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Total No. of Questions : 09] [Total No. of Pages : 03

Paper ID [A0613]

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B.Tech. (Sem.- 5th)

DESIGN OF STEEL STRUCTURES - I (CE-303)

Time : 03 Hours Maximum Marks :60

Instruction to Candidates:

1) Section - A is **Compulsory.**
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 ×2 = 20)*

a) What is rivet value? Write down the expressions to calculate rivet value.

b) When do we prefer Grillage Footings?

c) Differentiate between fillet and butt weld.

d) ISA 60 × 60 × 6 mm is used as tie member in a truss, one leg of which is adequately welded to 8 mm thick gusset plate. Determine the maximum tensile load in the tie.

e) Define pitch of Rivets.

f) Write any three advantages of bolted connections.

g) What is the maximum slenderness ratio recommended for a member carrying compressive loads resulting from Dead Load & Superimposed load?

h) The thickness of thinner part to be connected is 12 mm. For partially penetrated joint, the effective throat thickness for butt welding is to be computed. Give your recommendations.

i) What are purlins?

j) Why do we curtail the flanges of a plate girder?

Section - B

(4 × 5 = 20)

Q2) Both legs of an ISA 110 × 110 × 10 mm are connected to the gusset plates by 20 mm diameter rivets in a staggered chain of riveting. Determine the staggered pitch so that angle section may transmit a pull of 250 kN.

Q3) Design a suitable section for a beam carrying uniformly distributed load of 30 kN/m over an effective length of 12 m. The beam is effectively restrained for lateral buckling along its span.

Q4) A double angle discontinuous strut ISA 125 × 95 × 10 mm (long legs back to back) is connected to both the sides of a gusset plate 10 mm thick with 2 rivets. The length of strut between centre to centre of intersections is 4m. Determine the safe load carrying capacity of the section.

Q5) Design an I section purlin for a trussed roof for the following data:

Span of truss = 12 m
Spacing of truss = 4 m c/c
Slope of roof truss = 30°
Wind load on roof = 1000 N/m^2
Vertical load on roofing material = 200 N/m^2
Distance of purlin along slope of truss = 2 m
Allowable bending stress = 165 MPa
E = 2×10^5 N/mm^2.

Q6) Design a built up column of effective length 4.75m to support an axial load of 2000 kN. The column shall consist of four equal angle sections so that overall dimensions of the column shall be 400 mm × 400 mm. Take by = 250 MPa.

Section - C

(2 × 10 = 20)

Q7) Write short notes (any two):

(a) Design of flanges and web of plate girder.
(b) Design of Gusset Base.
(c) Economical spacing of Roof Truss.

Q8) Design a Grillage foundation for a compound column carrying an axial load of 3000 kN. The size of base plate is 100 cm × 75 cm and SBC = 240 kN/m^2. Use 4 beams for top tier beams and 10 beams for lower tier.

29) Design a welded plate girder to carry a superimposed load of 50 kN/m. In addition, the girder supports two concentrated loads of 600 kN each at top flange at $\frac{1}{3}$rd points from two secondary beams. The effective span of girder is 12m. Also design vertical intermediate stiffner and bearing stiffness at the load points and connection between flange plate and web plate assuming flange plate is curtailed. Draw sectional elevation and plan showing details of connections. The compression flange is restrained against lateral buckling.

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