

Roll No.

Total No. of Pages : 02

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M.Tech. Structural Design (Sem.-2)

ADVANCE STEEL DESIGN

Subject Code : MTSD-203

M.Code : 74292

Date of Examination : 08-07-22

Time : 3 Hrs.

Max. Marks : 100

INSTRUCTIONS TO CANDIDATES :

1. Attempt any FIVE questions.
2. Each question carries TWENTY marks.
3. Any missing data may be assumed appropriately.

1. Explain the various methods of analysing grids for roofs and steel bridges.
2. Proportion an RC abutment for a bridge of span 20m and width 9m. Angle of repose (Φ) and unit weight of backfill are respectively 30° and 18kN/m. Dead load and live load from the superstructure are found to be 150kN/m and 100 kN/m, respectively. Three neoprene pad bearings of overall size $320 \times 500 \times 65$ mm are provided for transferring the load from superstructure. Check the strength and stability criteria. The permissible compressive and tensile stresses can be taken as 5MPa and 0.5MPa.
3. The RCC T-beam girder deck for a bridge crossing using the following data:

Clear width of road way = 7.5mm, width of kerbs = 600mm, Effective span = 18m, footpaths one meter on either side, Live load = IRC class -AA, thickness of wearing coat = 100mm, Number of main girders = 4, Adopt M-20 grade of concrete and Fe-415 grade of steel, spacing of cross-girders = 4m, spacing of main girders = 2.5m, Design the deck slab and main girder using Courbon's method.
4. The deck slab of Road Bridge of span 12m is to be designed as one way slab with parallel post tensioned cables. Force in each cable at transfer is 600KN. If the slab is required to support $L.L=30 \text{ KN/m}^2$ with compressive and tensile stresses in concrete at any stage not to exceed 14 and 0 MPa, respectively. Find the maximum horizontal spacing of cables and its position at mid span. Consider loss ratio as 0.75.
5. Design a circular steel silo of 12m height and 4m internal diameter to store cement having bulk density = 16 kN/m^3 and angle of internal friction = 25° . Pressure ratio during filling = 0.5 and during emptying = 1.0. Use data suitably.

6. Design an overhead steel tank rectangular in cross-section of capacity 75000 litres. The available width of plate is 1 m and staging consist of four columns, spaced $4\text{m} \times 3\text{m}$. The bottom of tank is 9 m above GL. Design also the supporting beams. Show staging and braces. Assume data suitably.
7. What are various elements of an Industrial building? Explain any five with sketches.
8. A gantry girder of 6.2m span is to be designed for crane capacity of 250kN. The effective span of crane girder is 18m. Weight of crane girder excluding crab is 135kN and weight of crab is 65kN. Take clearance as 1m and wheel base as 3.0m. Choose suitable section and check the bending stresses and deflection.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.