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

III B.Tech II Semester Supplementary Examinations, November - 2017

DESIGN & DRAWING OF STEEL STRUCTURES

(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any ONE Question from Part – A
and any THREE Questions from Part – B
Use of IS 800-2007, IS-875 Part 3, Steel tables is to be permitted

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PART – A (30M)

1 Design a suitable web splice for a plate girder at a section at which the bending moment is $5000kN.m$ and shear force is $1000kN$. The plate girder is built-up from a web plate $2500mm$ deep$\times 16mm$ and two ISA $200mm\times150mm\times15mm$ angles and a $600mm\times16mm$ cover plate in each flange. The long legs of the flange angles are placed horizontally. [30M]
Draw:
(i) The elevation of the web splice showing all the details and
(ii) Cross-section of the plate girder at web splice.

(OR)

2 Design a gantry girder to carry an electric overhead travelling crane for an industrial shed to suit the following data: [30M]
(i) Crane load lifting capacity = $200kN$
(ii) Weight of crane excluding trolley = $150kN$
(iii) Weight of trolley = $75kN$
(iv) Distance between gantry rails = $20m$
(v) Minimum approach of crane hook = $1.2m$
(vi) Distance between centres of crane wheels = $3m$
(vii) Span of gantry girder = $6m$
(viii) Weight of rail section = $0.3\frac{kN}{m}$
(ix) Height of rail section = $75mm$
Draw to scale the cross section and longitudinal section of the girder.

PART – B(3X15=45M)

3 a) A tie bar $120mm\times10mm$ is to be connected to the other of size of $120mm\times14mm$. The tie bars are to be loaded by a pull of $120kN$. Find out the size of end fillets such that the stress in the end fillets is the same. Take the permissible stresses in the weldis $110\frac{N}{mm^2}$. [7M]

b) An ISA $65mm\times65mm\times10mm$ carries a tensile load of $200kN$, applied along its centroidal axis. This angle is to be welded to a gusset plate. Find out the lengths of side fillet welds required at the heel and toe of the angle. [8M]

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4 A beam of span $8m$ carries a $U.D.L\ of\ 20\frac{kN}{m}$ over the whole length. Design the beam assuming that the compression flange is laterally restrained throughout the length. Take $f_y = 250\frac{N}{mm^2}$. [15M]

5 Design a compression member of two channels placed toe-to-toe. The length of the compression member is 12m and carries a load of 1500kN The width over the backs of channels is $450mm$. The channels are connected by double lacing. Sketch the cross-section of the column. [15M]

6 Design the slab base for a column consisting of $ISHB\ 300\ at\ 58.8\frac{kg}{m}$ and carrying an axial load of $1000kN$. Take allowable bearing pressure of concrete as $4\frac{N}{mm^2}$. [15M]

7 Design a channel section purlin with and without sag bars for a trussed roof from the following data: [15M]
Span of roof =14m
Spacing of purlin along slope = $2m$
Spacing of truss = 3m
Slope of roof truss = 1 *vertical*, 2 *horizontal*
Wind load on roof =1200N/m^2
Vertical loads from roof sheets = $150\frac{N}{m^2}$

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