Code No: 5220AT

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech II Semester Examinations, February - 2017
ADVANCED STEEL DESIGN
(Structural Engineering)

Time: 3hrs **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.

PART - A

5 × 5 Marks = 25

1.a) Explain the different types of failures of welded connections. [5]
b) Explain the various configurations of shear and moment resistant connections. [5]
c) Explain the functions of bracing in a truss of an industrial building. [5]
d) Explain the different types of truss bridges. [5]
e) Explain the various components of a bunker. [5]

PART - B

5 × 10 Marks = 50

2. Design a lap joint to connect two plates of size 300 mm × 10 mm subjected to an axial tensile force of 400 kN. Use bolts of grade 4.6. [10]

OR

3. Design a welded connection between a gusset plate of 12 mm thick and a truss member ISA 100×100×10 subjected to a factored axial force of 300 kN. Assume the steel is of grade E250. [10]

4. An ISMB 350@ 514 N/m transmits an end reaction of 300 kN to the flange of an ISHB 350@ 661 N/m column. Design a bolted connection and show the connection details with a neat sketch. Use bolts of grade 4.6. [10]

OR

5. A bracket plate of 10 mm thickness is required to support a concentrated load of 175 kN at a distance of 150 mm from the face of a ISHB 350@ 661 N/m column flange. Design the bracket plate and the welded connection between the bracket plate and the column flange. [10]

6. Propose a suitable roof truss for an industrial building to be constructed in Visakhapatnam and also determine the design nodal loads, using the following data:

Life span	:	50 years
Permeability	:	Normal
Spacing of roof trusses	:	4 m
Pitch of the roof truss	:	1/4
Height of truss at eaves level	:	10 m
Size of the building	:	40 m × 12 m
Roof	:	GI sheeting
Topography	:	$\theta < 3^0$

The trusses are to be supported on 300 mm × 300 mm RCC columns. [10]

OR

7. Design an angle purlin of a roof truss for an industrial building using the following data:

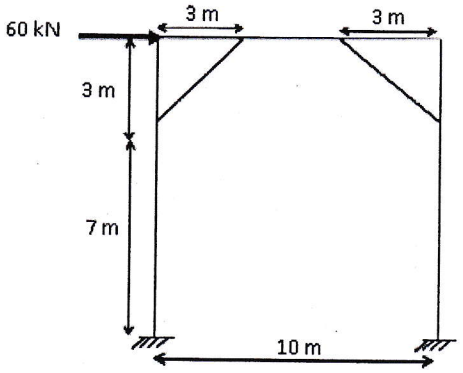
Span of the roof truss	:	15 m
Spacing of roof trusses	:	4 m
Spacing of Purlins	:	2 m
Slope of the roof truss	:	1 Vertical to 3 Horizontal
Wind load Normal to the roof	:	1.2 kN/m^2
Roof	:	GI sheeting

[10]

8. The effective span of a through type Warren truss girder with verticals for a single broad gauge track Railway Bridge is 45 m with 10 panels @ 4.5 m. The height of the truss girder is 6 m. The spacing between the main truss girders is 7.5 m. The chord members are of ISWB 500, the inner web members are of ISHB 400 and the end posts are of ISMB 450. Design the top lateral bracing if the wind pressure is 2 kN/m^2. [10]

OR

9. Analyse the portal bracing of a steel truss girder bridge subjected to the loading as shown in Figure. [10]



10. Explain the Janssen's theory for the design of bins. [10]

OR

11. Design a rectangular bunker of 10 m length and 5 m width supported on six columns (three along each long side) to store coal of unit weight 8.25 kN/m^3 and the angle of internal friction is 35^0. [10]

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