



Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



II SEMESTER M.TECH (STRUCTURAL ENGINEERING) END SEMESTER EXAMINATIONS, MAY 2016

SUBJECT: ADVANCED DESIGN OF STEEL STRUCTURES [CIE-585]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer any FOUR FULL questions.

Any missing data may be suitably assumed, IS800-2007, SP-6, IS456-2000 permitted All plates are Fe410(250) Grade and bolts are grade 4.6

| 1A. | A trough type Steel bridge girder (fig.QNo.1) consists of two pratt trusses and each supports a service live load of 70 kN/m, dead load 20 kN/m. Assume impact factor as 20%. Draw ILD and determine member forces in members $2-8, 2-9, 2-3, 8-9$ and design the member $2-3$. | 12.5 |
|-----|--|------|
| 2A. | Design a welded plate girder for a simply supported bridge deck beam with clear span of 30m subjected to a maximum bending moment of 4800kN-m and a maximum shear force of 900kN using thin web plates. use post critical method. Also design intermediate stiffners. | 12.5 |
| 3A. | Design a reinforced concrete slab and steel shear connector of a composite bridge deck of span 16m. Clear width of roadway 10.5m, footpath 1m on either side, spacing of the main girders 2m centre to centre. Use M20 grade concrete and Fe415 steel, rolled steel sections with Fe 250 ,yield stress of 236 N/mm ² Assume I.R.C. class AA tracked vehicle. (live load m ₁ =.088 and m ₂ =.018, dead load m ₁ =.05,m ₂ =.006) | 12.5 |
| 4A. | Design a pressed steel water tank to store 1.0lakhs liters of water. Also design a supporting intermediate secondary beam. Assume weight of the plates as 5mm=86kg,6mm=112kg,8mm= 138kg, for 1.25m x 1.25m plates. Draw FBD of all the Bearers and supporting tower need not be designed. | 12.5 |
| 5A. | Determine the plastic moment capacity and shape factor about both the centroidal axis of the section shown in fig.QNo.5a . Assume $f_y = 250MPa$. | 5 |
| 5B. | Design a continuous beam as shown in fig.QNo.5b. The load factor and shape factor may be assumed to be 1.7 and 1.12. Provide most economical section. | 7.5 |

