

III B. Tech II Semester Supplementary Examinations, November - 2018

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 IS: 456-2000 and design charts from SP-16 is allowed.****For all designs adopt Limit State Method**

PART –A

- 1 Design a Gantry girder to be used in an industrial building to carrying an electric overhead travelling crane, for the following data: [28M]
Crane capacity is 180 kN. Weight of crane excluding crab is 120 kN. Self-weight of crab is 40 kN. Span of crane between rails is 18 m. Minimum approach of the crane hook is 1.2 m. Wheel base is 3 m. Span of gantry girder is 9 m. Weight of rail section is 300 N/m. Height of rail section is 90 mm. Check the suggested section for bending stresses. Draw to a scale the cross-section showing all details.

(OR)

- 2 A built-up column 7 m long to carry a factored axial load of 1200 kN. The column is restrained in position but not in direction at both the ends. Design the column with two channels placed toe-to-toe. Provide single **lacing** system with **welded** connection. [28M]
Steel is of grade $f_y=250$ MPa. Draw to scale the cross-section and sectional elevation of the column with lacing details.

PART –B

- 3 a) Explain different types of welds with sketches. [4M]
b) Design a framed end connection for a beam using plates on either side of the beam web. The beam consists of section ISMB 300 and is connected with a flange of column ISMB 500. The end reaction from the beam is 100 kN. Steel is of grade $f_y=250$ MPa. Use field weld. [10M]
- 4 Design a built-up beam using rolled I-section ISMB 350. The effective span of the beam is 5.5m, it carries a UDL of 40 kN/m for the whole span. The ends of the beam are framed to the column. Use $f_y= 250$ MPa. Available thickness of plates: 12 mm and 14 mm. [14M]
- 5 Design a tension member of a heavy truss, carrying a force of 3800 kN. Length of the member is 9 m. Thickness of plates available 14 mm, 16 mm and 18 mm. [14M]
- 6 Design a channel section purlin on a sloping roof truss with the dead load of 0.20 kN/m², a live load of 2.5 kN/m² and a wind load of 1.5 kN/m². The purlins are spaced 2 m apart and of span 4 m c/c, simply supported on a rafter at a slope 20 degree to horizontal. [14M]
- 7 Design a slab base for a column consisting of single ISHB 300 @ 577 N/m and carrying an axial load of 1200 kN. The column is to be supported on a concrete footing with permissible bearing pressure of 4 N/mm². [14M]

