Code No: **R32013** **R10** **Set No. 1**

III B.Tech II Semester Supplementary Examinations, April - 2017
DESIGN AND DRAWING OF STEEL STRUCTURES
(Civil Engineering)

Time: 3 hours **Max. Marks: 80**

Answer any ONE Question from Part – A
and any THREE Questions from Part – B
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PART-A **(30M)**

1 A simply supported beam is to support a $U.D.L$ of $70\frac{kN}{m}$ excluding weight of the beam, over a clear span of $8m$. Design a plated rolled steel beam if $ISMB$ 500 at $0.869\frac{kN}{m}$ and $10mm$ thick plates are only available. The compression flange of the beam is laterally restrained. Draw to scale the cross-section and longitudinal section of beam.

(OR)

2 A steel column is to take a central load of $1600kN$ is to be built of four equal angles forming a $50cm \times 50cm$ square. The height of the column is to be $6m$ with hinged ends. Design a suitable column section and a lacing system. Draw to scale the plan and elevation.

PART-B **(3X15=45M)**

3 a) Two plates $180mm \times 10mm$ are to be connected in a lap joint, the connection being made by transverse filleted weld and necessary plug welds. Design the connection. Use $6mm$ welds.

b) A circular plate $125mm$ in diameter is welded to another plate along the periphery by $6mm$ fillet weld. Find the maximum twisting moment that can be applied to the plate in plane, if the stress in the weld is not to exceed $110\frac{N}{mm^2}$.

4 Design a slab base for a built-up column consisting of $2-MC$ 250 placed back to back separated by a distance of $160mm$. The factored axial load on the column is $1200kN$.

5 Design a channel section purlin with and without sag bars for a trussed roof from the following data:
Span of roof = $12m$ Spacing of purlin along slope = $2m$
Spacing of truss = $4m$ Slope of roof truss = 1 *vertical*, 2 *horizontal*
Wind load on roof = $1100\frac{N}{m^2}$ Vertical loads from roof sheets = $150\frac{N}{m^2}$

6 At $12m$ span welded plate girder is subjected to a uniformly distributed load of $30\frac{kN}{m}$ along with a concentrated load of $150kN$ at $4m$ from one of the supports.
Design: (i) The cross-section of the plate girder assuming the web to be $6mm$ thick and (ii) The welded joint for connecting the flange plates with the web.

7 Design a gantry girder to carry an overhead electrically operated crane for the following data:
Span of gantry girder= $6m$ Span of crane girder = $18m$
Crane capacity = $200kN$ Self-weight crane girder= $180kN$
Self-weight of trolley= $75kN$ Minimum hook approach= $1.0m$
Distance between wheels= $3.5m$ Self-weight of rails= $0.3\frac{kN}{m}$
Draw to scale the cross-section and longitudinal section.

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