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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S7 (R, S) / S7 (PT) (R,S) Examination November 2024 (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- Part 1, Part 2, Part 3 is permitted
State and assume suitable data wherever necessary

PART A

Answer all questions, each carries 3 marks. Marks

1	Write any three merits and demerits of bolted connections.	(3)
2	Under what circumstances do we use slot welds and plug welds?	(3)
3	Write different steps involved in design of tension members.	(3)
4	Explain the purpose of lug angles in tension member connection.	(3)
5	Define slenderness ratio. What is its significance in the design of compression members?	(3)
6	Explain the principle of laced and battened columns.	(3)
7	Differentiate web buckling & web crippling in beams.	(3)
8	Explain any two types of stiffeners used in plate girder with neat sketches.	(3)
9	Explain the different types of loads to be considered in the design of purlins.	(3)
10	List the different fire resistance criterion.	(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 width 200mm and thickness 12mm and 20mm so as to transmit a factored load of 150 kN using M20 bolts of grade 4.6 and Fe410 plates.	(14)

OR

12	An ISMC 300@ 35.8 kg/m is used as a tie member to transmit a factored load of 850kN. The channel section is connected to a gusset plate of 10mm thickness. Design a fillet weld if the lap length is limited to 300mm. Provide slot welds if required.	(14)

Module II

13 Design a single angle section for a tension member of a roof truss to carry a factored tensile force of 250kN. Use 20mm shop bolts of grade 4.6 for the connection. (14)

OR

14 Design a double angle tension member connected on each side of a 10mm thick gusset plate to carry an axial factored load of 400kN. Use 20mm black bolts. Assume shop connection. (14)

Module III

15 Design a single angle discontinuous strut to carry a factored axial compressive load of 85kN. The length of strut is 3m between the intersections. It is connected to 12mm thick gusset plate by 20mm diameter bolts of 4.6 grade. (14)

OR

16 Design a built-up column consisting of two channels placed back to back to carry an axial factored load of 1800kN. Design bolted single lacing system also. Length of the column is 10m and both the ends of the column are effectively restrained in direction and position. (14)

Module IV

17 Design a simply supported beam of effective span 2.5m span carrying a factored concentrated load of 150kN at midspan. The compression flange of the beam is laterally supported. Assume f_y=250N/mm^2. (14)

OR

18 Design a simply supported beam of 5m effective span carrying a uniformly distributed load of 40kN/m including its self-weight. The compression flange is laterally unsupported. Assume f_y=250N/mm^2. (14)

Module V

19 Design an I- section purlin for an industrial building for the given data. (14)
Weight of GI sheeting (including lap & connectors): 0.13 kN/m^2
Imposed load: 2.0kN/m^2
Wind load: 1.0kN/m^2, suction
Spacing of truss: 3.5m
Spacing of Purlins: 1.5m
Inclination of main rafter to horizontal: 30°

OR

20 a) A roof truss shed is to be built in Chennai for an industry. The shed is situated on a flat terrain with sparsely populated buildings. The height of building is 12m at the eves. Determine the basic wind pressure. (8)

b) Explain the various passive protection methods for steel structures against fire. (6)

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