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Question Paper Code: U6102

B.E. / B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Sixth Semester

Civil Engineering

21UCE602– DESIGN OF STEEL STRUCTURES

(Regulations 2021)

(IS 800 and steel tables are permitted)

Duration: Three hours

Maximum: 100 Marks

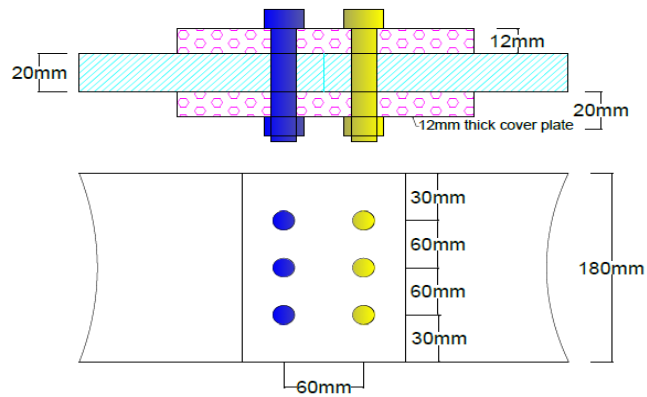
Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. How the design strength of fillet weld is calculated on its throat area as per IS code? **CO1-U**
2. Determine the efficiency of the bolted connection for the strength of joint is 270kN and strength of solid plate is 300kN. Take relevant data. **CO1-U**
3. Calculate the design strength due to rupture of critical section of the plate of size 120mm x 10mm with the holes for 18mm dia bolts. Use Fe415 grade steel. **CO2-App**
4. Find the tensile strength due to yielding of the tie member as shown in fig. Take relevant data. **CO1-U**
5. Define buckling load. **CO1-U**
6. Define column. **CO1-U**
7. Define laterally supported beam. **CO1-U**
8. What you mean by flexural member and its types? **CO1-U**
9. What are the loads that will act on roof trusses? **CO1-U**
10. What are the major components of industrial buildings? **CO1-U**

PART – B (5 x 16= 80 Marks)

11. (a) Find the efficiency of the butt joint is made using two cover plates of size 12 mm as shown in fig. The M20 bolts of grade 4.6 and Fe410 (E250) are used. **CO3-App** (16)



Or

- (b) Apply the principles of structural design to determine the strength of a double cover butt joint connecting two cover plates with thicknesses of 10 mm and 18 mm, using 6 mm thick cover plates and bolts. CO3-App (16)
12. (a) Determine the design tensile strength of a splice to connect a 300 mm x 20 mm plate with a 300 mm x 10 mm plate. The design load is 500 kN. Use 20 mm black bolts, fabricated in the shop. CO2-App (16)
- Or
- (b) Design a tension member to carry a load of 350 kN. The member consists of two angles placed back-to-back with the long leg outstanding. The length of the member is 3 meters. Please include all necessary calculations for the design, considering the material properties, cross-sectional area, and any relevant design codes. Ensure to account for factors like buckling, strength, and stability in the final design CO2-App (16)
13. (a) Design a single angle section of strut connected to the gusset plate to carry 180kN factored load. The length of the strut between centre to centre intersections is 3m. Analyse the dimensions of the structural steel angle member as per codal provisions. CO5-Ana (16)
- Or
- (b) Design a single angle section strut for a 180 kN factored load, with a length of 3 meters between the center-to-center intersections. The strut is connected to a gusset plate. Please determine the appropriate dimensions of the structural steel angle member based on the relevant codal provisions and provide an analysis of the design, including the checks for strength, stability, and connection CO5-Ana (16)

14. (a) Design a simply supported steel beam of effective span 12m to carry a factored uniformly distributed load of 70 kN/m. The beam is laterally supported along its length, and the depth of the beam is restricted to 500mm. **CO2-App** (16)

Or

- (b) If cantilever beam is built into a concrete wall. It supports a dead load of 20 kN/m and a live load of 10 kN/m. The length of beam is 5m. Design a section with necessary checks. Assume bearing length of 100 mm. **CO2-App** (16)

15. (a) A roof truss shed is to be built in Luck now for an industry. The size of shed is 24m x 40m. The height of building is 12 m at the eaves. Determine the basic wind pressure. **CO3-App** (16)

Or

- (b) Design a welded plate girder of span 24m to carry superimposed load of 35 kN/m. Avoid use of bearing and intermediate stiffeners. Use Fe415 (E250) steel. **CO3-App** (16)

