Seventh Semester B.E. Degree Examination, July/August 2021
Design of Steel Structures

Time: 3 hrs.   Max. Marks:100

Note: **1.** *Answer any FIVE full questions.*
        2. *Use IS:800-2007 and Steel table is permitted.*

1   a.   Explain with neat sketches, the different failures of bolted connections.   **(06 Marks)**
    b.   Distinguish between working stress design and limit state design of steel structures.
                                                                               (08 Marks)
    c.   Name the common types of steel structures.   **(06 Marks)**

2   a.   Write the advantages and disadvantages of steel members.   **(05 Marks)**
    b.   Design a bolted connection between the flange of a column ISHB450@907 N/m and a bracket plate 15 mm thickness. The bracket plate is supporting a load of 150 kN at an eccentricity of 350 mm. Adopt HSFG bolts of property class 8.8. Take f_{yb} = 640 N/mm^2, f_{ub} = 800 N/mm^2 and f_u = 410 N/mm^2; dia of bolts = 20 mm.   **(15 Marks)**

3   a.   Write the defects in welded connections with figure.   **(05 Marks)**
    b.   Calculate the load that can be transmitted through the eccentric welded connection shown in Fig.Q3(b). Take weld size = 6 mm.

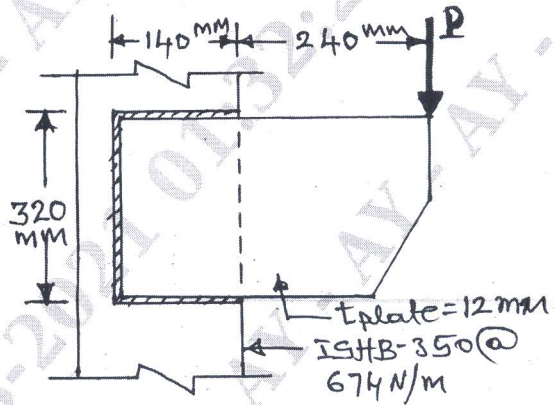Fig.Q3(b)   **(15 Marks)**

4   a.   Determine the shape factor for the inverted T-section of web 8 mm thick × 80 mm deep and flange 100 mm wide × 10 mm thick.   **(05 Marks)**
    b.   Determine the value of fully plastic moment for the two span continuous beam shown in Fig.Q4(b). Adopt a load factor 1.5. Draw admissible BMD.
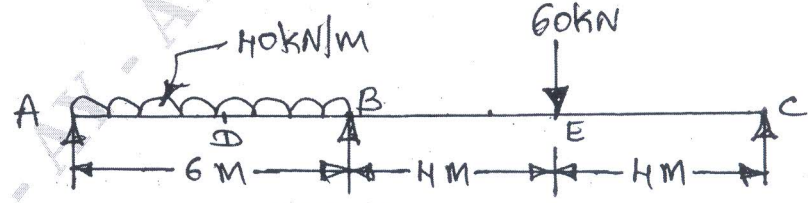

Fig.Q4(b)   **(15 Marks)**

5 Design a double angle tension member connected on each side of a 10 mm thick gusset plate to carry a factored axial load of 320 kN. Use 20 mm black bolts. **(20 Marks)**

6 Design a compression member made up of two channel sections placed back to back to carry a factored load of 750 kN over a length of 10 m. The ends of the compression member restrained against displacement only. Design single lacing system with 16 mm dia bolts for all connections. **(20 Marks)**

7 Design a gusseted base for a column ISHB 400@822 N/m along with cover plates 400 × 12 mm both sides. The column carries an axial load of 1750 kN (factored load). Use M20 concrete and SBC of soil as 225 kN/m^2. Also design the concrete base using M18 property class 8.8 HSFG bolts. **(20 Marks)**

8 Design a simply supported beam, using suitably ISMB section for an effective span of 6.0 m, subjected to a factored uniformly distributed load of 25 kN/m. Assume that it is laterally supported throughout. Apply all necessary checks. **(20 Marks)**

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