R18

Code No: 156CY

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, July - 2023

STRUCTURAL ENGINEERING – II (STEEL)

(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 15 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 12 marks and may have a, b as sub questions.
iv) Use of IS 800 and steel tables is allowed.

PART – A

(15 Marks)

1.a)	What is meant by prying action?	[2]
b)	What are the functions of a lug angle?	[2]
c)	What is a laterally supported beam?	[2]
d)	What is the tension field effect of a plate girder?	[2]
e)	What are the factors affecting the design wind speed at any location?	[2]
f)	Distinguish between elasticity and plasticity.	[1]
g)	What are the functions of a column base?	[1]
h)	What is the necessity of built-up structural steel sections?	[1]
i)	What is the function of plate girder bearing stiffener?	[1]
j)	What are the factors affecting the external wind pressure coefficient?	[1]

PART – B

(60 Marks)

2. Find the strength and efficiency of a bolted lap joint consisting of two plates of each of thickness 16 mm and width 350 mm as shown in figure 1. Use M16 bolts of grade 4.6. The staggered pitch is 80 mm, the gauge is 75 mm, end distance is 60 mm and edge distance is 50 mm. [12]

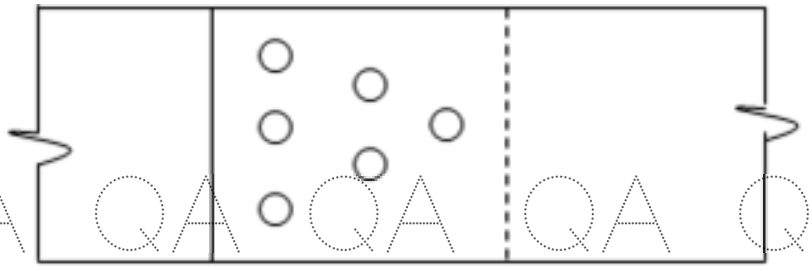

Figure 1

OR

3. Design a welded bracket connection shown in figure 2. The Column is of ISHB 350@ 674 N/m and the thickness of the bracket plate is 12 mm. [12]

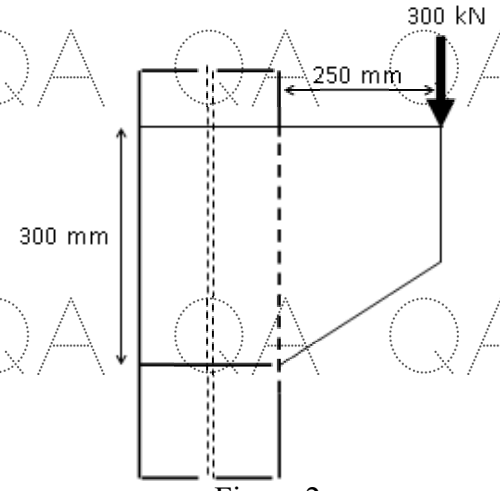

Figure 2

4. Design a battened column of unsupported length 8 m, with two channels placed facing each other to support a service axial load of 9000 kN. The column is to be restrained against rotation and translation at one end and restrained against translation only at the other end. [12]

OR

5. Design a slab base for a column of section ISHB 300@630 N/m subjected to an ultimate axial load of 900 kN. Adopt the grade of concrete for pedestal is M30. [12]

6. Design a laterally unsupported simply supported beam of span 6 m subjected to uniformly distributed design load of 50 kN/m. Assume that full torsional restraint and compression flange partially restrained against warping are provided at the supports and the load acting of the beam will have normal effect. [12]

OR

7. Determine the ultimate strength of a continuous beam supported and loaded as shown in figure 3. [12]

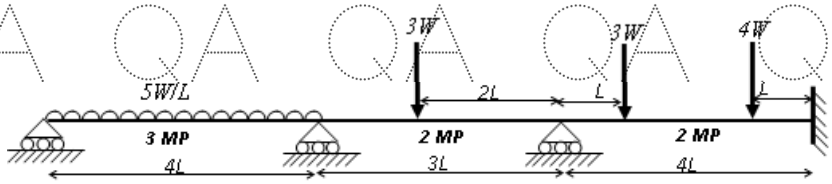

Figure 3

8. Design a simply supported plate girder of span 30 m subjected to an imposed load of 60 kN/m over its entire span in addition to a concentrated load of 200 kN at its mid-span. [12]

OR

9. A simply supported plate girder of span 16 m has Top flange: 300 mm × 20 mm, Bottom flange: 200 mm × 20 mm and web: 1000 mm × 10 mm. The plate girder is subjected to a concentrated load of 600 kN at its mid-span. Design the bearing stiffener. Adopt the length of bering is 230 mm. [12]

10. Design an angular purlin of a power plant structure to be constructed in Nalgonda using the following data: [12]

Terrain category	: 2
Size of the structure	: 15 m × 45 m
Roof covering	: G.I. sheeting
Spacing of roof trusses	: 3 m
Pitch of the roof truss	: 1/4
Permeability	: Medium
Height at eve level	: 9 m
Topography	: Plain

OR

11. Design a gantry girder to carry over head traveling crane for a workshop building using the following data: [12]

Capacity of crane	: 300 kN
Weight of crane excluding trolley	: 100 kN
Weight of trolley	: 50 kN
Distance between centers of gantry girder	: 9 m
Distance between centers of crane wheels	: 3 m
Span of gantry girder	: 6 m
Weight of rail section	: 0.3 kN/m
Height of rail section	: 75 mm

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