R18

Code No: 156CY

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, August - 2022
STRUCTURAL ENGINEERING – II (STEEL)
(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks

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Note: Use of IS 800:2007, IS 875 (part 3) and steel tables are allowed

1. Design the seat angle connection between the beam ISMB 250 and column ISHB 250 for a reaction from beam equal to 85 kN. Use M16 black bolt of property class 4.6 and grade Fe410 steel with fy =250 MPa. [15]

2. Design a tension member to carry an axial factored load of 500kN. Use a double angle rolled steel section connected (at site) to each side of a gusset plate of 10mm thick using 20mm diameter bolts of grade 4.6. [15]

3. A beam simply supported over an effective span of 7m, carries a uniformly distributed load of 50kN/m inclusive of its own weight. The depth of the beam is restricted to 450mm. Design the beam, assuming that the compression flange of the beam is laterally supported by a floor construction. Take fy = 250 N/mm^2 and E = 2×10^5 N/mm^2. Assuming width of the support as 230mm. [15]

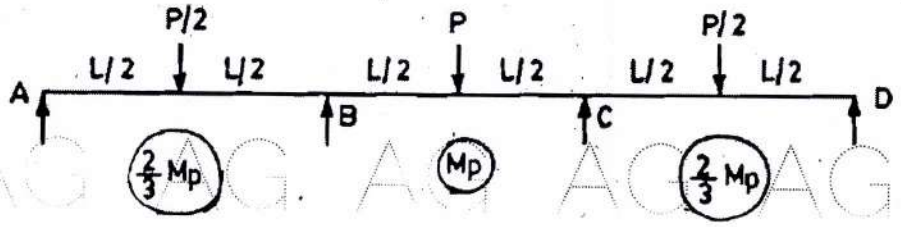
4. Design a bearing stiffener for a welded plate girder with the following specifications.
Web = 1000mm × 6mm thick
Flanges = 2 Nos. of 350 × 20mm plate on each side.
Support reaction = 350kN.
Width of the support = 300mm. [15]

5. Design a gantry girder to be used in an industrial building carrying an EOT crane for the following data:
Crane capacity = 200 kN.
Total self-weight of all components = 240 kN.
Minimum approach at the carne hook of gantry girder = 1.2m
Wheel base = 3.5m
C/C distance between gantry rails = 16m
C/C distance between columns = 8m
Self-weight of rail section = 300 N/m
Yield stress = 250 N/mm^2
Design the main gantry section. Connection design not required. [15]

6. Design a laced column for an axial load of 1200 kN with an effective span of 7.5m has one end fixed and other end hinged. Use channels for main members and an angle 45^0 for lacing bars. Sketch the details of the section. [15]

7.a) Explain the concept of plastic hinge.

b) Find the collapse load for the three-span continuous beam shown in figure below. The plastic moment capacity of the end-span sections is two-third of the plastic moment capacity (M_p) of the mid-span section. [7+8]



8. Design an I section purlin for an industrial building, located at Chennai, with Galvanised iron sheets as the roofing material.
Span of the truss =13m
Spacing of trusses = 6m c/c
Spacing of purlins = 1.2m c/c
Wind pressure intensity = 2 kN/m^2
Weight of GI sheets =130N/m^2
Grade of Steel: Fe 410 [15]

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