A G1009

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SEVENTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: CE401
Course Name: - DESIGN OF STEEL STRUCTURES
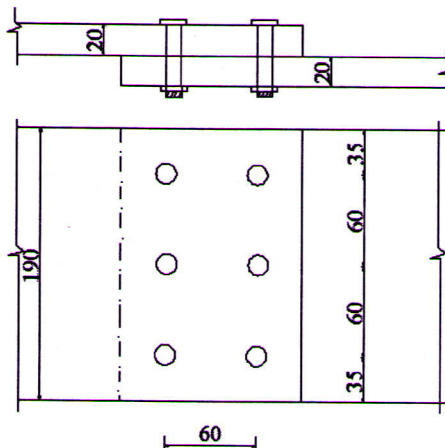
Max. Marks: 100 Duration: 3 Hours

(Use of IS800, IS875, IS883 are permitted)

PART A
Answer any two full questions, each carries 15 marks. Marks

1 a) Sketch different types of bolted connections (3)

   b) Find the efficiency of the lap joint shown in Fig.1. Given M20 bolts of grade 4.6 (12)
   and Fe 410 plates are used.

Dimensions in mm
Fig.1

2 a) Explain different types of weld (3)

   b) Determine the tensile strength of ISA 125 x 95 x 8 mm connected to the gusset (12)
   plate of 10mm through the shorter leg by 4, M20 bolts arranged in one row. The
   grade of steel is Fe410. Take p = 65 mm ,Edge & End distance = 40mm

3 a) Explain the purpose of lug angles in tension member connection? (3)

   b) Determine the design tensile strength of the plate 200 x 10mm with the holes as (12)
   shown below if the yield strength and ultimate strength of steel are 250MPa and
   410MPa. M20 bolts and 10mm thick gusset plates are used.
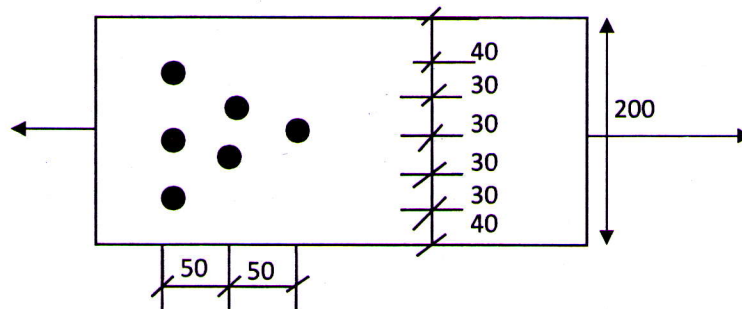
PART B
Answer any two full questions, each carries 15 marks.

4 a) Design a column 10 m long to carry a factored axial load of 1100kN.The column   (15)
is restrained in position but not in direction at both ends. Design a batten system
for the column. Assume that the two channels are kept back to back.

5 a) Explain the failure modes of axially loaded columns   (5)

   b) Determine the design load capacity of the column ISHB 300@577 N/m if the   (10)
length of the column is 3m and its both ends are hinged.

6 a) What are the cross section classification defined in IS 800-2007 based on   (3)
slenderness of plate elements?

   b) Design a simply supported beam of 10m effective span carrying a total factored   (12)
load of 60kN/m. The depth of beam should not exceed 500mm. The compression
flange of beam is laterally supported by floor construction. Assume stiff end
bearing is 75mm.

PART C
Answer any two full questions, each carries 20 marks.

7 a) Determine the design forces in the members of a Fink type roof truss for an   (20)
industrial building for the following data. Overall size of building : 48 x16m.,
C/c spacing of trusses: 8m , Rise of truss :1/4 of span , Self weight of purlins :
318 N/m., Height of columns : 11m. Roofing : A C sheets (171N/m^2), Location :
Agra.

8 a) Derive the expression for calculating the force **F** in a bolt subjected to a factored   (4)
load P at an eccentricity **e.** The line of action of the load is in the plane of the
bolted connection and the centre of gravity of the connection is the centre of
rotation.

   b) The trusses for a factory building are spaced at 6 m c/c. and the purlin is spaced at   (16)

2m c/c. The pitch of truss is 28^0 and span of truss is 18m. The roof consists of asbestos sheets with 150 N/m^2.Design a suitable I section purlin

9 a) Design a beam of clear span 3m at spacing of 1.5m in a roof. The bearing at each   (15)
       end is 30cm. The dead load of roof covering is 2kN/m^2 and live load is 2.5
       kN/m^2. Assume that teak wood is used.

   b) Classify the timber based on grades, modulus of elasticity, durability, location and   (5)
       treatability.

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