Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH (CIVIL) END SEMESTER EXAMINATIONS

MAY- 2023(Make up Examination)

SUBJECT: DESIGN OF STEEL STRUCTURES [CIE 4064]

Date of Exam: **Time of Exam:** **Max. Marks: 50**

Instructions to Candidates:

- Answer ALL the questions & missing data may be suitably assumed
- IS 800 and SP-6 is Permitted to Use. Use Fe410 gade steel with fy=250N/mm^2

1	Determine shear resistance (Vcr) corresponding to web buckling of a steel plate girder using post critical method. Assume stiffeners are provided at the support only. Mz = 4275 kN-m and Vz =877.5 kN. Flange size 450 mm x 35 mm and web 12 mm x1200mm.	CO1	03	3
2	Determine buckling resistance of intermediate stiffener 10 mm x160mm size. Given factored shear=588 kN; V_{cr}=469.8kN; spacing of the stiffeners=2000 mm, web plate size 12 mmx 1200 mm.	CO1	05	3
3	Derive the expression for the economical depth of the welded plate girder. Assume moment is carried by the flanges only.	CO1	02	2
4	Determine the fatigue strength of gantry girder section. Use following data. Crane operates for 225 days /year. Working hours = 8 hrs /day. Max. no. of trips/ hr = 3. Design life = 50 years. Section modulus Zez=3764.98x10^{3}mm^3 ,web size 7.6 mmx600 mm, Mu=676.6kN-m and Vu=337.34 kN.	CO2	05	3
5	Determine the overall buckling strength of ISWB225@332.56 N/m of I- section column subjected to factored axial tension Pu = 450 kN and Mz at top 35 kN-m and Mz at bottom 20 kN-m. '	CO3	05	3
6	Determine resistance to combined effect of a column ISHB 250@51kg/m. of effective height 5.0m. subjected to maximum factored axial force 500 kN and factored moment 45 kN-m at top and 25 kN-m at the bottom. Given f_{bd}=201.6n/mm^2 .	CO3	03	3
7	Determine the size of the base plate to carry service axial load of 600 kN and bending moment 30 kN-m resting on RCC footing with M_{40} grade concrete.	CO4	05	3
8	Draw a neat sketch of cross section of composite bridge			2

	having following components: Thickness of the slab = 350 mm Road width (including foot path) = 8 m Span of the bridge = 18 m Spacing of welded I steel girders = 2.0 m Shear connectors 16dia- 2nos at 240 mm c/c	CO5	03	
9	Design the shear connectors used in composite bridge to transfer a factored vertical shear of 650 kN. Given: Spacing of girders 2.2 m c/c Thickness of the slab 350mm and M_{30} Grade concrete Flange thickness (35 mmx450 mm) Web size(10 mm x1200mm) C.G of the composite section is at a distance 215.5 mm from the top of RCC slab. Assume 20 mm diameter steel connectors.	CO5	05	3
10	Discuss the disadvantages of light gauge steel structures:	CO5	02	2
11	Discuss local buckling of thin elements and write the equation to calculate critical plate stresses in compression.	CO5	03	2
12	Determine the design capacity of a steel purlin ISMC125 in bending and shear subjected to factored M_Z=8.7 kN-m, M_y =0.87 kN-m , Fz=6.55 kN Fy=0.69kN(dead and live load case).	CO4	05	3
13	Discuss difference between RCC and PEB buildings.	CO5	04	2