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- OR iii. Design a rectangular bunker of 12m length and 6m width supported on 8 columns to store coal by bulk density 8kN/m^3 and an angle of internal friction 35 degree. Height of vertical portion is 4m. and height of hooper is 4m. 7

Total No. of Questions: 6

Total No. of Printed Pages:4

Enrollment No.....



Faculty of Engineering
End Sem (Odd) Examination Dec-2022
CE3ES03 / CE3ET03

Advanced Design of Steel Structures

Programme: B.Tech.

Branch/Specialisation: CE

Duration: 3 Hrs.

Maximum Marks: 60

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

- Q.1 i. Web Buckling in plate girder is caused by- 1
(a) Diagonal tension
(b) Diagonal tension and diagonal compression
(c) Diagonal compression
(d) Neither diagonal tension nor diagonal compression
- ii. Bearing stiffener in a plate girder is used to- 1
(a) Transfer the load from the top flange to the bottom one
(b) Prevent buckling of web
(c) Decrease the effective depth of web
(d) Prevent excessive deflection
- iii. Gantry girders are subjected to- 1
(a) Horizontal loads only
(b) Vertical loads only
(c) Vertical loads and horizontal thrust both
(d) Can't say with the data provided
- iv. Trusses are solved using which of the following methods- 1
(a) Method of joints
(b) Method of section
(c) Both (a) and (b)
(d) Only logical calculations are done for calculations
- v. Partial safety factor for limit state of serviceability for live load are- 1
(a) 1.5 (b) 1.2 (c) 1.3 (d) 1

P.T.O.

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- vi. What is the truss angle if the span length is 20m and truss height is 5m? **1**
 (a) 20 (b) 26.57 (c) 25.30 (d) 14.04
- vii. While calculating wind pressure, coefficient k_1 stands for- **1**
 (a) Coefficient for terrain category
 (b) Risk coefficient
 (c) Topography factor
 (d) Co-efficient of earth pressure
- viii. Chimneys are not used in- **1**
 (a) Brick manufacturing units
 (b) Thermal power plants
 (c) Hydro-power plants
 (d) Cement industries
- ix. Silo is also known as- **1**
 (a) Shallow bins (b) Deep bins
 (c) Wide bins (d) Thin bins
- x. Which theory is used for bunker? **1**
 (a) Airy's theory (b) Coulomb theory
 (c) Janseen theory (d) Mohr theory
- Q.2 i. What are the component of plate girder bridge? **2**
 ii. Explain the design steps for deck type plate girder bridge. **8**
- OR iii. Design a deck type plate girder railway bridge for single track **8**
 B.G. loading for the following data:
 Effective span=24m
 Spacing of plate girder=1.9c/c
 Weight of stock rail=260N/m
 Weight of guard rail=280N/m
 Weight of fastenings=300N/m of track
 Timber sleepers=250*150*2.8@04m c/c
 Density of timber=7.4kN/m³
 Take permissible stresses as per railway steel bridge code.
- Q.3 i. What are the effects of wind loads on truss girder bridges? **3**

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- ii. What are different types of truss bridges? Explain the design principles of optimum depth of truss-girder. **7**
- OR iii. The pratt truss bridge is provided for single broad guage track. **7**
 The Effective Span of bridge is 24mc/c. The cross girder are spaced 4m apart. The stringers are spaced 2 m between centre line. The main girders are provided at a spacing of 6m between their centre line. dead load on each truss is 15kN/m. Equivalent uniformly distributed live load on each truss is 175kN/m. Assume the impact factor to be 20%. Design the member U_2U_3 .
- Q.4 i. Define rafter and roof bracing. **3**
 ii. List out various elements of the roof truss in industrial shed and mark all its significance. **7**
- OR iii. A Roof truss is to built in Jodhpur City area for an industrial use. **7**
 Determine the basic wind pressure. The size of truss shed is 18*30m.
- Q.5 i. Give difference between self-supporting chimney and steel guyed chimney? **3**
 ii. Design for Delhi a self-supporting steel stack of height 72m, the diameter of cylinder shell is 3m foundation is raft resting on medium soil of bearing capacity of 200kN/m². Assume that 100mm thick lining supported by the stack throughout the height. **7**
- OR iii. Design for Bhopal a self-supporting steel stack of height 70m, the diameter of cylinder shell is 4.25m foundation is raft resting on medium soil. Assume that 100mm thick lining supported by the stack throughout the height. **7**
- Q.6 i. Write any three differences between bunker and silo. **3**
 ii. A silo with internal diameter 6m. Height of cylindrical portion 18m and opening with 05m is to be built to store wheat. Design the silo M20 grade concrete and FE-415 steel. Given: **7**
 Unit weight of wheat- 8.5 kN/m³
 Angle of internal friction=28 degree.

P.T.O.

Scheme of Marking

	Faculty of Engineering End Sem (Odd) Examination Dec-2022 CE3ET03 Advanced Design of Steel Structure		
	Programme: B.Tech.		Branch/Specialisation:

Note: The Paper Setter should provide the answer wise splitting of the marks in the scheme below.

Q.1	i)	Web Buckling in Plate Girder is caused by, C) diagonal compression	1
	ii)	Bearing stiffener in a plate girder is used to B) Prevent buckling of web	1
	iii)	Gantry girders are subjected to . D) Can't say with the data provided	1
	iv)	Trusses are solved using which of the following methods C) Both Method of Joints and Method of Section	1
	v)	Partial Safety Factor for limit State of Serviceability for Live Load are c) 1.5	1
	vi)	What is the truss angle if the span length is 20m and truss height is 5m. B) 26.57	1
	vii)	While Calculating Wind Pressure, coefficient k1 stands for B) Risk Coefficient	1
	viii)	Chimneys are not used in C) Hydro-Power Plants	1
	ix)	silo is also known as b) Deep bins	1
	x)	Which theory is used for bunker? (c) Janseen theory	1

Q.2	i.	Each component of plate girder bridge?	1 mark *2	2
	ii.	Steps for Deck Type Plate Girder Bridge?	1 mark*8	8
OR	iii.	Load calculation Bending moment Shear force Depth Flange area	3 marks 2 mark 1 mark 1 mark 1 mark	8
Q.3	i.	Effects of wind loads on truss girder bridges 1 mark for each effect	1 mark * 3=3	3
	ii.	different types of truss bridges? Explain the design principles of optimum depth of truss-girder	3 marks 4 marks	7
OR	iii.	Design of top chord member ILD Forces Check for load carrying capacity	2 marks 1 mark 2 marks 2 marks	7
Q.4	i.	Define Rafter Roof Bracing	1.5 marks 1.5 marks	3
	ii.	Each elements	1 marks*7	7
OR	iii.	Value of k1 k2 k3 Formula and ans for wind pressure	3 marks 4 marks	7
Q.5	i.	Difference Between Self Supporting Chimney and Steel Guyed Chimney? Each*3difference	1 Marks	3
	ii.	Section calculation Wind load calculation Overturning moment	2 marks 2 marks 3 marks	7
OR	iii.	Section calculation Wind load calculation Overturning moment	2 marks 2 marks 3 marks	7

Q.6	i.	Difference Between Bunker and Silo?Any Three? Marks*3difference	1	3
	ii.	ii. Calculation of force Design of wall Design of horizontal beam Design of hopper bottom	2 marks 2 marks 2 marks 1 mark	7
	iii.	iii. Calculation of pressure Design of wall	4 marks 3 marks	7
