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Reg. No.

Question Paper Code

11805

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023

Sixth Semester

Civil Engineering

CE8601 - DESIGN OF STEEL STRUCTURAL ELEMENTS

(Use of IS 800 and Steel Tables are permitted)

(Regulations 2017)

Duration: 3 Hours

Max. Marks: 100

Answer ALL Questions

PART - A (10 × 2 = 20 Marks)

- | | <i>Marks,
K-Level, CO</i> |
|---|-------------------------------|
| 1. Draw the stress strain plot of a structural steel. | 2,K1,CO1 |
| 2. Define the term hardness. | 2,K1,CO1 |
| 3. How to calculate the efficiency of a joint? | 2,K2,CO2 |
| 4. Explain the terminology Grade 4.6. | 2,K1,CO2 |
| 5. Discuss Shear Lag in Tension member. | 2,K2,CO4 |
| 6. Examine lug angle and its use. | 2,K2,CO4 |
| 7. Define slenderness ratio. | 2,K1,CO5 |
| 8. Define the term: Buckling of column. | 2,K1,CO5 |
| 9. List out the loads to be considered for the design of roof truss. | 2,K1,CO6 |
| 10. Differentiate laterally supported and laterally unsupported beam. | 2,K2,CO6 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

- | | |
|---|-----------|
| 11. a) Discuss about the various mechanical properties of steel. | 13,K3,CO2 |
| OR | |
| b) Enumerate the manufacturing process of structural steel. | 13,K3,CO2 |
| 12. a) An 8mm thick plate is joined by a double cover butt joint using 5mm thick cover plates. Assume 4.6 grade M20 bolts. Determine strength and efficiency of the joint per pitch of 50mm. | 13,K3,CO3 |
| OR | |
| b) A tie member consists of two ISMC 250. The channels are connected on either side of a 12mm thick gusset plate. Design the welded joint to develop the full strength of the tie. However the overlap is limited to 400mm. | 13,K3,CO3 |

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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13. a) Design a suitable angle section to carry a factored tensile force of 250kN assuming a single row of M20 bolts. The length of the member is 3.5 m. 13,K3,CO4

OR

- b) A single unequal angle 100 x 75 x 8 mm is connected to a 8 mm thick gusset plate at the longer ends by 4 mm welds on either side of an angle section. The average length of the weld is 200 mm. Determine the design tensile strength of the angle if the gusset is connected to the 100 mm leg. 13,K3,CO4

14. a) A Steel column of effective height 5m has to transmit an axial load of 2000KN. Design the gusseted base. The size of the column is ISHB450. Adopt M20 concrete. 13,K3,CO5

OR

- b) A double angle discontinuous strut ISA 150x75x10mm long leg back to back is connected to either side by gusset plate of 10mm thick with 2 bolts. The length of the strut between the intersections is 3.5m. Determine the safe load carrying capacity of the section. 13,K3,CO5

15. a) Design an angle purlin for a roof with the following data. 13,K3,CO6
Span of truss: 8m
Spacing of truss : 4m c/c
Pitch of truss : 1/4
Spacing of purlins along the slope truss : 2m c/c
Roof coverings : Asbestos sheets
Basic wind pressure: 1.5 kN/sq.m

OR

- b) Design a simply supported beam of span 8 m. The spacing of the beams are 4m with thickness of RC slab =150 mm, floor finishes = 1.4kN /m² and light partitions = 1kN/m². The beam also carries a central concentrated load of 250 kN with all the loads being characteristic loads. The beam is laterally restrained with grade of steel being Fe 490. 13,K3,CO6

PART - C (1 × 15 = 15 Marks)

16. a) Design a single bolted double cover butt joint to connect plates of Fe410 grade having thickness 16mm. Use M16 bolts of grade 4.6. Find the efficiency of the joint. 15,K3,CO3

OR

- b) An angle section ISA 80mmX50mmX8mm is welded to a 12mm thick gusset plate at site. Design the weld to transmit the load equal to the strength of the members. Grade of steel Fe 410. 15,K3,CO3