O.P.Code: 23CE0125	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech. III Year II Semester Regular Examinations April-2026

DESIGN OF STEEL STRUCTURES

(Civil Engineering)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Define the terms (i) size of weld (ii) effective throat thickness?	CO1	L2	2M
	b	What is a simple connection and eccentric connection?	CO1	L1	2M
	c	What is meant by short column and long column?	CO2	L1	2M
	d	Why are lug angles provided in tension members?	CO2	L2	2M
	e	What is the purpose of bearing stiffeners?	CO3	L1	2M
	f	Distinguish between laterally restrained and unrestrained beams.	CO3	L2	2M
	g	Determine the live load per square meter on sloping roof having a slope of 38^0.	CO4	L2	2M
	h	What is meant by reversal of stresses in roof truss and how it is checked.	CO4	L2	2M
	i	State the relationship between plastic moment and yield moment.	CO5	L1	2M
	j	Define collapse load, collapse mechanism and load factor.	CO5	L2	2M

PART-B

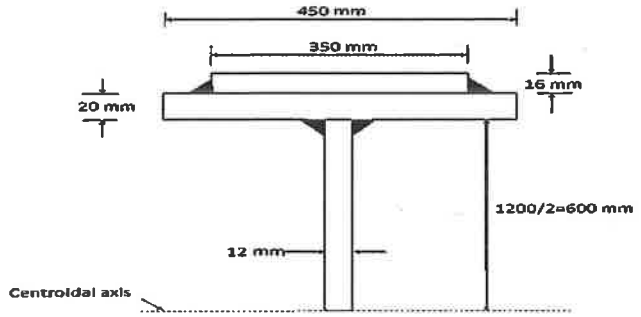
(Answer all Five Units **5 x 10 = 50** Marks)

UNIT-I

2		An ISA 110 mm × 110 mm ×10 mm carries a factored tensile force of 150 kN. It is to be jointed with a 10 mm thick gusset plate. Design the joint using HSFG Bolt when (i) no slip is permitted, (ii) when slip is permitted. Assume steel Fe410 grade.	CO1	L4	10M

OR

3		Design s suitable fillet weld to connect web plate to flange plate and flange plate to flange cover plate of s built-up girder as shown in below figure., for the following data. Assume shop welding. Web plate : 1200 mm × 12 mm Flange plate : 450 mm × 20 mm Flange cover plate : 350 mm × 16 mm Maximum factored shear force = 1600 kN	CO1	L4	10M



UNIT-II

4		A tension member carrying a factored tensile load of 180 kN has to convert through a gusset plate of 10 mm thick using 16 mm diameter of ordinary bolt of grade 4.6. The available length of the gusset plate for making connection is 250 mm. Design the member and its connection. Also design the lug angle if required.	CO2	L4	10M

OR

5		A column section ISHB 350@710.2 N/m carries a factor axial compressive load of 1700 KN. And factored bending moment of 85 kN.m. Design the base plate and its connections. Assume concrete pedestal of M20 grade.	CO2	L4	10M

UNIT-III

6		Calculate the design bending strength of ISLB 300 @ 0.369 kN/m. considering the beam to be a laterally unsupported beam. Assume the design force is less than the design shear strength and is of low shear. The effective length of the beam is 4m. Assume Fe410 grade of steel.	CO3	L4	10M

OR

7		Design a steel beam section for supporting roof of a big hall for the following data and apply the usual checks. Assume steel of grade Fe410. Clear span= 6.5 m End bearings= 150 mm c/c spacing of beams =3 m Imposed load on the beam = 10 kN/m^2 Dead load= 4 kN/m^2 Restriction on beam depth = 375 mm The compression flange of the beam is laterally supported throughout	CO3	L4	10M

UNIT-IV

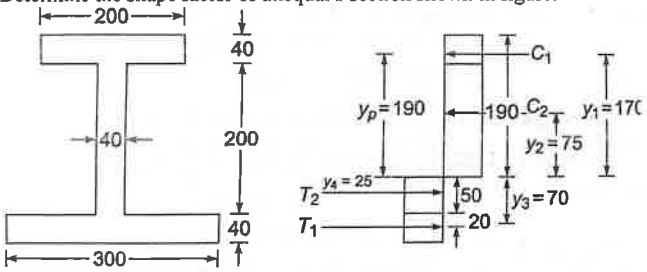
8		Calculate the maximum wheel load and moments on gantry girder for the following data: Crane capacity= 100 kN Self- weight of crane girder excluding trolley= 100kN Self-weight if trolley electric motor, hook etc = 20kN Approximate minimum approach of the crane= 1.2m Wheel base= 3m c/c distance between gantry rails=14 km c/c distance between column (span of gantry girder) = 6m self -weight of rail section= 300 N/m yield stress of steel= 250 N/m^2	CO4	L4	10M

OR

9		Design angle purlin for the following data by simplified method: Spacing of trusses = 4.5 m Spacing of purlins = 1.8 m Weight of A.C. sheets including laps and fixtures = 0.205 kN/m^2 Live load = 0.6 kN/m^2 Wind load = 1 kN/m^2, suction Inclination of main rafter of truss = 21^0	CO4	L4	10M

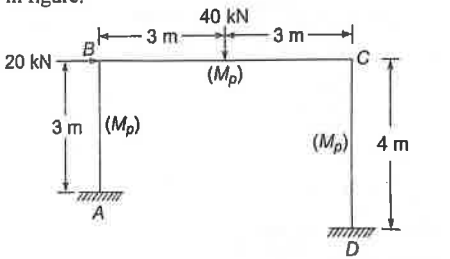
UNIT-V

10 Determine the shape factor of unequal I-section shown in figure. **CO5 L4 10M**



OR

11 Determine the plastic moment capacity Mp required for the frame shown in figure. **CO5 L4 10M**



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