Code No: R1632011 **R16** SET - 1

III B. Tech II Semester Supplementary Examinations, November- 2019

DESIGN AND DRAWING OF STEEL STRUCTURES

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any ONE Question from Part – A and any THREE Questions from Part – B

Use of I) IS: 800-2007 2) IS 875 – steel table 3) Part III (wind loads)

For all designs adopt Limit State Method

*****

PART –A

1 Design a built up laced column and associated connecting elements to carry an axial load 1000 kN and moment 30 kN-m. The column height is 12 m, hinged at bottom and top, and built with Four angle sections placed in the form of back to back and connected by field weld joints of laced system. Neatly sketch and detail the built up section and apply necessary design checks. Use steel grade Fe410. [28M]

2 Design a 18 m long simply supported welded plate girder and its component elements carrying UDL dead load (exclude self weight) 50 kN/m, and two point loads located at quarter span on each side, each 300 kN. Assume the girder is supported laterally throughout its length. Use thin web and stiffened plate girder as per Tension field method. Assume stiff bearing length at support 180 mm. Design and detail the girder and elements with necessary design checks as per I.S code. Assume shop weld joints. [28M]

PART –B

3 Design a butt joint between 10 mm thick bracket plate and column, so as to transfer reaction load 120 kN at eccentricity 75 mm (from column flange: Column ISHB 200). Neatly detail the joint and apply necessary design checks. [14M]

4 Design a laterally restrained simply supported beam section of 6 m clear span and carrying factored UDL: 30 kN/m. Assume stiff bearing length 125 mm. Apply necessary design checks. [14M]

5 Deign a Channel section of roof Purlin with the following data: [14M]
Spacing of truss 3 m (centre to centre), Spacing of purlin: 1.2 m, Angle of truss 30^0, weight of roof cover: 120 N/m^2, Wind load: 1.30 kN/m^2. Neatly detail the weld joint and connection system.

6 Design a Gusset base system and connecting elements to carry column axial load of 600 kN (Column section ISHB 450) and moment 50 kN-m. Assume M30 grade concrete used in foundation. Design and detail the system with necessary checks. [14M]

7 Design a gantry girder (without lateral restraint along its span) for an Industrial building to support overhead travelling crane. Use the following data: [14M]
Centre to centre distance between column (span of gantry) 6 m, Crane capacity 150 kN, Self weight of crane girder (exclude trolley) 160 kN, Self weight of trolley motor and other accessories 40 kN, Minimum hook approach 1.00 m, Distance between wheel centers of trolley 2.00 m, Centre to centre between gantry rails (span of crane) 12 m, Self weight of rail section 250 N/m, Yield strength of steel 250 MPa.

www.jkvrsgroup.com www.upiqpbank.com