R20 Regulation *Subject code: 3P6AC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech VI Semester Supplementary Examinations, April 2026

DESIGN OF STEEL STRUCTURES

(CE)

Maximum Marks: 70 Date:18.04.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Use of IS 800-2007 and IS steel table book is permitted

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	Write the Physical and Mechanical properties of structural steel.	2M	1	L1
2	Define Lap joint & butt Joint with neat sketch.	2M	1	L1
3	Define Gross Area and Net Area.	2M	2	L1
4	Define slenderness ratio.	2M	2	L1
5	Define shape factor.	2M	3	L1
6	Define Web crippling.	2M	3	L1
7	Determine the live load per square meter of plan area of a roof of slope 30°?	2M	4	L1
8	Differentiate between a plane truss and space truss.	2M	4	L1
9	Mention different type of stiffeners in plate girder.	2M	5	L1
10	Why are intermediate stiffeners required for plate girders?	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Design a bolted lap joint connecting two steel plates of size 100 mm × 16 mm and 100 mm × 16 mm to transmit a factored axial load of 150 kN. Assume the yield and ultimate stress of steel as 250 N/mm^2 and 410 N/mm^2 respectively.	10M	1	L2
	OR			
12	Calculate the strength of a 20mm diameter bolt of grade 4.6 for the following cases. The main plates to be jointed are 12mm thick. A. Lap joint B. Single cover butt joint, cover plate being 10mm thick.	5M 5M	1	L2
13	Design a double angle tension member connected on each side of a 10mm thick gusset plate to carry an axial factored load of 350kN. Use 20mm diameter black bolts. Assume shop connection.	10M	2	L2
	OR			
14	Design a column with single lacing system to carry a factored axial load of 1000kN. The effective length of column is 4m. Use two channels placed back to back.	10M	2	L2

15	Compute the moment carrying capacity and shear strength of a laterally unsupported ISMB 500 member of length 5m with fy = 250MPa.	10M	3	L2
	OR			
16	An ISMB 500 beam transmits an end reaction of 250 kN to the web of a column ISHB 300@577 N/m. Design and sketch a stiffened seated connection. Use M24 black bolts.	10M	3	L2
17	a) What are purlins? Write its use. b) Write the detailed procedure for the design of Angle Purlin?	3M 7M	4	L2
	OR			
18	Design an I-section purlin, for an industrial building situated in the outskirts of Allahabad, to support a galvanized corrugated iron sheet roof for the following data: Spacing of the truss c/c =6.0 m Span of truss =12.0 m Slope of truss=30° Spacing of purlins c/c=1.5 m Intensity of wind pressure =2 kN/m^2 Weight of galvanized sheets =130 N/m^2 Grade of steel = Fe 410	10M	4	L2
19	Design a simply supported welded plate girder of 25m span subjected to a uniformly distributed load of 30 kN/m, exclusive of self-weight. Design the connection. Use Fe410 steel.	10M	5	L2
	OR			
20	Design intermediate transverse stiffeners and connections without using tension field action for the welded plate girder section as follows; Web plate = 3000 mm × 8 mm; Flange plates = 500 mm × 20 mm; Factored bending moment and shear force are 4500 kN-m and 900 kN respectively.	10M	5	L2