5TH SEM./CIVIL./ 2024(S)
Th-2 Structural Design-II

Full Marks: 80   **Time- 3 Hrs**

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1.   Answer **All** questions.   2 x 10
   a.   For bolts of property class 4.6,what do the number 4 and 6 indicate ?
   b.   Define bolt value.
   c.   Define pitch.
   d.   What is the angle between fusion faces of fillet weld ?
   e.   Write three classification of mortars .
   f.   What are types of foundation bases.
   g.   Write down the disadvantages of steel structures.
   h.   Differentiate between web buckling and web crippling of beams.
   i.   Define net section area of a tension member.
   j.   What is slenderness ratio of a masonry wall ?

2.   Answer **Any Six** Questions.   6 x 5
   a.   Explain different types of butt welds with sketches.
   b.   Explain the concept of block shear in the design of tension member.
   c.   Mention the assumptions made in the design of bearing bolts.
   d.   Write down the codal provision of design consideration for masonry walls under eccentric loading.
   e.   Determine the plastic moment capacity of the unsymmetrical I-section .Given size: Top flange-100 mm x 20 mm, bottom flange-200 mm x 20 mm and web -200 mm x 20 mm.
   f.   A tie member of a roof truss consists of 2 ISA 90x60x8 mm .The angles are connected on the either side of 10 mm gusset plates and the member is subjected to a factored pull of 360 kn. Design the welded connection .assume welding is to be made in the field.
   g   What are factors that determine the buckling class of structural elements ? Determine the buckling class of ISHB 400 @ 806.4 N/m.

3   Write short notes on   10
   •   Crinkling in tubular steel compression member
   •   Design considerations for masonry wall footings

4   A tubular column consists of IS-1161 grade st.35 steel. The column is   10
         hinged at both ends. The outside diameter of tube is 219.1 mm. The
         weight of 1.5 m length of the tube is 330 N. The length of column is 4 m.
         Determine the safe load carrying capacity of the column.

5   Determine the design axial load on the column section ISMB 400, given   10
         that the height of the column is 3.0 m and that is pin-ended. Also assume
         the following : fy=250 N/mm2,fu=410 N/mm2 and E=2x10⁵ N/mm2

6   A tension member consists of a flat 100 mmx 10 mm which is connected   10
         to a gusset plate 10 mm thick by 2 nos of 16 mm dia bolts. If steel of
         grade Fe410 and bearing bolts of 4.6 are used in workshop, determine the
         strength of flat against yielding, rupture and block shear. Also determine
         the maximum load the joint can carry safely.

7   Design a lap joint between two plates each width 100 mm, if the   10
         thickness of one plate is 16 mm and other is 12 mm. The joint has to
         transfer a design load of 180 kN. The plates are Fe-410 grade and M-16
         bolts of grade 4.6.