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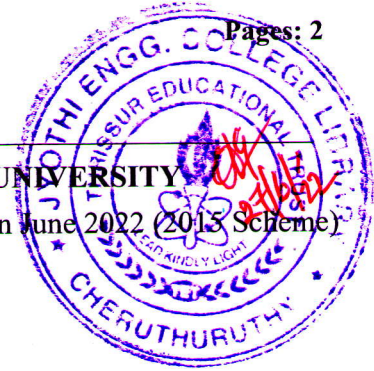
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Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh Semester B.Tech Degree Supplementary Examination June 2022 (2015 Scheme)



Course Code: CE401

Course Name: - DESIGN OF STEEL STRUCTURES

Max. Marks: 100

Duration: 3 Hours

**Use of IS-800, IS-875, IS-883, SP6, Steel Tables is permitted
State and Assume suitable data wherever necessary.**

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) Sketch and briefly explain the various failure patterns of bolted connection (5)
- b) Two plates of 300 x 12mm are to be connected by a double cover butt joint with M20 class 4.6 grade bolts. Cover plates are of 10mm thickness, The joint should resist a factored tensile force of 600kN. Design the connection (10)
- 2 a) Design a tension member to carry factored load of 600 kN. Length of the member is 3.5m. The tension member is connected to a gusset plate of 16mm thickness with one line of M20 bolts of grade 8.8 (10)
- b) Explain the possible failure modes in Tension member? (5)
- 3 a) List out the merits and demerits of welded connection over bolted connection? (5)
- b) Determine the tensile strength of a tension member ISA 150x75x10mm connected to a 10mm thick gusset plate by 4 Nos M20 Class 4.6 bolts. (10)

PART B

Answer any two full questions, each carries 15 marks.

- 4 a) Design a built up column of 10 m long to carry an axial load of 1100 kN. The column is restrained in position but not in direction at both ends. Provide double laced system with bolted connection. Use Fe410 steel & bolts of grade 4.6. Design the column with 2 channels placed back to back? (15)
- 5 a) Explain web buckling and web crippling (5)
- b) Design a laterally unsupported beam simply supported at both end. Effective span 6m carrying a working load of 40 kN/m including self-weight, $f_u = 410\text{MPa}$ (10)
- 6 a) Design a gusset base for a column ISHB 350 @ 72.4 kg/m carry a factored axial (10)

load of 4000kN. 20mm thick cover plates are used. The base plate is resting on a concrete pedestal of M30 grade.

- b) Write the design steps for the design of battened column? (5)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) Design a purlin on a sloping roof truss with the dead load of 0.2kN/m^2 , live load of 2kN/m^2 and a wind load of 0.6kN/m^2 (suction). The purlins are 1.5m centre to centre and a span of 3.5 m, simply supported on a rafter at a slope of 20° . (16)
- b) Explain the various types and components of Trusses and explain the various load combinations considered in the design of trusses (4)
- 8 a) A solid wooden column 150X150mm is made of babul wood. Find safe axial load on column (10)
- i) If unsupported length $S= 1.5\text{m}$
- ii) If unsupported length $S= 3\text{m}$
- b) A timber beam of clear span 8m carries a UDL of 16kN/m including self-weight of the beam. Bearing length over the support is 0.25 m. Assuming beam is of deodar wood. Design the beam (10)
- 9 a) Explain the design procedure of purlin? (5)
- b) A roof truss shed is to be built in Luknow for an industry. The size of shed is $28\text{m} \times 8\text{m}$. the height of building is 12m at the eaves. Determine the basic wind pressure (7)
- c) Explain the necessity of seasoning of timber and discuss the various defects seen in timber? (8)
