rupture of critical section is determined?	(3)
5	Discuss the deign procedure in the design of a double angle discontinuous strut	(3)
6	What is a column base? List different types of column bases and explain any one with sketch.	(3)
7	Explain with sketches any three methods to provide lateral restraint for steel beams	(3)
8	Describe the Components of a Plate Girder	(3)
9	Briefly explain any three types of roof truss with figures	(3)
10	Explain how is fire resistance determined?	(3)

PART B

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

Module I

11	a)	Design a lap joint between two plates each 12mm thick. The load to be transferred by the joint is 140kN. Use 20mm diameter bolts of class 4.6.	(7)
	b)	A tie member 75mm X 8mm is connected to a 10mm thick gusset plate by welding provided on all four sides. The overlap of tie member on to the gusset plate is 50mm. Determine the maximum load the connection can carry.	(7)

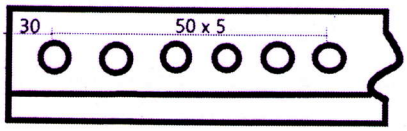
OR

12 a) An ISA 100 X 100 X 10mm is subjected to a factored tensile load of 85kN. Design the bolted connection to join the angle section to a 12mm thick gusset plate. (7)

b) Compare the strength of a Double V and Single V weld provided between two plates of size 150mm X 20mm and 150mm X 16mm. (7)

Module II

13 a) Determine the design tensile strength of the angle ISA 100X65X10 when it is connected to a 12mm thick gusset plate using 6 bolts of 20mm diameter and class 4.6. (14)



OR

14 a) Design a single angle tension member to carry and factored axial tension of 180kN connected to a 20mm thick gusset plate using M20 Class 4.6 bolts. (14)

Module III

15 a) Two channel sections are to be used to build a 11m long steel built-up column. Design the column to carry a factored axial load of 1300kN. Design the lacing system and required connections. (14)

OR

16 a) A steel column ISHB 400@77.4 kg/m is 4m long. The column is restrained in direction and position at both the ends. Check the safety of the column when the factored axial load is 1500kN (7)

b) A steel column made of ISWB 400 is carrying a factored load of 1800kN. Design a suitable base plate for the column when the column is resting on a pedestal made of M30 grade concrete. (7)

Module IV

17 a) Design a simply supported beam having 6 m span to carry a factored UDL of 125kN/m including self weight and an imposed load of 50kN. The compression flange of the beam is supported laterally by the floor structure. Assume a 75mm stiff end bearing. (14)

OR

18 a) An ISMB 500 is used as a beam over a span of 7m, with simply supported ends. (14)

Determine the maximum factored UDL that beam can carry if the compression flange is laterally unsupported.

Module V

19 a) Design a purlin for the following given data: (14)

Cladding and insulation load: 0.15 kN/m2

Live load: 3kN/m^2

Wind load: 1kN/m^2

Purlins are 2.5m centre to centre and span of 4, simply supported on rafter of 30 degree slope. Use angle section purlin

OR

20 a) Explain the various methods of fire protection (7)

b) Explain the material property of steel at elevated temperature (7)

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