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6E 3034

B.Tech. VI Semester (Back) Examination, May 2015

Civil Engg.

6CE3 Steel Structures - II

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

Min. Passing Marks : 24

Instructions to Candidates:

*Attempt any **Four questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessery. any data you feel missing suitably be assumed and stated clearly.) Units of quantities used/ calculated must be started clearly.*

Questions of units I and II are to be attempted by using limit state design using IS 800 - 2007 and those of units III and IV by working stress method(IS 800 - 1984) use of following supporting material is permitted during examination.

1. IS: 800 - 2007 2. IS: 800-1984 3.IS: Handbook for structural Engineers Vol I

4. Railway Bridge Rules 5. IS: 875 part 3 *(Steel Tables)*

Unit - I

1. Design a gantry girder to be used in an industrial building carrying a manually operated overhead travelling crane, for the following data:

i)	Crane capacity	- 220 KN
ii)	Self weight of crane girder excluding tralley	- 180 KN
iii)	Self wt of the trolley, electric motor, hook etc.	- 40 KN
iv)	Approximate minimum approach of the crane hook to the gantry girder	- 1.20 m
v)	Wheel base	- 3.4 m
vi)	C/C distance between ganty rails	- 14 m
vii)	C/C distance between columns (Span of gantry girder)	- 7 m

Take steel of grade Fe410 **(20)**

(OR)

1. Design main rafter of a Fink type roof truss for an industrial building for the data given below

i)	Overall length of the building	- 48 m
ii)	Overall width of the building	- 18 m
iii)	C/C spacing of roof tresses	- 8 m
iv)	Rise of tress	- 1/4 of span
v)	Self wt of purlins	- 318 N/m
vi)	Height of columns	- 12 m
vii)	Roofing and side coverings	Aesbestos cement sheets (dead wt. = 171N/m$^{2)}$

The building is located in industrial area of Bhiwadi (near Delhi) in open terrain. Both the ends of the tress are hinged use steel of grade Fe410 **(20)**

UNIT - II

2. Design a welded plate girder 26 m in simply supported span and laterally restrained throughout it if has to support a uniform load of 90KNm throughout the span exclusive of self weight design the girder without intermediate transverse stiffeners. check the adequacy of the section by limit state design principles available in IS 800 - 2007 including post - critical method. Also design end bearing stiffener. connections need not be designed. **(20)**

 (OR)

2. Design a welded plate girder of 22m span using the tension field action for the following factored forces maximum moment, M_2 = 5200 KNm, Maximum shear force = 950 KN. The girder is laterally restrained intermediate stiffeness need to be designed. Connections need not to be designed moment and and shear capacity of end panels is to be checked using the tension field action and bearing stiffeness need not to be designed. **(20)**

UNIT - III

3. The effective span of a deck type plate girder railway bridge for single broad gauge track is 30 m. The depth of plate girder is 2400mm. The spacing between the plate girders is 20 m. The rail level is 400 mm above the top of the plate girders The design reaction is 1000 KN The net area of tension flange is 25,500 mm^2 and the gross area of the compression flange is 30,800 mm^2 The moment of inertia of the plate girder section about xx axis is 4.98×10^{10} mm^4. Determine the increase of stresses in the flanges of leeward girder in the following cases:

a) Overturning effect due to wind, when the bridge is unloaded

b) Horizontal tress effect due to wind, when the bridge is unloaded

c) Overturning effect due to wind, when the bridge is loaded

d) Horizontal tress effect due to wind, when the bridge is loaded **(20)**

(OR)

3. A part truss girder through bridge is provided for a single broad gauge track. The effective span of the bridge is 48 m. The cross girders are spaced at 4m apart.The strangers are placed each 0.15 outside the centre - lune of rails 0.60 KN per meter weight stock rails and 0.40 KN per meter weight guard rails are provided. The sleeper weight may be assumed as 3.5 KN/m per track, and wt. of fastening may be taken as 0.25 KN/m. The main girdes are provided at spacing of 5.3 m c/c, design the central top chord member. The bridge is located in Mumbai, and is to carry standard main line loading **(20)**

UNIT - IV

4. Design an overhead bolted steel rectangular flat bottom tank of capacity 80,000 litres. The available width of plates is 1.22 m and lengths upto 6.3 m. The staging consists of 4 columns, and the bottom of the tank is 10 m above the ground level. The tank is located in Jaipur. staging and supporting beams need not to be designed **(20)**

(OR)

4. Design an overhead circular tank, with hemispherical bottom, for a capacity of 2,20,000 litres. It is to be supported an 8 columns uniformly placed along periphery for which M = 0.00827 WR, T = 0.00063 WR and $F = \frac{W}{16}$ connections need not to be designed. **(20)**