Reg. No. | | | | | | | | | | | | | |

B. E / B. TECH.DEGREE EXAMINATION, MAY 2023

Sixth Semester

CE18601 – DESIGN OF STEEL STRUCTURES

(CIVIL ENGINEERING)

(Regulation 2018)

(*Use of IS 800, IS875 (Part 3) and Steel Tables may be permitted*)

TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Provide the apt connection for the problem statement using codal provisions.	3
CO 2	Design of tension members using codal provisions.	3
CO 3	Design columns and columns bases.	3
CO 4	Design bending member with appropriate section using design principles.	3
CO 5	Compute the wind loads and others loads on industrial structures based on codal provisions.	3

PART- A(10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	Write a note on plane moment eccentric connection.	1	1
2.	List the advantages of HSFG bolts.	1	1
3.	Sketch any two typical cross sections of tension member.	2	2
4.	State the purpose of providing tension splice.	2	2
5.	Discuss the purpose of providing battens in compound steel columns.	3	2
6.	Distinguish slab base and gusseted base.	3	2
7.	What are castellated beams?	4	2
8.	Define laterally restrained beam. Why do compression flanges require lateral support?	4	2
9.	Define end bearing in roof trusses.	5	1
10.	What are the loads acting on the roof truss and for what load combination the truss to be designed?	5	2

PART- B (5x 14=70Marks)

		Marks	CO	RBT LEVEL
11. (a)	Design and detail a welded joint for connecting two 400 mm x15 mm flats to carry a factored tensile load of 300 kN.	**(14)**	**1**	**3**

(OR)

(b)	Design a single bolted double cover butt joint to connect boiler plates of thickness 12 mm for maximum efficiency. Use M16 bolts of grade 4.6. Boiler plates are of 416 grade. Find the efficiency of joint.	**(14)**	**1**	**3**
12. (a)	Design an unequal angle section to act as a tie member 1.56 m long in a roof truss, if it is to carry an axial load of 120 kN.	**(14)**	**2**	**3**

(OR)

(b)	Design a tension member to carry a factored tensile load of 300 kN. The 3m long tension member is connected to a gusset plate 16mm thick with one line of 20mm diameter bolts of grade 4.6.Use Fe 410 grade steel.	**(14)**	**2**	**3**
13. (a)	Design a gusseted base f a column ISHB 350 @9.10 N/m with two plates carrying a factored load of 3600 kN.The column is supported on concrete pedestal with M25 concrete.	**(14)**	**3**	**3**

(OR)

(b)	Design a laced column with two channel section placed back to back of length 10m to carry an axial factored load of 1400 kN. The column may be assumed to have restrained in position but not in direction at both the ends (hinged ends)	**(14)**	**3**	**3**
14. (a)	Design a simply supported beam of 10m effective span carrying a total factored load 60 kN/m. The depth of beam should not exceed 500 mm. The compression flange of the beam is laterally supported by floor. Assume stiff bearings is 75mm.	**(14)**	**4**	**3**

(OR)

(b)	Design a welded plate girder of span 24m to carry a superimposed load of 35 kN/m. Avoid use of bearing and intermediate stiffeners. Use Fe415 steel.	**(14)**	**4**	**3**
15. (a)	Design a purlin for a trussed roof from the following data: i. Span of roof truss=10m ii. Spacing of roof trusses=4. 5 m/ center to centre iii. Spacing of purlins along the slope of roof truss=1.8 m/ center to centre iv. Slope of roof truss=1 vertical to 4 horizontal v. Wind load on roof surface normal to roof=1200N/m^2 vi. Vertical load from roof sheeting =180N/ m^2. vii. Use channel section.	**(14)**	**5**	**5**

(OR)

Q. Code: 795267

(b) Design a gantry girder for an electric overhead crane with the following data. **(14) 5 5**

i. Capacity of crane=100 kN.
ii. Weight of trolley=40 kN.
iii. Weight of crane girder=200 kN.
iv. Span of crane girder=18m.
v. Centre to centre distance between columns=8m.
vi. Minimum clearance between trolley and gantry girder=1.2m.
vii. Center to centre distance of crane wheels=3m.

PART- C (1x 10=10Marks)

(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	A single unequal angle ISA 9060, 6 mm is connected to a 10 mm gusset plate at the ends with 5 nos. of 16 mm bolts to transfer tension. Determine the design tensile strength of the angle if the gusset is connected to 90 mm leg.	**(10)**	**2**	**3**

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