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

Enrollment No.....

Faculty of Engineering

End Sem Examination May-2023

CE3CO14 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.

Q.1 i. Which of the following is a type of steel structure design? **1**

(a) Continuous design (b) Simple design

(c) Semi-continuous steel design (d) All of these

ii. Which of the following is a disadvantage of steel? **1**

(a) High durability (b) Reusable

(c) High strength per unit mass (d) Fire and corrosion resistance

iii. What is the minimum percentage of chromium and nickel added to stainless steel? **1**

(a) 10.5%, 0.5% (b) 0.5%, 10.5%

(c) 30%, 50% (d) 2%, 20%

iv. Which method is mainly adopted for design of steel structures as per IS code? **1**

(a) Earthquake load method (b) Ultimate load method

(c) Limit state method (d) Working stress method

v. Which of the following relation is correct? **1**

(a) Design Strength = Ultimate strength / Partial factor of safety

(b) Design Strength = Ultimate strength + Partial factor of safety

(c) Design Strength = Ultimate strength * Partial factor of safety

(d) Design Strength = Ultimate strength – Partial factor of safety

vi. Which of the following relation is correct? **1**

(a) Net area = Gross area / deductions

(b) Net area = Gross area – deductions

(c) Net area = Gross area * deductions

(d) Net area = Gross area + deductions

P.T.O.

vii. Among which of the following is the location of plastic hinge? **1**
(a) At centre for uniformly distributed load
(b) At points away from concentrated load
(c) At supports
(d) At centre of beam

viii. Which of the following relation between load factor, collapse load (Wc) and working load (W)? **1**
(a) F = W / Wc (b) F = Wc + W
(c) F = Wc W (d) F = Wc / W

ix. What is the value of the imperfection factor for buckling class a? **1**
(a) 0.35 (b) 0.73 (c) 0.21 (d) 0.23

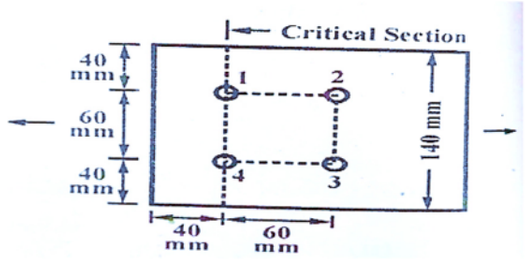
x. Which of the following is not a parameter for decrease in strength of slender member? **1**
(a) Variation of material properties (b) Seismic load
(c) Residual stress (d) Initial lack of straightness

Q.2 i. Write a note on structural properties of steel. **2**

ii. Discuss partial load factors. **3**

iii. Define welded connection and explain the various failures of welded joints with the help of neat diagrams. **5**

OR iv. Determine the design tensile strength of plate 140mm X 12mm with the holes for 18mm diameter bolts as shown in fig below: **5**



Q.3 i. What is the difference between bending and buckling of a steel beam? State the checks to be performed for beam design. **2**

ii. A beam MB 600 @123 kgf/m has an effective span of 7 m. Two floors joints transmit the floor load at a distance of 4m from each end. Determine the safe load which the two floor joints can transmit on the beam if the beam is effectively restrained laterally by the floor joints the steel conforms to IS code? **8**

OR iii. Design a load caring stiffener for a load of 650 kN for the section ISMB600? **8**

Q.4 i. What is the basic difference in behaviour between tension and compression members while resisting the loads? **3**

ii. Calculate the strength of ISA 65 x 65, 6 mm thick when used as a tension member with its longer leg connected by: **7**
(a) 16 mm dia. rivets (b) Fillet weld

OR iii. A single angle strut ISA 75 x 75 x 8 mm of a roof truss is 2.08 m long. It is connected by one rivet at each end. Determine the safe load this strut can carry. **7**

Q.5 i. Discuss the behaviour of members under combined loading. **4**

ii. Design a column section to carry a load of 450 kN at an eccentricity of 120 mm from the x-x axis the effective length of column is 3.9 m. Use relevant IS code. **6**

OR iii. Design the slab base for a column consisting of ISHB 300 @58.8 kg/m and carrying an axial load of 2000 kN. Take allowable bearing pressure on concrete as 4.5 N/mm^2. **6**

Q.6 Attempt any two:

i. What is the procedure for designing of roof truss? **5**

ii. Define roof trusses and their types with neat diagram. **5**

iii. Explain steps for designing purlin. **5**

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Scheme of Marking

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CE3CO14 Design of Steel Structures
Programme: B.Tech. | Branch/Specialisation:

Q.1	i)	A BCD	1
	ii)	D	1
	iii)	A	1
	iv)	C	1
	v)	A	1
	vi)	B	1
	vii)	A	1
	viii)	D	1
	ix)	C	1
	x)	B	1

Q.2 - 1 → ~~Defination~~ - 2

Q.2 1 → Two properties 1 mark for each Properties

2 → Defination – 3 Marks

3 → Defination → 2 mark

Failures with Figure → 1 mark for each

OR

4 → Tdg – 1 marks

Tdn → 1 marks

Tdb → 3 marks

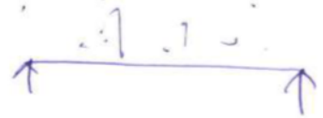
Q.3 → 1) → Define → 1 mark for each

2) → Sketch → 1 mark

→ B.M & SF. → 3 marks

→ M~~d~~ → 3 marks

→ Vd → 1 marks



OR

3) → Dimension → 4 marks

→ Bearing check → 4 marks

→

Q.4 → 1) Difference → 1 marks for each

2) ~~For~~ for a part → 3-5 marks

for b part → 3-5 marks

OR 3) fcd → 3 marks

Safe load → 4 marks

Q.5 → 1) Explanation → 4 marks

2) Column design → 3 marks

Q.6 → 1) Explanation

5 mark each.

Check → 3 marks

(OR)

3) Thickness → 4 marks
Formulae → 2 marks