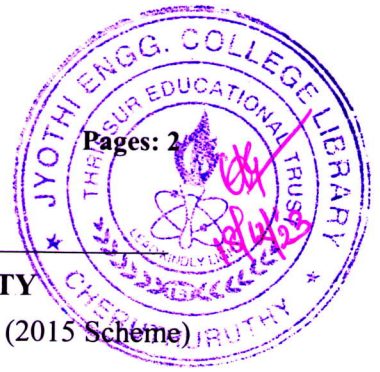


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Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S7 (S, FE) / S7 (PT) (S,FE) Examination December 2023 (2015 Scheme)

Course Code: CE401

Course Name: - DESIGN OF STEEL STRUCTURES

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) Explain the concept of shear lag with a neat sketch. (3)
- b) Design a double angle tension member connected to each side of a gusset plate to carry a factored load of 400 kN. Use M20 bolts. (12)
- 2 a) Explain different Failures patterns of tension members. (3)
- b) Design a double cover butt joint with 8 mm cover plates using ordinary black bolts between two plates of width 200 mm and thickness 10 mm and 20 mm respectively to transmit a factored load of 165kN. Use Fe 410 plates. (12)
- 3 a) What are the different types of bolted connection? (3)
- b) A diagonal member of a roof carries a maximum axial pull of 450kN. Design the section. (12)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) Distinguish between a slab base and a gusseted base. (5)
- b) Design a gusseted base for an axially loaded column to carry a factored load of 1900 kN. The column consists of ISHB 400 @77.4 kg/m. The base plate rests on M 20 concrete foundation. Design the bolted connection between the column flange and gusset plate. Use 24 mm diameter bolt. (10)
- 5 a) List the elements of a welded plate girder. (5)
- b) Design a welded plate girder of span 25 m to carry superimposed load of 35kN/m. Avoid the use of bearing and intermediate stiffeners. Use Fe 415 steel. (10)
- 6 a) Distinguish between laterally restrained and unrestrained beams. (5)
- b) A simply supported steel joist of 5m effective span is laterally supported throughout. It carries a total udl of 60 kN inclusive of self weight. Design an appropriate section using steel of grade Fe 410. (10)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) A communication tower of 85 m height is proposed to be built over hill top of height 520 m with a gradient 1 in 5. The horizontal approach distance is 2.8 km from the level ground. The tower is proposed at Dehradun. Determine the design wind pressure. (5)
- b) Design an I section purlin for an industrial building to support a galvanised iron sheet roof. (15)
- Given:
- Spacing of truss=6 m
- Spacing of purlin=2 m
- Inclination of rafter to horizontal= 29°
- Weight of sheet taking into account laps and connecting bolt= 135N/m^2
- Wind Load= 1 kN/m^2
- Imposed snow load = 1.5kN/m^2
- 8 a) Design a wooden simply supported beam of clear span 5m and carries a UDL of 13kN/m . The bearing at each end is 30cm. Assume that teak wood is used. (10)
- b) A bracket is bolted to the flange of a column ISHB 300 @ 577 N/m . Use 8 mm thick bracket plate, M20 bolt of grade 4.6. The load of 300 kN is acting at an eccentricity of 350 mm. Design the Type I connection. (10)
- 9 a) Classify timber based on grades, modulus of elasticity, durability, treatability and location. (5)
- c) A deodar timber beam carries a udl of 18 kN/n inclusive of self-weight of the beam. The beam is simply supported at both ends. The clear span of beam is 5 m. Design the timber beam. (15)
