Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

VI SEMESTER B.TECH (CIVIL) END SEMESTER EXAMINATIONS
MAY- 2022
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 corresponding to web buckling (V_{tf}) using tension field method. Stiffeners are provided at 2000mm c/c and V_{cr}=506kN. Mz = 4275 kN-m and Vz =8777.5 kN. Flange size 450x35 mm and web 12x1200mm.	CO1	03
2	Check the buckling resistance of intermediate stiffener 10x160mm size. Given factored shear=588kN; Vcr=469.8kN; spacing of the stiffeners=2000mm, web plate size 12x1200mm.	CO1	05
3	Derive the expression for the economical depth of the welded plate girder. Assume moment is carried by the flanges only.	CO2	02
4	Check the gantry girder section for fatigue strength. 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 7.6x600 mm, Mu=676.6kN-m and Vu=337.34 kN.	CO2	03
5	Check the overall buckling strength of ISWB225@332.56 N/m of I-section column subjected to factored axial tension Tu = 450 kN and Mz at top 35 kN-m and Mz at bottom 20 kN-m. Assume section is plastic.	CO3	03
6	Design a moment resisting welded connection to transfer a moment of 60kN-m from an ISLB 500 to a column ISHB 300@577N/m. Explain how the transfer of 120kN shear can be loaded in the same conneon:	CO4	05
7	Draw the typical sketches to show the following beam column welded connection; state when do you prefer those connections : a) Unstiffened seated connection. b) Stiffened seated connection.	CO4	04
8	Draw a neat sketch of cross section of composite bridge having following components : Thickness of the slab = 300mm Road width (including foot path) = 8mts Span of the bridge = 18mts Spacing of welded I steel girders = 2.2mts Shear connectors 16dia- 2nos at 240 c/c	CO5	03

9	Design the shear connectors used in composite bridge to transfer a vertical shear of 650 kN. Given: Spacing of girders 2.2mc/c Thickness of the slab 350mm and M25 Grade concrete Flange thickness(35x450)mm Web size(10x1200)mm CG of the composite section is at a distance 215.5mm from the top of RCC slab. Assume 20mm Diameter steel connectors.	CO5	05
10	What are the disadvantages of light gage steel structures:	CO5	02
11	Discuss local buckling of thin elements and write the equation to calculate critical plate stresses in compression.	CO5	03
12	Determine the design capacity of a steel purlin ISMC150 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.	CO4	05
13	Determine the design bending moment and shear force of a Roof truss steel Purlin ISMC150. Given weight of the AC sheets =180N/m^2 Live load =750 N/m^2 Wind load in X direction=1.8kN/m Span of the truss= 36mts Slope theta-7 degree Spacing of the purlin =1.6mts Truss spacing S=4.5mts.	CO4	03
14	With neat sketches explain a. Un stiffened compression Element. b. Effective design width. In the case of light gauge steel.	CO5	04