R16

Code No: 136BB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, March - 2024

DESIGN OF STEEL STRUCTURES

(Civil Engineering)

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

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.
iv) Use of only IS 800 and steel tables is allowed.

PART – A

(25 Marks)

1.a)	What are the disadvantages of steel as a structural material?	[2]
b)	Write the advantages of welded connections.	[3]
c)	Define single angle and double angle struts.	[2]
d)	Mention different failure modes in tension members.	[3]
e)	What is laterally un-supported beam?	[2]
f)	Define elastic and plastic bending moment.	[3]
g)	What is the difference between beam and plate girder?	[2]
h)	What are the various types of stiffeners provided in plate girders?	[3]
i)	Mention the components of roof truss.	[2]
j)	What are the loads acting on the roof truss and for what load combinations the truss is to be designed?	[3]

PART – B

(50 Marks)

2. Discuss about the limit state design philosophy and types of limit states considered for the design of steel structures. [10]

OR

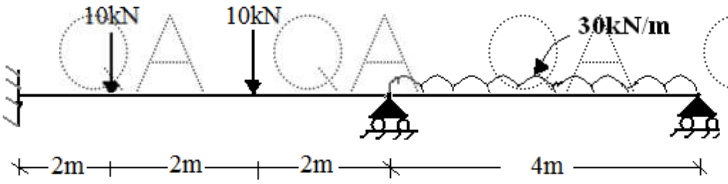
3. Two plates 200 × 10mm of grade 410 are connected by bolts of diameter 20mm of grade 4.6 using butt joint. Design the bolted connection to transmit a pull equal to the strength of the plate. Also sketch the arrangement of bolts in the joint. [10]

4. Design a tension member to carry an axial load of 1000kN. Two angles placed back to back with long leg outstanding are desirable. The length of the member is 5m. [10]

OR

5. Design a laced column with two channels back to back of length 12m to carry an axial factored load of 1300 kN. The column may be assumed to have restrained in position but not in direction at both ends. [10]

6. A two span continuous beam of uniform section loaded with ultimate loads as shown in figure. Determine the required plastic moment of resistance. [10]



OR

7. An ISLB 300 @ 369.8 N/m transmits an end reaction of 600kN, under factored loads, to the web of ISMB 450 @710.2 N/m. Design a bolted framed connection. Steel is of grade Fe410 and bolts are of grade 4.6. [10]

8. Design a welded plate girder for an effective span of 30 m carrying a UDL 15 kN/m and concentrated loads of 100 kN acting at 12 m from left support. The girder is simply supported. [10]

OR

9. Check the beam section ISWB 500 @1.45 kN/m against web crippling and web buckling if reaction at the end of beam is 160 KN, The length of bearing plate at the support is 100 mm. Design bearing plate. The bearing plate is set in masonry. [10]

10. A Knee braced roof truss of a factory building which is situated in Delhi having the span of 20m and a pitch of 1/5. The height of the truss at eves level is 10m. The spacing of the trusses is 5m. The factory building which is 40m long, Design gable rafter and gable columns for the data given. Assume any suitable data if required. [10]

OR

11. Design the angle purlin for the following data -
a) Span of purlin = 3.0 m
b) Dead load on purlin = 1200 N/m
c) Live load on purlin = 400 N/m.
d) Wind load on purlin = 1800 N/m .
Apply check as per IS 800 requirements. [10]

---ooOoo---