Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem Examination May-2024

CE3CO31 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. Assume suitable data if necessary. Notations and symbols have their usual meaning.
Use of steel table and IS: 800 should be permitted for this exam.

Q.1 i. The best tension member section will be a- **1**
(a) Bolted single-angle section
(b) Welded single angle section
(c) Double angle section on opposite side of gusset plate
(d) Channel section

ii. The thickness of gusset plate should not be less than- **1**
(a) 6 mm (b) 8 mm (c) 12 mm (d) Data insufficient

iii. The vertical plate of plate girder is termed as- **1**
(a) Web plate (b) Flange plate
(c) Cover plate (d) None of these

iv. Which of the following section will be preferred for a column? **1**
(a) ISLB (b) ISMB (c) ISWB (d) ISHB

v. The thickness of the base plate is determined from the- **1**
(a) Flexural strength of the plate
(b) Shear strength of the plate
(c) Bearing strength of the concrete pedestal
(d) Punching criteria

vi. Design strength in compression is taken as- **1**
(a) f_y /1.1 (b) f_u /1.25
(c) From table (d) None of these

vii. In finding thickness of the base plate w is- **1**
(a) Load on column
(b) Load on column + weight of footing
(c) Bearing capacity of soil
(d) Upward thrust

P.T.O.

viii. The slenderness ratio for tension member with reversal of load other than wind- **1**
(a) 80 (b) 100 (c) 180 (d) 350

ix. Short Section of wood or steel, nailed, screwed, or bolted to the rafters of the truss for supporting purlins are known as- **1**
(a) Battens (b) Ridge (c) Eaves (d) Cleats

x. The live load for slopping roof with slope 15° where access is not provided to roof is taken as- **1**
(a) 0.55 kN/m^2 (b) 0.65 kN/m^2
(c) 0.75 kN/m^2 (d) 1.10 kN/m^2

Q.2 i. What are the various types of steel sections? **2**
ii. Enlist the limitations of welded connections. **3**
iii. Describe efficiency of joints in steel structures. **5**
OR iv. Explain the eccentrically loaded connections. **5**

Q.3 i. What do you understand by strength of steel beams? **2**
ii. Write down the steps to design a plated beam. **8**
OR iii. Design a beam of 5 m effective span, carrying a uniform load of 20 kN/m, if the compression flange is laterally unsupported. Assume fy = 250 MPa. **8**

Q.4 i. What are the compression members in steel structure? **3**
ii. Explain the mode of failure of tension members. **7**
OR iii. Design a single angle section for a tension member of a roof truss to carry a factored tensile force of 500 kN. The member is subjected to the possible reversal of stress due to the action of wind. The effective length of the member is 4m. Use 20mm shop bolt of grade 4.6 for the connection **7**

Q.5 i. Explain requirement of lacing/battening in column. **3**
ii. Design a gusseted base for column ISHB 300 @ 577N/m with two plates 500mm × 40mm carrying a factored load of 3000 kN. The column is to be supported on concrete pedestal to be built with M20 concrete. **7**
OR iii. A column 6 metre long has to support of factored load of 9000 kN the column is effectively held at both ends and restrained in direction at one of the ends design the column using beam sections and plates. **7**

Q.6 Attempt any two:
i. Enlist and explain various types of trusses. **5**
ii. What is purlin? Write the design steps for purlin design. **5**
iii. Describe lug and cleat angle in roof trusses. **5**

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Marking Scheme

Design of Steel Structures (T) - CE3CO31 (T)

Q.1	i)	c		**1**
	ii)	a		**1**
	iii)	a		**1**
	iv)	d		**1**
	v)	a		**1**
	vi)	c		**1**
	vii)	d		**1**
	viii)	c		**1**
	ix)	d		**1**
	x)	b		**1**
Q.2	i.	4 points	0.5 Marks each	**2**
	ii.	3 points	1 Marks each	**3**
	iii.	Description 5 points	1 Marks each	**5**
OR	iv.	Description 5 points	1 Marks each	**5**
Q.3	i.	Correction definition and explanation	2 Marks	**2**
	ii.	All complete steps – full marks otherwise point by point marking.		**8**
OR	iii.	Step marking for design		**8**
Q.4	i.	Correction definition and explanation	3Marks	**3**
	ii.	Enlisting of all the modes of failure 3 Marks and correct explanation of min two of them – 4 Marks i.e. 2Marks each.		**7**
OR	iii.	Step marking on design.		**7**
Q.5	i.	4 points	1Marks each.	**4**
	ii.	Step marking for design		**6**
OR	iii.	Step marking for design		**6**
Q.6				
	i.	Enlisting correct types – and explanation of any 3 types –	2Marks. 1 Marks each.	**5**
	ii.	for the definition and for the design steps.	1Marks 4 Marks	**5**
	iii.	Correct definition of lug – and Correct definition of cleat angle –	2 Marks each 3 Marks .	**5**

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