

Enrollment No.....



Faculty of Engineering
End Sem (Even) Examination May-2019
CE2CO17 Structural Design & Drafting-II (Steel)

Programme: Diploma

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. Size of rivet hole is _____ size of rivet 1
 (a) More than (b) Less than
 (c) Equal to (d) Not compared with
- ii. Which of the following is advantage of HSFG bolts over bearing type bolts? 1
 (a) Joints are not rigid
 (b) Bolts are subjected to shearing and bearing stresses
 (c) High strength fatigue
 (d) Low static strength
- iii. What are steel tension members? 1
 (a) Structural elements that are subjected to direct compressive loads.
 (b) Structural elements that are subjected to direct tensile loads.
 (c) Structural elements that are subjected to indirect compressive loads.
 (d) Structural elements that are subjected to indirect tensile loads
- iv. The strength of tensile members is not influenced by: 1
 (a) Length of connection (b) Net area of cross section
 (c) Type of fabrication (d) Length of plate
- v. What is the effective length when both ends of compression member are fixed? 1
 (a) 0.65L (b) 0.8L (c) L (d) 2L
- vi. Lacing shall be designed to resist a total transverse shear equal to _____ of axial force in member 1
 (a) 5% (b) 1% (c) 4.3% (d) 2.5%

P.T.O.

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| | vii. | A beam section is provided on the basis of | 1 |
| | | I. Section modulus II. Deflection III. Shear | |
| | (a) | I, II (b) II, III (c) I, III (d) I, II and III | |
| | viii. | As per IS specification, the beam sections should be | 1 |
| | (a) | Not symmetrical about any principal axes | |
| | (b) | At least symmetrical about one of the principal axes | |
| | (c) | Symmetrical about all principal axes | |
| | (d) | Unsymmetrical about all principal axes | |
| | ix. | The range of economical spacing of trusses varies from (where L is span). | 1 |
| | (a) | L/3 to L/5 (b) L/4 to 2L/5 | |
| | (c) | L/3 to L/2 (d) 2L/5 to 3L/5 | |
| | x. | The external wind pressure acting on a roof depends on | 1 |
| | (a) | Degree of permeability of roof | |
| | (b) | Slope of roof | |
| | (c) | Both (a) and (b) | |
| | (d) | None of these | |
| Q.2 | i. | Explain various types of load to be considered in design of steel structures. | 2 |
| | ii. | Differentiate between weld joint and rivet joint | 3 |
| | iii. | Design a double riveted lap joint for MS plates 10.5 mm thick. Calculate the efficiency of the joint. The permissible stresses are:
$\sigma_t = 90 \text{ MPa}$, $\tau_s = 75 \text{ MPa}$, $\sigma_c = 150 \text{ MPa}$ | 5 |
| OR | iv. | A 15mm thick plate is joined to a 13mm plate by 200mm long (effective) butt weld. Determine the strength of joint if a double V Butt weld is used. Assume that Fe-410 grade plates and shop welds are used. | 5 |
| Q.3 | i. | Draw various types of sections used for tension members. | 2 |
| | ii. | A tension member of a truss consists of a single angle ISA 125x75x10mm carrying a load of 180KN. If 20mm diameter rivets be used design the connection to the gusset plate using a lug angle. | 8 |

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| OR | iii. | Determine the axial load capacity of the column ISHB 300 @ 577 N/m if the length of column is 3m and it's both ends pinned. | 8 |
| Q.4 | i. | Explain different types of bracings used in a braced building? | 3 |
| | ii. | Design a column of effective length 5.90m. It is subjected to a factored axial compressive load of 2000KN. Provide two channels back to back connected with battens by site welded connection. Use steel of grade Fe-410. | 7 |
| OR | iii. | Calculate the value of the least radius of gyration for a compound column consisting of ISHB 250 @ 536.6 N/m with one cover plate 300mm x 20 mm on each flange. | 7 |
| Q.5 | i. | Explain various types of built up steel sections used for beam. | 4 |
| | ii. | Design a simply supported beam of effective span 1.75m carrying a factored concentrated load of 350KN at mid span. | 6 |
| OR | iii. | An ISMB 500 section is used as a beam over a span of 6m, with simply supported ends. Determine the maximum factored uniformly distributed load that the beam can carry if the ends are restrained against torsion, but compression flange is laterally unsupported. | 6 |
| Q.6 | | Attempt any two: | |
| | i. | Explain different types of steel roof truss. | 5 |
| | ii. | Describe the procedure for calculations of dead load, live load and wind load acting on roof truss. | 5 |
| | iii. | Enumerate the selection criteria of steel roof truss. | 5 |

Marking Scheme

CE2CO17 Structural Design & Drafting-II (Steel)

Q.1	i.	Size of rivet hole is _____ size of rivet	1
		(a) More than	
	ii.	Which of the following is advantage of HSFG bolts over bearing type bolts?	1
		(c) High strength fatigue	
	iii.	What are steel tension members?	1
		(b) Structural elements that are subjected to direct tensile loads.	
	iv.	The strength of tensile members is not influenced by:	1
		(d) Length of plate	
	v.	What is the effective length when both ends of compression member are fixed?	1
		(a) 0.65L	
Q.2	vi.	Lacing shall be designed to resist a total transverse shear equal to _____ of axial force in member	1
		(d) 2.5%	
	vii.	A beam section is provided on the basis of	1
		I. Section modulus II. Deflection III. Shear	
		(d) I, II and III	
	viii.	As per IS specification, the beam sections should be	1
		(b) At least symmetrical about one of the principal axes	
	ix.	The range of economical spacing of trusses varies from (where L is span).	1
		(a) L/3 to L/5	
	x.	The external wind pressure acting on a roof depends on	1
Q.2		(b) Slope of roof	
	i.	Types of load to be considered in design of steel structures.	2
	ii.	Differentiate between	3
		Weld joint	1.5 marks
		Rivet joint	1.5 marks
	iii.	Design a double riveted lap joint for MS plates 10.5 mm thick. Calculate the efficiency of the joint.	5
		Shear Strength	2 marks
		Bearing Strength	2 marks

OR	iv.	Correct Answer	1 mark	5
		Determine the strength of joint if a double V Butt weld is used		
Q.3	i.	Types of sections used for tension members.		2
		Diagram	1 mark	
	ii.	Description	1 mark	8
		Design the connection to the gusset plate using a lug angle.		
		Strength of rivet	4 marks	
		Pattern	2 marks	
OR	iii.	Lug angle	2 marks	8
		Determine the axial load capacity of the column		
		E. length	1 mark	
		Section	3 marks	
	Q.4	Check	4 marks	3
		Types of bracings used in a braced building		
Q.4	i.	Diagram	1.5 marks	7
		Description	1.5 marks	
	ii.	Design a column of effective length		7
		E. length	1 mark	
		Section	3 marks	
		Spacing	3 marks	
OR	iii.	Calculate the value of the least radius of gyration for a compound column		7
Q.5	i.	Types of built up steel sections used for beam.		4
		Diagram	2 marks	
		Description	2 marks	
		B.M.	1 mark	
OR	ii.	Section Modulus	2 marks	6
		Choosing Section	1 mark	
		Check	2 marks	
	iii.	B.M.	1 mark	6
		Section Modulus	2 marks	
		Choosing Section	1 mark	
		Check	2 marks	

Q.6	Attempt any two:		
	i.	Types of steel roof truss.	5
		Diagram	
		Description	
	ii.	Calculations of dead load	5
		Live load	
		Wind load acting on roof truss	
	iii.	Selection criteria of steel roof truss.	5
		1 mark for each	
		(1 mark * 5)	
