

--	--	--	--	--	--	--	--	--	--



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

M.Tech II Semester End Examinations (Supplementary) - January, 2018

Regulation: IARE-R16

ADVANCED STEEL DESIGN (Structural Engineering)

Time: 3 Hours

Max Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT – I

1. (a) What are the advantages and disadvantages of welded connections [7M]
 (b) An ISA 100×100×10mm carries a factored tensile force of 100kN. It is to be jointed with a 12mm thick gusset plate. Design a high strength bolted joint when Slip is not permitted and Slip is permitted. Use M16 bolts of grade 8.8 and Fe410 steel. [7M]
2. (a) Discuss the shear failure of black bolts in bearing type bolted connections with sketches. [7M]
 (b) Design a welded connection [three sides] for the tension member ISA 100 × 65 × 8mm subjected to 150 kN service load [Field weld]. [7M]

UNIT – II

3. (a) A beam ISLB500@75kg/m transmits end reaction 120kN and moment 90kN-m to the flange of the column ISHB 400@82.2kg/m. Design a suitable shop made fillet weld. [7M]
 (b) Design a stiffened seat angle connection of fillet weld of a beam ISMB 500@86.9kg/m which transmit an end reaction of 250kN to the web of column ISHB300@63kg/m. Detail the joint with neat sketch? [7M]
4. (a) Design the I section Purlin of roof with the following data. Spacing of roof truss 4m, spacing of purlins 1.5m, pitch of roof 1 in 4, weight of GI roof sheeting 125 N/m^2 , wind load intensity normal to roof 12004 N/m^2 . Check the serviceability conditions? [7M]
 (b) A tension member of roof truss carrying tensile force 30kN meets the principle rafter carrying compressive load 100kN at right angle. The panel length along the principle rafter is 2.4m. Design both the members and welded joint for the members. (Assume allowable stress in fillet weld 80MPa) [7M]

UNIT – III

5. (a) A Pratt type roof truss for factory building of span 30m and pitch 1in4 proposed to construct at Delhi (plain terrain –category-2). The spacing of the truss 5m c/c and the length of building 60m. Design the following truss components? [7M]
 - i. Purlin
 - ii. Principle rafter

- (b) Design members AB, AC and joint A of a roof truss, $26^{\circ}34'$ apart for the following data. [7M]

Table 1

Member	Length	Compressive force	Tensile force
AB	2.3 m	75kN	55kN
AC	1.8 m	60kN	80kN

Also design the welded connections at joint A. Use tubes of grade Yst 210.

6. (a) Explain different types of bracing systems used in the design of truss girder bridges? Explain their functionality? [7M]
(b) Explain different types of forces to be considered in the design of truss bridges? [7M]

UNIT – IV

7. (a) With the help of neat sketch explain the types of truss bridges. [7M]
(b) Design a rectangular steel bunker 12m length 6m width supported on eight columns (four along each side of length) to store coal density $8 \text{ kN} / \text{m}^3$, angle of internal friction 35° . Height of vertical portion 6m and height of hopper 2m. Provide 600x600mm hopper. Detail the elements and connections? [7M]
8. (a) Mention different type of forces to be considered in the design of bins? [7M]
(b) Write short notes on different loads acting on the roof truss. [7M]

UNIT – V

9. (a) Explain with a neat sketch the design of silo's by airy's method [7M]
(b) What are the material properties for design of storage hoppers? [7M]
10. (a) Explain the factors affecting design of bins [7M]
(b) Write the procedure followed in the design of Bunkers. [7M]

— o o ○ o o —