Hall Ticket No | | | | | | | | | | | Question Paper Code: BST006

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

M.Tech II Semester End Examinations (Regular) - July, 2017

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 types of defects in welded connection? Explain any three defects in weld with sketches. **[4M]**

   (b) Two plates of thickness 16 mm each are joined by a triple bolted lap joint.Use ordinary bolts of property class 5.6. Design the joint and calculate the efficiency.Grade of steel is Fe 490. Sketch the details. Can the joint be made economical? Justify with numerical **[10M]**

2. (a) Discuss the assumptions in the design of HSFG bolted connections as a non slip joint. **[4M]**

   (b) Design a fillet weld (Three sides and site weld) to join a tension member consisting of 2 ISA 100 X 75 X 10 mm to a 12 mm thick gusset plate. The service tensile load is 410 kN. Use Fe 540 Grade steels. **[10M]**

UNIT – II

3. A double plate bracket is provided using 12mm thick plates connected to flanges of a steel column having flange thickness of 12.7 mm and transmit a factored load of 600 kN at an eccentricity of 225 mm to induce torsion in the bolt. Design the bracket using M24 grade 5.8 bolts. The load is included at 80° w.r.t horizontal acting outwards. **[14M]**

4. An ISMB 500 @ 86.9kg/m is connected to the flange of a column ISHB 400 @ 82.2kg/m carrying a vertical service load of 200kN at a distance of 300mm from the flange of the column and a horizontal service load of 50kN at the top of the flange acting outwards. Assume flange welds and web welds of same size. Adopt shop welds and Fe410 grade steel. Design the connection using fillet welds and sketch the details. **[14M]**

UNIT – III

5. Design the following members of a roof truss and the forces are shown in Figure 1. Design the connection also and sketch the details. All the forces indicated are service load. **[14M]**

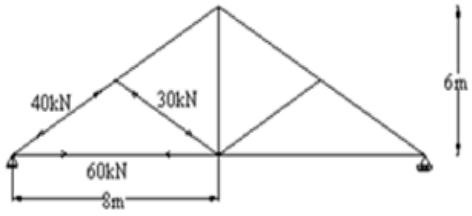

Figure 1

6. Design members AB, AC and joint A of a roof truss, $25°44'$ apart for the following data as shown in Table 1. **[14M]**

Table 1

Member	Length	Compressive force	Tensile force
AB	2.4 m	80kN	65kN
AC	1.85 m	62kN	82kN

Also design the welded connections at joint A. Use tubes of grade Y_{st} 210.

UNIT – IV

7. (a) Write the procedure followed in the design of tension member in truss. **[7M]**
   (b) Discuss wind loads and wind effects on truss girder bridges. **[7M]**

8. Analyse and design of portal bracing of a through type truss girder bridge subjected to load Q = 70 kN, shown in Figure 2. **[14M]**

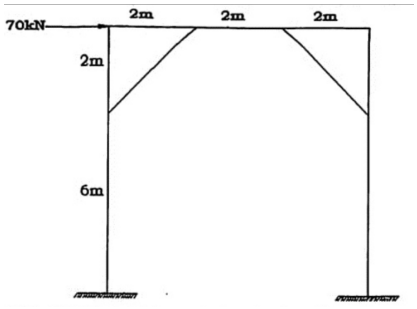

Figure 2

UNIT – V

9. (a) Explain the different failure modes of steel bins. **[7M]**
   (b) Write the procedure followed in the design of Silos. **[7M]**

10. Explain with neat sketch the design of bunker by Jansen theory. **[14M]**

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