

8E 8092Roll No. 18ECTCE024[Total No. of Pages : **3**]**8E 8092**

B.Tech. VIII - Semester (Main & Back) Examination, April-2019
Civil Engineering
8CE2A Design of Steel Structures - II

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 26

Instructions to Candidates:

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

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

- | | |
|----------------------|--------------------------------------------------|
| ✓ 1. I.S. 800 - 2007 | 2. I.S. 800 - 1984 |
| 3. I.S. 875 - Part 3 | ✓ 4. Railway bridge Rules |
| 5. Steel tables | ✓ 6. ISI Handbook for structural Engineers VOL-I |

Unit - I

1. Design a gantry girder to be used in a mill building to carry an E.O.T. Crane, having the following data. (Steel grade Fe 410) (16)
- | | | |
|--------------------------------------------|---|---------|
| i) Crane capacity | : | 250 kN |
| ii) Weight of crane excluding trolley | : | 200 kN |
| iii) Self wt. of trolley, motor, hook etc. | : | 60 kN |
| iv) Wheel base | : | 3.4 m |
| v) Span crane between rails | : | 20 m |
| vi) Minimum hook approach | : | 1.1 m |
| vii) Span of gantry girder | : | 7 m |
| viii) Self weight of rail section | : | 300 N/m |
| ix) Diameter of crane wheels | : | 150 mm |

(OR)

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(1)

[Contd....]

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

- i) Overall length of building : 48 m
- ii) Overall width of building : 18 m
- iii) C/C spacing of roof trusses : 8 m
- iv) Rise of truss : 1/4 of span
- v) Self weight of Purlin : 318 N/m
- vi) Height of columns : 12 m
- vii) Roofing and side coverings : Asbestos cement sheets
(Dead wt. - 171 N/m²)

Location - Bhiwadi (Near Delhi) in open terrain Steel Grade - Fe410. (16)

Unit - II

2. Design a welded plate girder 26m in span and laterally restrained throughout. It carries a uniform load of 90 kN/m throughout the span exclusive of self weight. Design the girder using intermediate transverse stiffener (Steel grade Fe410). (16)

(OR)

- 2. a) Explain the Serviceability criterion and Compression flange buckling criterion for Minimum web thickness. (8)
- b) Explain stiff bearing length and outstand of web stiffeners with example. (4)
- c) Write the importance of Bearing stiffeners. (4)

Unit - III

3. Design a deck type plate girder railway bridge for single track B.G main line loading for following data : (16)

- i) Effective span : 24 m
- ii) Spacing of plate Girders : 1.9 m C/C
- iii) Weight of guard rails : 260 N/m
- iv) Weight of Stock rails : 440 N/m
- v) Weight of fastening etc. : 280 N/m of track
- vi) Size of sleepers (timber) : 2.8 m×0.25 m×0.15 m @ 0.4 m C/C
- vii) Density of timber : 7.4 kN/m³

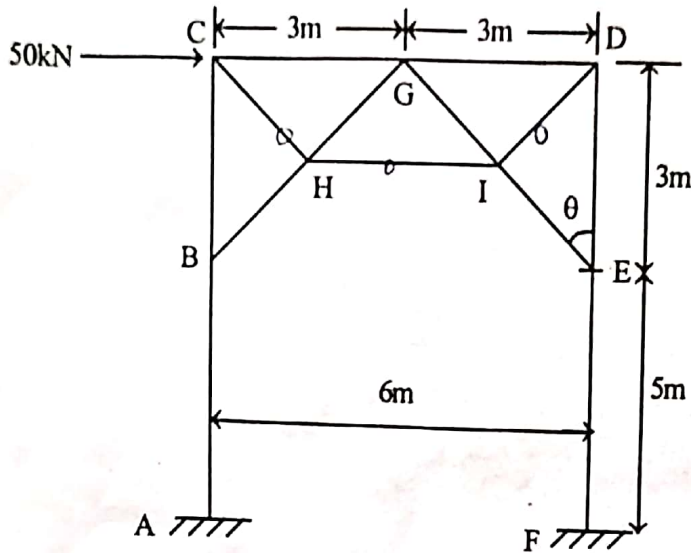
Take permissible stresses as per Railway Steel bridge Code

(OR)

3. a) Explain overturning effects due to wind load on plate girder bridge for railways. (8)
- b) Draw a neat diagram for arrangement for Deck type plate girder Bridge for railway and label their components (4)
- c) What are the IRC recommendations for bolting in plate girder bridge. (4)

Unit - IV ✓

4. Analyse the portal boring of a truss girder bridge when it is subjected to a lateral force of 50 kN. (16)



(OR)

4. a) Draw a neat diagram of elevation of truss girder, top & bottom lateral bracings of a through type truss girder bridge. (10)
- b) Write a short note on economic proportions of truss Bridge with explaining inclination of diagonals and number of panels. (6)

Unit - V ✓

5. Design an elevated Cylindrical steel tank with hemispherical bottom for 1,60,000 litres capacity. The ring beam of the tank is at a height of 10 m from the ground level. Tank has conical roof. The tank is to be built at Delhi ($f_y = 250 \text{ N/mm}^2$) (16)

(OR)

5. Design an overhead rectangular tank of 75,000 litres capacity. The height of columns of staging is 12 m. Take wind pressure intensity of 1.5 kN/m^2 . Staging and supporting beams need not to be designed. The tank may be assumed to be supported on 6 Numbers of Columns. (16)

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