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Question Paper Code: BST006

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

M.Tech II Semester End Examinations (Regular / Supplementary) - July, 2018

Regulation: IARE–R16

ADVANCED STEEL DESIGN

Time: 3 Hours **(STE)** **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) Briefly explain different types of failures in welded joints with a neat sketch. **[7M]**

   (b) Design a suitable fillet weld to connect web plate to flange plate and flange plate to cover plate of compression flange in plate girder shown in Figure 1. The size of web plate is 1000x10mm thick and flange 300x16mm and cover plate 600x10mm. The maximum factored shear applied is 800kN. Use shop made fillet weld (Use steelstrength f_u 410MPa and f_y250MPa). **[7M]**

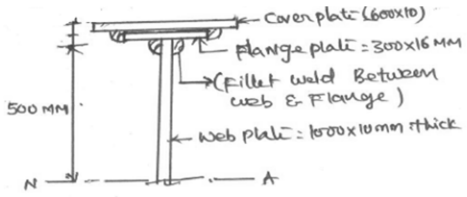

Figure 1

2. (a) What is meant by stiffened and un-stiffened connections of beam column. Show the arrangement in both the cases with neat sketch? **[7M]**

   (b) Design a suitable site made fillet weld to connect tension member with gusset plate as shown in Figure 2. Check the strength of weld at failure. **[7M]**

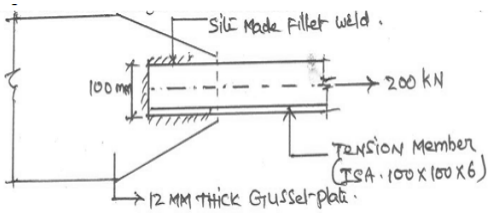

Figure 2

UNIT – II

3. (a) A ISLB350@49.5kg/m beam carries total load of 180kN (UDL) over a span of 6m. The beam connected to column section ISHB250@54.7kg/m by site made fillet weld on both sides . Design the joint and detail connecting system with neat sketch. **[7M]**

   (b) A 10mm thick bracket plate used to transfer reaction 100kN (factored) at eccentricity 150mm from column flange. Design a suitable site made butt weld. (Use steel strength fu 410MPa and fy250MPa) shown in Figure 3. **[7M]**

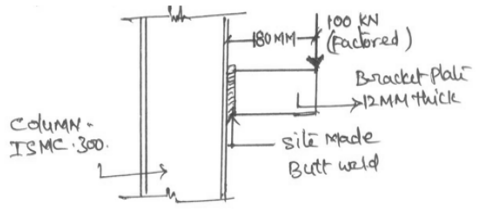

Figure 3

4. (a) Design an I section of fixed beam which carries UDL load 8kN/m over a span of 8m. Check the section for serviceability conditions? Assume the top compression flange laterally restrained(Use steel strength fu 410MPa, andfy=250MPa). **[7M]**

   (b) Design a simply supported steel beam which carries UDL load 10kN/m over a span of 6m. Assume the compression flange is laterally unrestrained with bearing length 100mm (Use steel strength fu 410MPa, and fy=250MPa). Check the section for serviceability conditions? **[7M]**

UNIT – III

5. (a) Enlist the loads acting on the structure and write on live load calculations for roof truss. **[7M]**

   (b) N- type roof truss of 18m span and length 36m proposed to construct for an industrial building. The spacing between the trusses are 6m c/c ,subjected to uniform wind intensity 1.5kN/m^2 normal to the roof. Assume the height of building up to eave strut 8m and pitch of roof 1in4.Use GI roof covering with no openings. Design the Truss elements include geometry of N- type truss components of the roof truss and with a neat sketch. **[7M]**

6. (a) As per the I.S code , what are the limitations to be considered for the design of compression and tension members during the design of bridge truss? **[7M]**

   (b) A Pratt type railway truss bridge-single track broad gauge type ,(through type) of 11 equal panels each of length 5m and depth 5m, carries UDL live load 30kN/m and dead load 20kN/m respectively. Design the following elements at mid span **[7M]**

      i. Top chord member

      ii. Bottom chord member

UNIT – IV

7. (a) Discuss wind loads and wind effect on truss girder bridge. **[7M]**

   (b) A through type Pratt truss girder of pedestrian bridge span 20m, width 3m subjected to UDL $3\text{kN}/m^2$ is subjected to uniform wind pressure $2\text{kN}/m^2$. The walk way constructed with RCC slab is 150mm thick. Design the following elements and detail with neat sketch? **[7M]**

      i. Longitudinal truss girder

      ii. Bottom bracing system

8. (a) Briefly explain Janssen's theory for the design of bunkers? **[7M]**

   (b) Design a circular steel Silo of height 16m and internal diameter 6m to store cement of bulk density of $18\text{kN}/m^3$ and angle of internal friction 25^o? **[7M]**

UNIT – V

9. (a) Write step wise procedure followed in the design of bins. **[7M]**

   (b) Explain with neat sketch the design of Silo's by Airy's method. **[7M]**

10. (a) Classify types of bins and explain the factors affecting design of bins. **[7M]**

    (b) Write the procedure followed in the design of Bunkers and explain bin storage and bulk storage. **[7M]**

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