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PRN:		Course Code :	CET2501

Third Year **B. Tech** End Semester Examination Winter 2023

Design of Steel Structures

Day and Date: Wednesday, 29/11/2023 Max Marks: **100**

Time : 10.30 am to 1.30 PM Duration: **03** hrs

Instructions:
1) All questions are compulsory.
2) Assume suitable data wherever necessary.
3)Figures to the right indicate full marks.
4) Use of IS 800(2007) and Steel table is allowed

			Marks	Bloom's Level	CO
Q.1		**Attempt the following**			
	a)	Explain in detail advantages and disadvantages of steel structures	08	L2	1
	b)	Explain design philosophy of limit state method.	08	L2	1
		OR			
	b)	Explain in detail step by step design procedure for a design of bolted connection.	08	L2	1
Q.2		**Attempt the following**			
	a)	Explain in detail step by step design procedure for a tension member.	06	L2	1
	b)	Design a single angle section for a tension member of a roof truss to carry a factored force of 300 kN. The member is subjected to possible reversal of stress due to action of wind. The length of the member is 3m. Use M 20 bolts of grade 4.6. for connection	10	L4	1
		OR			
	b)	Design a tie member of roof truss subjected to working loads of 80KN (D.L) and 120KN (L.L).Use double angle section connected back to back on either side of gusset 8mm thick. Use bolted connection fy = 250 Mpa , fu=410Mpa for bolted member and bolt material.	10	L4	1
Q.3		**Attempt the following**			
	a)	Explain in detail step by step design procedure for a compression member.	06	L2	2
	b)	Determine compression load carrying capacity of angle section 100 x 100 x 6mm connected to the 12 mm gusset plate. Assume Fy= 250 N/mm^2, Fu = 410 N/mm^2. E= 2 x 10^5 N/mm^2.	12	L3	2
		OR			
	c)	Design single angle strut connected to gusset plate to carry 360 kN factored load. The length of strut between center connection is 3m.	12	L4	2
Q.4		**Attempt the following**			
	a)	Explain in detail design clauses for laced column system.	05	L2	3
	b)	A column 5m long has to support a factored load of 3600 kN. The column is connected with pin connection at both ends. Design the column using beam section and plates. Also assume the following Fy= 250 N/mm^2, Fu = 410 N/mm^2. E= 2 x 10^5 N/mm^2.	09	L4	3
		OR			
	c)	Design a slab base for a column ISHB 250@573N/m subjected to factored axial compressive load of 1000 kN. The load is transferred to the base plate by direct bearing of column flanges.	09	L4	3

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Use M20 concrete.

Q.5	**Attempt any Two of the following**				
a)	Explain in detail different forces acting on gantry girder. Draw neat sketch gantry girder arrangement.	09	L2	3
b)	Explain the Following 1. Web Buckling 2. Web Crippling 3. Curtailment of Flange Plate	09	L2	3
c)	Explain design steps for laterally unsupported beam.	09	L2	3
Q.6	**Attempt any Two of the following**			
a)	Explain the following 1. Shape Factor 2. Plastic Hinge 3. Collapse Mechanism	09	L2	4
b)	Explain Upper bound theorem and Lower bound theorem of plastic analysis.	09	L2	4
c)	Determine collapse load for a simply supported beam subjected to a central point load by using static and kinematic method.	09	L2	4

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