Code No: RT32013 **R13** 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

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PART –A

1 Design a built up laced column and associated bracing elements to carry an axial load 1200 kN. The column height is 8 m, fixed at bottom and hinged at top, built with Two channel sections placed in the form of toe – to – toe and connected by shop weld joints of laced system. Design, configurate, Detail and apply necessary design checks to the built up column section. Choose economic section. Use steel grade Fe410. [28M]

2 Design a weld stiffened plate girder with thin web and its component elements for a simply supported bridge deck beam of clear span 24 m, The girder subjected to dead load (Include self weight) 18 kN/m, imposed load 12 kN/m, and two moving loads 100 kN each, spaced at 2 m apart. Assume the top compression flange of girder laterally restrained and prevented from rotation. Assume stiff bearing length at each support 150 mm. Design and detail the girder and elements with necessary design checks as per I.S code. Assume filed weld joint system. [28M]

PART -B

3 Design a stiffened seat angle and weld connection for a column section ISHB250 that transfer the reaction 150 kN from the connecting beam ISHB250. Use Fe410 grade steel. Neatly sketch the detailing and apply necessary design checks. [14M]

4 Design a laterally unrestrained simply supported beam section of 4 m clear span that carrying UDL: 50 kN/m. Assume stiff bearing length 75 mm. Apply necessary design checks. [14M]

5 Determine the tensile strength of a angle section 100 x 75 x 10 mm of roof truss that connected to a gusset plate 16 mm thick by 4 no.s 20 mm diameter power driven rivets arranged in one row along the length of member. Assume short leg of the angle kept outstanding and gusset plate is thick enough against the bending stresses. Assume necessary data and neatly sketch the detailing. [14M]

6 Design a slab base and its connecting system to carry column axial load of 200 kN (Column ISHB 300). Assume M20grade concrete used for foundation. Design and detail the connecting system as per I.S code. [14M]

7 a) Write the design steps of Gantry girder and the consideration of forces and limitations [8M]

b) As per I.S code mention the limiting deflections of gantry girder for the following: [6M]
i) Manually operated crane, ii) EOT cranes with capacity less than 500kN, iii) EOT cranes with capacity more than 500kN.