

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2064)

14662

B. Tech 4th Semester Examination

Design of Steel Structures-I (O.S.)

CE-4002

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : The question paper consists of five sections A, B, C, D and E. A candidate is required to attempt five questions in all selecting one question from each section A, B, C, D and all parts of section E. Use of IS codes IS 800:2007 is allowed.

SECTION - A

1. Two plates each 300 mm wide and 16 mm thick are to be jointed using a lap joint using 20 mm diameter bolts of grade 4.6. Design the joint to transmit a service load of 400 kN. (20)
2. A tie member of Fe 410 grade steel consists of two ISA 75 mm x 50 mm x 8 mm welded on the opposite side of a 12 mm thick gusset plate at site using fillet weld. Design the welded connection to transmit a service load of 200 kN. (20)

SECTION - B

3. Determine the tensile strength of a tie consisting of two ISA 90 x 60 x 6 mm connected to either of a gusset by 4 mm welds. The average length of the weld are 200 mm long both at top and bottom. (20)

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4. A built up column consisting of four equal angles ISA 90, 6 mm placed with back to back distance of 290 mm. The column carries a factored load of 700 kN. The column is 12.0 m long and is fixed at both ends. Assume steel of grade FE 410, design the lacing system for the column. (20)

SECTION - C

5. Enumerate the step by step procedure to determine the bending resistance of a laterally supported steel beam using limit state method. (20)
6. A simply supported steel beam having an effective span of 9.0 m is supported laterally throughout. The beam carries a distributed load of 12 kN inclusive of self-weight. The depth of the beam is limited to 450 mm. Design an appropriate section using steel of grade Fe 410. (20)

SECTION - D

7. Design a slab base for a column ISMB 350 subjected to factored axial load of 1500 kN. The load is to be transmitted to the base by welded connection. (20)
8. A simply supported plate girder having an effective span of 24 m carries a superimposed load of 35kN/m. Design a welded plate girder without bearing and transverse stiffeners. Use steel of grade Fe 410. (20)

SECTION - E

9. Briefly answer the following questions:
- (a) Differentiate between welded and bolted joints.
 - (b) What are the different types of bolted joints?
 - (c) What do you understand by limit state of serviceability?

- (d) With the help a diagram, explain the block shear failure of a tension joint.
- (e) What do you understand by web crippling? How will you determine it's bearing strength?
- (f) Explain what you understand by plastic shear resistance of a beam under pure shear?
- (g) Explain the difference between slab base and gusseted base.
- (h) Explain the post-buckling behaviour of a plate girder.
- (i) Explain how you will determine the buckling resistance of a stiffener?
- (j) Explain how longitudinal load act on gantry girders?
(2×10=20)