Code No: 156CY

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, March - 2024
STRUCTURAL ENGINEERING – II (STEEL)
(Civil Engineering)

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

Note: This question paper contains two parts A and B. i) **Part-A** for 15 marks, ii) **Part-B** for 60 marks.

- Part – A is a compulsory question consisting of ten sub-questions. The first five sub-questions are from each unit relating to design theory and codal provisions and carry 2 marks each. The next five sub-questions are from each unit and carry 1 mark each.
- Part – B consists of 5 questions (numbered 2 to 11) carrying **12 marks each**. Each of these questions is from one unit and may contain sub-questions. For each question there is either or choice, which means that there will be two questions from each unit and the student should answer either of the two questions.
- Use of only IS 800 and steel tables is allowed.

PART – A

(15 Marks)

1.a)	Differentiate nominal diameter and gross diameter of bolt.	[2]
b)	Define tension member.	[2]
c)	Construct the failure mode of laterally unsupported beams.	[2]
d)	What are the classifications in Stiffeners?	[2]
e)	Classify the type of truss based on span.	[2]
f)	Define the term – Pitch.	[1]
g)	Write the expression for calculating net area for angle section in tension.	[1]
h)	What is laterally unsupported beam? Give an example.	[1]
i)	Discuss the elements of the plate girder.	[1]
j)	List the various components of a roof truss.	[1]

PART – B

(60 Marks)

2 Determine the design strength of a 22mm diameter bolt for the cases given below a) Lap joint b) single cover butt joint with 12 mm cover plate c) double cover butt joint with 10 mm cover plates Main plate is 16 mm thick. Use 4.6 grade bolts. [12]

OR

3. Design a lap joint between the two plates each of width 120mm, if the thickness of one plate is 16 mm and the other is 12 mm. The joint has to transfer a design load of 160kN. The plates are of Fe 410 grade. Use bearing type plates. [12]

4. Design a single angle equal section 100×100×10 mm, connected to a gusset plate at the ends with 20mm diameter bolts with the connection length of 250mm to transfer tension. [12]

OR

5. Determine the design axial load on the column section ISMB 400, given that the height of the column is 3.5 m and that it is pin-ended. Also assume the following: f_y= 250 N/mm^2; f_u=410 N/mm^2; E = 2×10^5 N/mm^2. [12]

6. Design a suitable built up beam section for a span of 8m to carry a uniformly distributed load of 15kN/m and a central concentrated load of 100 kN. The beams is laterally supported throughout. [12]

OR

7. Analyze and Design a laterally supported beam of effective span 5 m for the following data. Grade of steel: Fe 410 Factored maximum B.M. = 180 kN-m Factored maximum S. F. = 220 kN. Check for deflection is not required. [12]

8. A welded plate girder has
a) Each top and bottom flange = 435 × 28 mm and
b) Web 1250 × 10 mm.
Predict the design of vertical and horizontal stiffeners. [12]

OR

9. Explain the step by step procedure for design of vertical, intermediate and horizontal stiffeners in a plate girder. [12]

10. An industrial roof shed of size 20 m × 30 m is proposed to be constructed at Mangalore near a hillock of 160 m and slope is 1 in 2.8. The roof shed is to be built at a height of 120 m from the base of the hill. Determine the design wind pressure on the slope. The height of roof shed shall be 12m. [12]

OR

11. Design a purlin for a roof truss having the following data:
Span of the truss = 6.0 m,
Spacing of truss = 3m c/c,
Inclination of roof = 30^o
Spacing of Purlin = 2m c/c,
Wind pressure = 1.5 kN/m^2,
Roof coverage= A.C Sheeting weighing 200 N/m^2,
Provide a channel section Purlin. [12]

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