Civil EM II

Code No: 126DY

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech III Year II Semester Examinations, May - 2016
STEEL STRUCTURES DESIGN AND DRAWING
(Common to CE, CEE)

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

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

Note: Use of IS 800-2007 and Steel tables is allowed:

PART - A

(25 Marks)

1.a) What are the load combinations for design purposes? [2]
b) Mention the advantages and disadvantages of welded connections. [3]
c) State four standard support conditions of compression members and state corresponding expressions for effective length. [2]
d) Name the lateral systems that are used in compound beams and which is the mostly used one. [3]
e) What is the maximum deflection that is to be allowed in steel beams? [2]
f) What are laterally supported beams? [3]
g) What is stiffened seat connection? [2]
h) What is web angle connection? [3]
i) Mention basic design assumptions of plate girder. [2]
j) What is the purpose of providing bearing stiffener in plate girders? [3]

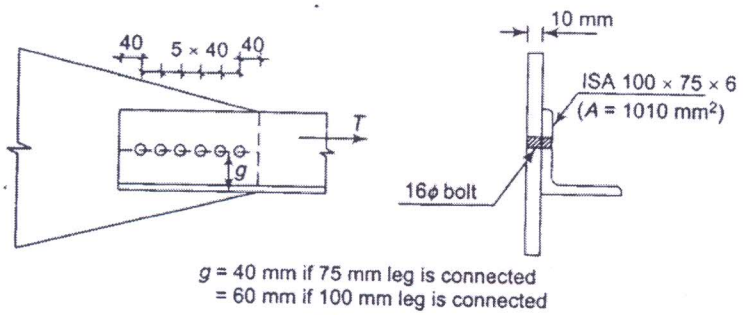
PART - B

(50 Marks)

2. Two plates 10 mm and 18 mm thick are to be joined by a double cover butt joint. Assuming cover plates of 8 mm thickness, design the joint to transmit a factored load of 500 KN. Assume Fe 410 plate and grade 4.6 bolt. Assume the thickness of packing plate as 8 mm. [10]

OR

3. A single unequal angle 100 × 75 × 6 is connected to a 10 mm thick gusset plate at the ends with six 16 mm diameter bolts to transfer tension as shown in figure-1 Determine the design tensile strength of the angle assuming that the yield and the ultimate stress of steel used are 250 MPa and 410 MPa if the gusset is connected to the 100 mm leg. [10]



g = 40 mm if 75 mm leg is connected
= 60 mm if 100 mm leg is connected

Figure-1

4. Design a column having an effective length of 6 m and subjected to a factored axial load of 2400 KN. Provide the channels back to back connected by welded battens. Assume Fe 410 grade steel. Sketch the details of the section. [10]

OR

5. Design a slab base for a column ISHB 350 carrying an axial factored load of 1200 KN. M25 concrete is used for the foundation. Provide welded connection between column and base plate. Sketch the column base. Sketch the details of the section. [10]

6. A simply supported steel joist of 4 m effective span is laterally supported throughout. It carries a total uniformly distributed load of 40 KN inclusive of self-weight. Design an appropriate section using steel of grade Fe 410. Sketch the details of the section. [10]

OR

7. Design I section purlin for a trussed roof for the following data:
Span of roof = 10 m
Spacing of purlins along slope or truss = 25 m
Spacing of truss = 4 m
Slope of roof truss = 1 vertical to 2 horizontal
Wind load on roof surface normal to roof = 1100 N/m^2
Vertical load from roof sheet = 150 N/m^2. Sketch the details of the roof. [10]

8. Determine the safe load P that can be carried by the joint shown in figure -2. The bolts used are 20 mm diameter of grade 4.6. The thickness of the flange of I-section is 9.1 mm and that of bracket plate 10 mm. [10]

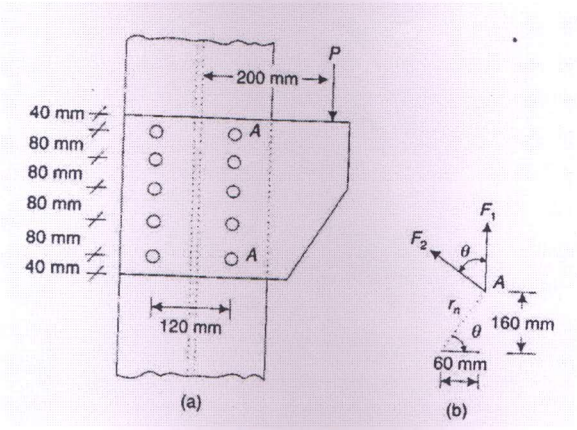


Figure-2

OR

9. Design a stiffened seat angle for a reaction of 250 KN from a beam of ISMB 400 using M20 bolts of grade 4.6. The beam has to be connected to ISMC 200 column. Assume fy = 410 MPa. [10]

10. Design a welded plate girder of span 24 m to carry a superimposed load of 35 KN/m. Avoid use of bearing and intermediate stiffeners. Assume fy = 250 MPa. Draw the cross section and longitudinal elevation of plate girder. [10]

OR

11. A plate girder is made of 500 mm × 30 mm flanges with 10 mm thick web. The overall depth is 1560 mm. The girder has to carry a factored shear of 1500 KN. Assuming the tension field action is not utilized in the design; determine whether intermediate stiffeners are necessary? If intermediate stiffeners are to be provided, what would be the thickness of web? fy = 250 N/mm^2. Draw the cross section and longitudinal elevation of plate girder. [10]

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