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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
SECOND SEMESTER M.TECH DEGREE EXAMINATION APRIL/MAY 2018

Branch: Civil Engineering

Stream: Structural Engineering

01CE6102 Advanced Metal Structures

Max. Marks: 60   Duration: 3 Hours

(Use of Relevant IS codes & Steel table permitted)

(Assume suitable data if not given)

Answer any two questions from each part

PART - A

1.a	Briefly explain Simple, Rigid & Semi-rigid Connections. Draw neat sketches of typical Beam to Column connections for each type.	(4)
b	Design bolted seat angle connection for connecting an ISMB 225@ 31.2kg/m to flange of ISHB 250@51 kg/m. Factored End reaction is 100 kN. Use 4.6 grade bolts.	(5)
2. a	Design hanger joint with an end plate to carry a downward load of 150 kN. Use end plate size 220 mm x 180 mm and appropriate thickness and 2 nos of M25 Gr.8.8 HSFG bolts.	(6)
b	Explain the various weld defects which occurs in steel structures	(3)
3.a	An ISLC 250@ 28kg/m transmits and end reaction of 150 kN to flange of Stanchion ISHB 300@ 58.8 kg/m. Design welded web angle connections.	(5)
b	Design a welded cover plate splice for an ISHB 300@ 58.8 kg/m column supported by an ISHB 300 @ 58.8 kg/m column so as to transfer a factored axial load of 250 kN. The splice is near a point of lateral restraint. The ends are not prepared for full contact in bearing.	(4)

PART - B

4.a	State the advantages and disadvantages of composite steel structures	(5)
b	Derive the equation for determining thickness of slab base, when subjected to axial load alone.	(4)
5.	Design a gantry girder for the following data. Crane type : MOT, Crane capacity: 60 kN, Weight of crab: 20 kN, Weight of crane: 100 kN, Minimum clearance between crane hook and gantry girder: 1.0 m, wheel base: 2.5m, Distance	(9)

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between c/c of gantry: 15m, Distance between c/c of gantry columns: 4m.

Check the girder for laterally unsupported condition alone. Also check the deflection of gantry girder designed.

Shear check not expected.

6.a	Briefly explain partial and full shear connectors	(4)
b	Explain how composite steel structures are designed for positive and negative bending moment.	(5)

PART - C

7.a	Design an aluminium beam to carry udl of 2 kN/m over a span of 4m. Use H30 alloy. Perform all necessary checks.	(6)
b	Design an aluminium equal leg angle strut to carry axial load of 100 kN. Effective length of strut is 2.0 m. Provide single channel section. Perform all necessary checks	(6)
8.a	Briefly explain the steps involved in design of a stiffened compression member using cold formed steel.	(6)
b.	Briefly explain the various methods of analysis.	(6)
9.	Find the plastic moment value of the given frame. All the members have same M_p. Plot the bending moment diagram. Find the reactions.	(12)