



R22 Regulation

Subject code: 4E6AC

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Regular Examinations, May 2025

DESIGN OF STEEL STRUCTURES

(CE)

Maximum Marks: 60

Date: 20.06.2025

Duration: 3 hours

- Note: 1. This question paper contains two parts A and B.
 2. Part A is compulsory which carries 10 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.

Allow IS 800-2007 CODE BOOK AND STEEL TABLE BOOKS ARE ALLOWED

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	What do you mean by plasticity?	1M	CO1	L1
b)	List the mechanical properties of steel.	1M	CO1	L1
c)	Why lug angles are used?	1M	CO2	L1
d)	What is the main purpose of lacings and battens?	1M	CO2	L1
e)	Distinguish between laterally supported and unsupported beams.	1M	CO3	L2
f)	Differentiate bending and shearing.	1M	CO3	L2
g)	State any three types of roof trusses.	1M	CO4	L1
h)	List the various design loads for designing of a truss.	1M	CO4	L1
i)	What is the difference between a beam and a plate girder?	1M	CO5	L2
j)	When do you go for plate girder web splicing?	1M	CO5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	Explain the various types of Bolts with neat sketches.	10M	CO1	L2
OR				
3	An ISA 65x65x10 carries a tensile load of 200 kN, applied along its centroidal axis. This angle is to be welded to a gusset plate. Find out the lengths of side fillet welds required at the heel and toe of the angle.	10M	CO1	L3
4	A T-section ISHT-75@153N/m is used as tie member. The flange is to be connected to a gusset plate by side end fillet welds keeping the length of connection equal to the width of flange of the section. Determine the design strength of the given tension member.	10M	CO2	L3
OR				
5	Design a built up column composed of two channel sections placed back to back, carrying on axial load of 1500 kN. The effective length of the column is 7 m. Also design a single Lacing system.	10M	CO2	L3

6	Determine the design bending strength of ISLB 350 @ 486 N/m considering the beam to be (a) Laterally supported (b) Laterally unsupported The design shear force 'V' is less than the design shear strength. The unsupported length of the beam is 3.0 m. Assume the grade of steel as Fe 410.	10M	CO3	L3
OR				
7	Design a beam 4m effective length subjected to 50 KN/m UDL (Including self weight) the flanges are embedded in slab and simply supported at both the ends.	10M	CO3	L3
8	A pitched roof is to be provided for an industrial building of effective span 12 m. The trusses are spaced at 4 m center to center and purlins at 1.6 m center to center. The pitch of the roof is 280. The weight of the roofing material is 16 kg/m ² and the normal wind pressure is 220 kg/m ² . Design I-Sectionl purlin assuming the permissible bending stress as 165 Mpa.	10M	CO4	L3
OR				
9	Choose the suitable channel section purlin without sag bars for a trussed roof from the following data: Span of the roof =12m, Spacing of purlin along slope=2m, spacing of truss =4m, Slope of roof truss -1 vertical, 2 Horizontal , Wind load on roof =1100 N/m ² , vertical loads from roof sheets=150N/m ² .	10M	CO4	L3
10	Design a welded plate girder for a simply supported bridge deck beam with a clear span of 20 m, subjected to the following: Dead load including self weight = 20 kN/m Imposed load = 10 kN/m Assume that the top compression flange of plate girder is restrained laterally and prevented from rotation. Use Mild steel of $f_y = 250$.	10M	CO5	L3
OR				
11	Design the section of a plate girder of span 20 m to carry superimposed load of 35 kN/M. Use Fe 415 steel.	10M	CO5	L3