6E3034

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B. Tech. VI-Sem. (Old Back) Exam., April/May-2016

Civil Engineering

6CE3 (O) Steel Structures - II

Time: 3 Hours **Maximum Marks: 80**

Min. Passing Marks (Old Back): 24

Instructions to Candidates:-

Attempt any four questions by selecting one question from each unit. Assume missing data suitable if and specify the same. Use LSM (IS 800 2007) for questions of unit I and II and WSM (IS 800 1984) for remaining questions (Unit III and IV). Use of following supporting materials is permitted during examination: IS 800 2007, IS 800 1984, ISI Hand Book for Structural Engineers Vol 1 (Steel Tables), Railway Bridge Rules and I.S. 875 Part 3.

1. NIL 2. NIL

UNIT-I

Q.1 (a) What is the main purpose of gantry girder? List the loads that should be considered while designing a gantry girder. [4]

(b) Design a gantry girder to carry an overhead travelling crane, having the following data: [16]

(i)	Span of gantry girder	: 6 m
(ii)	Crane capacity	: 200 kN
(iii)	Distance between centres of gantry girder	: 16 m
(iv)	Weight of crane girder	: 120 kN
(v)	Weight of crab	: 50 kN
(vi)	Minimum approach of crane hook	: 1.02 m

(vii) Distance between centres of wheels : 3.8 m

(viii) Height of rail section : 80 mm

(ix) Mass of rail section : 30 kg/m

Take $f_y = 250\ N/mm^2$

OR

Q.1 (a) Find the design wind pressure on a sloping roof of span 10 m and pitch ¼ . The height of eaves is 5 m above ground. The building is situated in Delhi and its permeability is normal. [8]

(b) Design an I – section purlin for a trussed roof from the following data: [12]

(i) Span of roof = 12 m

(ii) Spacing of truss = 5 m

(iii) Spacing of purlins along slope of roof truss = 2 m

(iv) Slope of roof truss = 1 vertical, 2 horizontal

(v) Wind load on roof surface normal to roof = $1000\ N/m^2$

(vi) Vertical load from roof sheets, etc. = $200\ N/m^2$

UNIT-II

Q.2 (a) Explain the following terms briefly: [2×3=6]

(i) Web splicing

(ii) Intermediate stiffeners

(iii) Bearing stiffeners

(b) A welded plate girder has following elements - [14]

Flange plates 400 × 16 mm, one plate for each flange

Web 2000 × 10 mm

Compute the sectional properties and moment of resistance of the plate girder. Design also the bearing stiffeners, if the plate girder is to carry uniformly distributed load of 120 kN/m.

OR

Q.2 (a) What do you understand by curtailment of plates? Explain briefly. [5]

(b) Design a section of a riveted plate girder to carry a uniformly distributed load of 1000 kN over a span of 10 m. A full lateral support is provided to the compression flange. Show the curtailment and also design the flange to web connections. [15]

UNIT-III

Q.3 (a) Explain briefly: [6]

(i) Lateral bracing

(ii) Portal bracing

(b) A pratt truss as shown in fig.1 is to used as one of the two main girders of a single track bridge carrying rolling loads on stringers which in turn are carried by cross – girders connected to the nodes of the trusses. The truss centre lines are 6 m apart while a pair of stringers divide this distance into three equal parts of 2 m each. The following additional data is given: [14]

Span of the main girder	36 m
Dead load on each truss	20 kN/m
Equivalent uniformly distributed live load per girder	60 kN/m

Draw influence lines for forces in members L_2L_3, U_2L_2, U_1L_2 and U_3L_3. Design sections for L_2L_3, U_2L_2, U_1L_2 and U_3L_3.

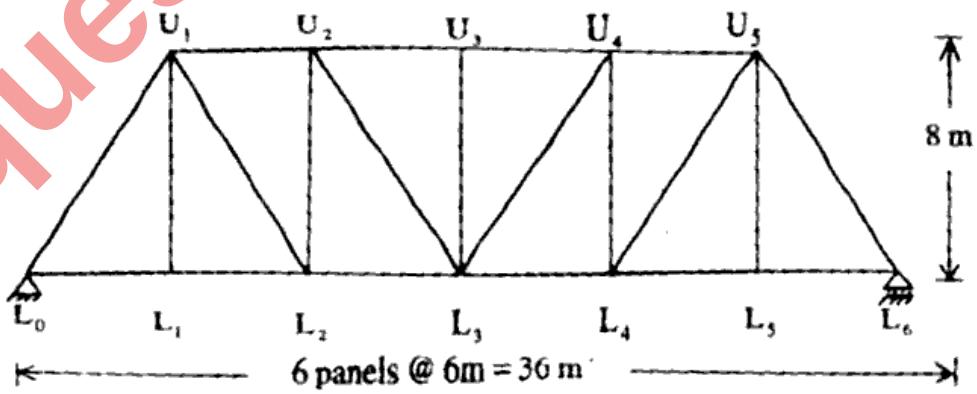

Fig. 1

OR

Q.3 (a) Draw a neat sketch of a through type truss girder bridge and label the components. [6]

(b) Write a short note on 'overturning effects' due to wind load on railway bridges. [6]

(c) A deck type plate girder railway bridge is to be constructed for a broad gauge single line track on the main line. The following data is available: [8]

Effective span (L)	= 20 m
c/c distance between plate girders	= 2 m
Dead load on each girder	= 220 L + 600 N/m
Dead load of track with sleepers	= 6800 N/m
Lateral load	= 9000 N/m

Determine the maximum bending moment and shear force for which one plate girder will be designed.

UNIT-IV

Q.4 Design a suitable staging for a circular water tank against gravity and wind loads. The total gravity load on staging is 3500 kN. The diameter of ring beam is 7 m. Total wind force acting on container is 85 kN acting at 2 m above the top of the staging. The staging height is 18 m. [20]

OR

Q.4 An overhead pressed steel tank is to be designed for a capacity of 75000 litres at Kanpur railway station. Pressed steel plates of size 1.25 × 1.25 m are available. The tank is supported on beams suitably placed which in turn are supported on a staging consisting of 4 columns. The height of the tank from the ground level to the bottom of the supporting beams is 12 m. Design the tank and the supporting beams. [20]
