Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY 2025

Date: 24-05-2025 **Time:** 09:30 am – 12:30 pm

School: SOE	**Program:** B. Tech Civil Engineering	
Course Code : CIV3004	**Course Name:** Design of Structural Steel Elements	
Semester: VI	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**-**	**28**	**72**		

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

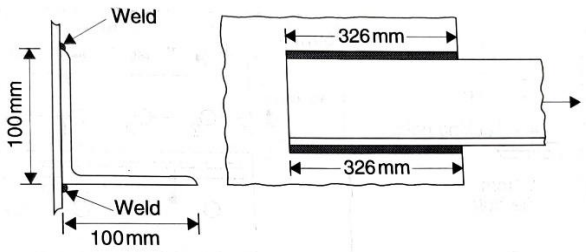
1.	List any two disadvantages of using steel as a structural material.	2 Marks	L1	CO2
2.	Differentiate between bearing type and friction type bolted connections.	2 Marks	L1	CO2
3.	Mention any two advantages of welded connections over bolted connections.	2 Marks	L1	CO2
4.	Differentiate between complete and incomplete penetration in groove welds.	2 Marks	L1	CO2
5.	Name the three primary modes of failure in tension members.	2 Marks	L1	CO3
6.	Write the formula to compute the design strength in gross section yielding.	2 Marks	L1	CO3
7.	What is shear lag in tension members?	2 Marks	L1	CO3
8.	What is meant by “squashing” in compression members?	2 Marks	L1	CO3
9.	What is the slenderness ratio? Mention its significance.	2 Marks	L1	CO3
10.	What are built-up columns? Why are they used?	2 Marks	L1	CO3

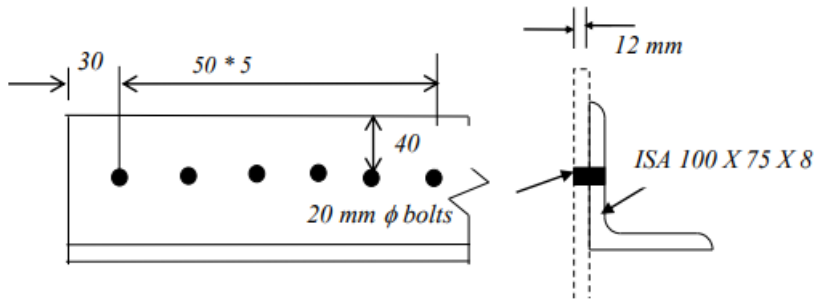
Part B

Answer the Questions. **Total Marks 80M**

11.	a.	Two plates of 8 mm thickness are joined by a single cover butt joint using M16 bolts (grade 4.6). The cover plate thickness is 6 mm. Calculate the strength of the bolt and comment on the type of failure expected.	10 Marks	L3	CO2
		Or			
12.	a.	Two Fe410 grade flat plates of dimensions 150 mm × 10 mm are to be joined using M20 bolts of grade 4.6 in a single lap joint. Design the lap joint to carry a factored tensile load of 180 kN. Assume bolts are arranged in two rows.	10 Marks	L3	CO2

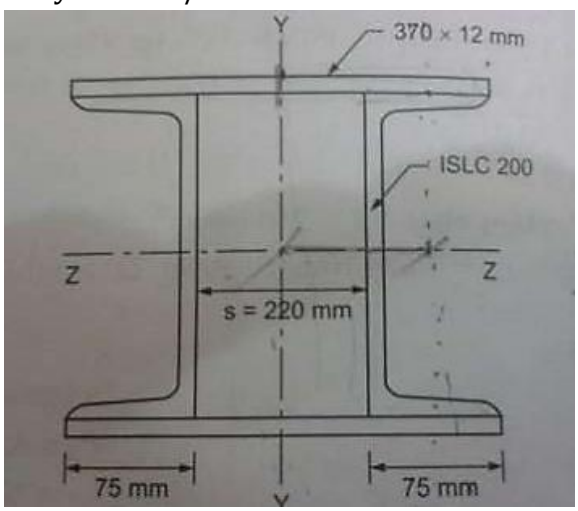
13.	a.	A groove weld is used to connect two plates of thickness 12 mm and 10 mm, respectively. The plates are subjected to a factored axial tensile force of 320 kN. The welding is done in the workshop. Determine the length of weld considering single U-groove and double-U groove. Use Fe410 steel.	10 Marks	L3	CO2
		Or			
14.	a.	A tie member with dimensions 90 mm × 10 mm is required to transmit a factored tensile load of 180 kN. The member is to be welded to a 14 mm thick gusset plate using fillet welds. The steel grade is Fe410. Design the fillet welds and determine the necessary overlap length for the following cases: a) Welding on two sides of the tie member b) Welding all around the tie member. Assume shop welding and provide calculations for weld size, weld length, and overlap length.	10 Marks	L3	CO2

15.	a.	Find the ultimate tensile strength of ISA100x100x10 which is connected to a 12mm thick gusset plate using welded connection. The yield and ultimate strengths are 250MPa and 410MPa respectively. 	10 Marks	L3	CO3
		Or			
16.	a.	A single unequal angle 100 X 75 X 8 mm is connected to a 12 mm thick gusset plate at the ends with 6 nos. 20 mm diameter bolts to transfer tension. Determine the design tensile strength of the angle. (a) if the gusset is connected to the 75 mm leg,	10 Marks	L3	CO3

17.	a.	Calculate the strength of a discontinuous strut of effective length 2.5m. The strut is tack bolted and is connected to a 8mm gusset plate. The strut consist of two unequal angles IS70 x70 x8 with long legs connected and placed on the opposite of a gusset plate	10 Marks	L3	CO3
		Or			
18.	a.	Calculate the strength of a discontinuous strut of effective length 2.5m. The strut is tack bolted and is connected to a 8mm gusset plate. The strut consist of two unequal angles IS70 x70 x8 with long legs connected and placed on the same side of a gusset plate	10 Marks	L3	CO3

19.	a.	Design a suitable angle section to carry a factored tensile force of 210 kN assuming a single row of M20 bolts. The yield strength and ultimate strength of the material is 250 MPa and 410 MPa, respectively. The length of the member is 3 m.	20 Marks	L3	CO3
		Or			
20.	a.	Design a suitable angle section to carry a factored tensile force of 210 kN assuming a welded connection. The yield strength and ultimate strength of the material is 250 MPa and 410 MPa, respectively. The length of the member is 3 m.	20 Marks	L3	CO3

21.	a.	Design a single angle compression member to carry a factored load of 180kN. The effective length of the member is 2.55m.	20 Marks	L3	CO3
		Or			
22.	a.	Figure shows a built up column section. The column has effective length of 4.75 m. find the design compressive load for the column. Take fy = 250 N/mm2. 	20 Marks	L3	CO3