R22 Regulation *Subject code:4E6AC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Regular/Supplementary Examinations, April 2026

DESIGN OF STEEL STRUCTURES

(CE)

Maximum Marks: 60 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 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.
Use of IS 800-2007 and IS steel table book is permitted

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	What ingredient in steel composition is responsible for its ductility?	1M	1	2
b)	The partial safety factor for field weld is	1M	1	2
c)	The best section for a tension member is	1M	2	2
d)	For a T section to be used as column the buckling class is	1M	2	2
e)	What is the condition for higher shear case in supported beams?	1M	3	2
f)	What is the primary purpose of a stiffened seat connections?	1M	3	2
g)	The self-weight (N/m^2) of roof truss may be obtained by the formula?	1M	4	2
h)	What is the purpose of purlin in a roof truss?	1M	4	2
i)	The optimum depth of a plate girder is given by the formula?	1M	5	2
j)	If a plate girder cannot bear load at supports, what is to be done?	1M	5	2

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	Find the efficiency of the lap joint shown in figure 1. Given 20mm diameter bolts of grade 4.6 and Fe410 plates are used.	10M	1	2

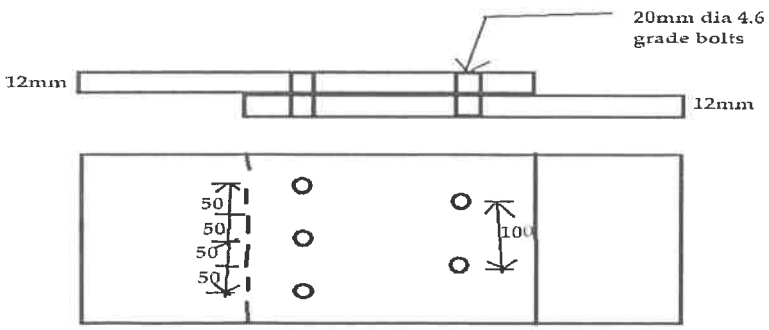


Fig.1

OR

3	a) Classify the types of welds. Explain the butt welds with neat sketches. b) Explain I.S code requirements for the size and length of welds.	6M 4M	1	2
4	Design a double angle section to withstand an axial tensile load of 250kN. Assume gusset plate thickness as 16mm and grade of steel as Fe410.	10M	2	4
	OR			
5	Design a built up column 10m long to carry a factored axial load of 1000kN. The column is restrained in position but not in direction at both ends. Provide single lacing system with bolted connections. Assume steel of grade Fe410 and bolts of grade 4.6.	10M	2	4
6	A simply supported steel joist at 4meters effective spans laterally supported through out. It carries a total; uniformly distributed load of 30kN/m (inclusive of its self-weight). Design an appropriate section using steel of grade Fe410.	10M	3	4
	OR			
7	Design a stiffened seated connection for an ISMB 350 @ 514 N/m transmitting an end reaction of 320kN (Due to Factored Load) to column section ISHB 300 @ 576.8 N/m using bolted connections. Use Steel of grade Fe410 and bolts of grade 4.6.	10M	3	4
8	Discuss different roof trusses used in steel structures with neat schematics?	10M	4	2
	OR			
9	Symmetric truss of span 20 m and height 5 m are spaced at 4.5 m centre to centre. Design channel section purlins to be placed at 1.4 m distances to resist following loads: Weight of sheeting including bolts = 171 N/m2 Live load =0.4 kN/m2 Wind load =1.2 kN/m2 Roof slope 30^0.	10M	4	4
10	Design a welded plate girder of span 25 m to carry a super imposed load of 20 kN/m. Use Fe-415 (E250) grade steel.	10M	5	4
	OR			
11	Design a welded plate girder 25 m in span and laterally restrained throughout. It has to support a uniform load of 110 KN/m throughout the span exclusive of self-weight. Design the girder without intermediate transverse stiffeners. The steel for the flange and web plates is of grade Fe415. Yield stress of steel may be assumed to be 250 MPa irrespective of the thickness plates used. Design cross section, connection and the end load bearing stiffener.	10M	5	4