Reg. No.																

Question Paper Code	13588

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Sixth Semester

Civil Engineering

20CEPC601 - DESIGN OF STEEL STRUCTURES

Regulations - 2020

(Use of IS 800:2007, Steel Tables is permitted)

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Which structural steel section is commonly used for beams in construction? (a) T-section (b) I-section (c) Angle section (d) Channel section	1	K1	CO1
2.	Dead load on a structure includes: (a) The weight of moving vehicles (b) Seismic forces acting on the structure (c) The weight of the structural components (d) Wind forces	1	K1	CO1
3.	The type of welding used to join structural members is usually: (a) Gas welding (b) Arc welding (c) Resistance welding (d) Forge welding	1	K1	CO2
4.	What is the efficiency of riveted joint having minimum pitch as per IS:800? (a) 0.6 (b) 0.4 (c) 0.3 (d) 0.5	1	K1	CO2
5.	The design strength of a tension member depends on: (a) Gross area (b) Net area (c) Both gross and net area (d) Thickness of the member	1	K1	CO3
6.	The net section area of a tension member is: (a) Gross area + Bolt holes (b) Gross area - Bolt holes (c) Only the area of the bolt holes (d) Area including welds	1	K1	CO3
7.	The critical buckling load in a column is inversely proportional to: (a) Slenderness ratio (b) Radius of gyration (c) Effective length squared (d) Column height	1	K1	CO4
8.	Lacing in a built-up column is provided to: (a) Reduce weight (b) Prevent local buckling of components (c) Reduce the effective length (d) Distribute load evenly	1	K1	CO4
9.	In a plate girder, stiffeners are provided to: (a) Resist axial compression (b) Increase bending strength (c) Prevent local buckling of the web (d) Enhance flexibility	1	K1	CO5
10.	A purlin in a roof truss is designed to: (a) Support truss loads (b) Support roofing sheets (c) Provide lateral stability (d) Resist axial tension	1	K1	CO6

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

		Marks	K – Level	CO
11.	List the mechanical properties of Steel.	2	K1	CO1
12.	How the loads are classified?	2	K1	CO1
13.	Summarize how to calculate pitch and edge distance.	2	K2	CO2
14.	Write down the minimum pitch and maximum pitch as per IS 800- 2007.	2	K1	CO2
15.	Define Tension Splice.	2	K1	CO3
16.	Describe the formula for design strength due to yielding of critical section.	2	K2	CO3
17.	Compare column and strut.	2	K1	CO4
18.	Recall single lacing & double lacing.	2	K1	CO4
19.	What is laterally supported beam?	2	K1	CO5

20.		Outline web crippling.	2	K2	CO5
21.		Define Purlin.	2	K1	CO6
22.		Write down the formula for calculating the design wind speed as per IS 800-2007.	2	K2	CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Explain briefly various types of loads to be considered in design of steel structures.	11	K2	CO1
		OR			
	b)	Draw a typical stress-strain for mild steel and explain the salient points on it. Also explain the mechanical properties of mild steel.	11	K2	CO1
24.	a)	Find the safe load and efficiency of a double cover butt joint The main plates are 12 mm thick connected by 18 mm diameter bolts at a pitch of 100 mm. Design the cover plate also. What is the percentage reduction in the efficiency of the joint if the plates are lap jointed?	11	K3	CO2
		OR			
	b)	Two plates10mm and 16mm thick are to be joined by double cover butt joints. Assuming cover plates of 8mm thickness, design the joints to transmit a factored load of 450kn.Assume 410 plate and bolt of grade 4.6.	11	K3	CO2
25.	a)	Design single angle section for a tension member of roof truss to carry a factored load of 200 KN. The member is subjected to a possible several reversal stress due to reaction of wind. The length of member is 3 m. Use 20 mm shop prefabricated bolts of 4.6 grades.	11	K3	CO3
		OR			
	b)	Design tensile strength of roof truss diagonal 100x75x10mm connected to gusset plate by 5mm width. Assume length of well at top is 130mm and 300mm. Also assume thickness of gusset plate as 10mm.	11	K3	CO3
26.	a)	Design a single angle strut connected to the gusset plate to carry a 200 KN factored load. The length of strut between center to center is 4 m.	11	K3	CO4
		OR			
	b)	Design a suitable slab base for a column section ISHB 400@ 822 N/m. Supporting an axial load 500kN. The base plate is to rest on a concrete pedestal of M20 grade concrete.	11	K3	CO4
27.	a)	Design a laterally supported beam of effective span 5 m for the following data. Grade of steel: Fe 410 Factored maximum B.M. = 180 kN-m Factored maximum S. F. = 220 kN. Check for deflection is not required.	11	K3	CO5
		OR			
	b)	Construct the step by step procedure for design of vertical, intermediate and horizontal stiffeners in a plate girder.	11	K3	CO5
28.	a)	Design a channel section purlin for the following data 1.Spacing of trusses= 6m 2.Spacing of purlin= 1.8m 3.Weight of sheet= 100 N/m^2 4.Weight of purlin= 100 N/m 5. Live load= 0.5 KN/m^2 6.Wind load= 1.5 KN/m^2 7.Inclination of main rafter= 30^0	11	K3	CO6
		OR			
	b)	Construct the different types of roof truss with neat sketches.	11	K3	CO6