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CBCS SCHEME

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BCV701

Seventh Semester B.E./B.Tech. Degree Examination, June/July 2026
Design of Steel Structural

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. Use of IS 800 – 2007 and Steel table is permitted.
4. Missing data, if any, may be suitably assumed.

		Module – 1	M	L	C
Q.1	a.	Mention any four advantages and four disadvantages of Steel Structures.	8	L2	CO1
	b.	Mention loads and load combination adopted in the design of steel structures. Explain briefly importance of the same.	8	L2	CO1
	c.	Mention four classes of sections as per IS 800 – 2007.	4	L2	CO1
		OR			
Q.2	a.	Define : i) Plastic Neutral Axis ii) Elastic and plastic section modulus iii) Shape factor and load factor iv) Plastic hinge.	8	L2	CO1
	b.	Identify plastic hinge 'X' is 0.414ℓ from the simple support of a propped cantilever beam supporting a UDL of ω KN/m over the entire span.	12	L3	CO1
		Module – 2			
Q.3	a.	Mention the different types of bolts used to connect the steel structural elements. Explain briefly advantages of HSFG bolts.	8	L2	CO2
	b.	Design a bolted connection for a lap joint of plate thickness 10 mm and 12 mm to carry a factored load of 150 KN. Use M16 and 4.6 grade bolt. Assume the bolts are fully threaded.	12	L4	CO2
		OR			
Q.4	a.	Explain the various modes of failure of bolted connections with neat sketch.	8	L2	CO2
	b.	Design a bolted connection between flange of the column ISHB 450 @ 907 N/m and bracket plate. The bracket plate carries a load of 150 KN at an eccentricity of 350 KN. Bracket plate thickness 15 mm. Adopt HSFG bolts of property class 8.8.	12	L4	CO2

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		Module – 3			
Q.5	**a.**	What are the common defects in welding? Explain briefly with neat sketches.	**8**	**L2**	**CO2**
	b.	A tie member of roof truss consists of 2 ISA 100 × 75 × 8 mm and are connected to both sides of 10 mm gusset plate, by longer legs, factored axial force in the member is 500 KN. Design the welded joint by providing weld i) Along two parallel sides of angle ii) Along three sides of connected angel Assume shop weld.	**12**	**L3**	**CO2**
		OR			
Q.6	**a.**	What are the advantages of welded connection over other connections?	**6**	**L2**	**CO2**
	b.	Design welded connection for two angles ISA 100 × 75 × 8 connected to 10 mm gusset with longer legs at its extremities. Design the weld for full strength of the member. Assume shop welding size of fillet weld as 6 mm.	**14**	**L4**	**CO2**
		Module – 4			
Q.7	**a.**	Mention the three important failure parameters to be considered while designing a tension member in limit state method. Explain any one briefly as per IS 800 – 2007 provisions.	**8**	**L2**	**CO3**
	b.	Design a double angle equal sections back to back on each side of gusset plate 8 mm thick for a tie member of a truss to carry a factored load of 250 KN center to center length of member between centroids of connections is 2.5 m. Use bolted connections. Assume f_y = 250 MPa, f_u = 410 MPa.	**12**	**L4**	**CO3**
		OR			
Q.8	**a.**	Define column base. What are the types of column bases?	**8**	**L2**	**CO3**
	b.	Design a Slab Base for a column ISHB 350 at 710.2 N/m subjected to a factored axial compressive load of 1500 KN. The SBC of soil is 250 KN/m^2. Use M20 grade concrete for pedestal.	**12**	**L4**	**CO3**
		Module – 5			
Q.9		A column 4.6 m long weld effectively at both ends and restrained in direction at one end has to support a factored load of 2800 KN. Design the column using standard ISHB sections and plates.	**20**	**L4**	**CO3**
		OR			
Q.10		Design a compression member using double channel section "face to face" to carry a factored load of 1600 KN. The length of the column is 5 m with one end is fixed and other is hinged. Also design single lacing system.	**20**	**L4**	**CO3**

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