Ref. No. **Ex/CE/PC/B/T/323/2023(S)**

B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER SUPPLEMENTARY EXAM– 2023

SUBJECT: Design of structures-II

Time: 3 hours **Full Marks: 100**

Use Separate Answer scripts for each part
(50 marks for each part)

Answer all questions

Assume reasonable values of any data if required. The notations have their usual meaning.IS 800, IS-875, and SP-6 are allowed in the examination hall.

Part – I

Q. No.	Question	CO	Marks
1	A 16 m X 50 m factory shed is to be constructed at Rourkela. The steel roof trusses are to be used for roofing on the concrete columns. The spacing of the roof truss is 5 m and the span of the truss is 16m. The column height above GL is 7 m. Galvanised corrugated iron sheet will be used. The maximum spacing of the purlin is 1.75m. Propose a suitable type of roof truss and calculate the dead load and live load acting at the nodal point for the design	[CO1]	20
2	The design member forces of the diagonal member (nodal length of 2.8m) in a typical pitched roof truss of a factory shed are as follows: Compressive force (factored) = 300 KN (DL + LL) Tensile force (factored) = 400 KN (DL + WL) Design the member using a double angle section having a gusset plate of thickness of 10 mm. Use limit state method of design. Assume 3 bolts of 12 mm diameter of 4.6 grade at each end. Edge distance = 40 mm and pitch = 50 mm.	[CO2]	15
3	Determine the weld size of the bracket connection as shown in fig 3.Use limit state method.	[CO3]	15

[Turn over

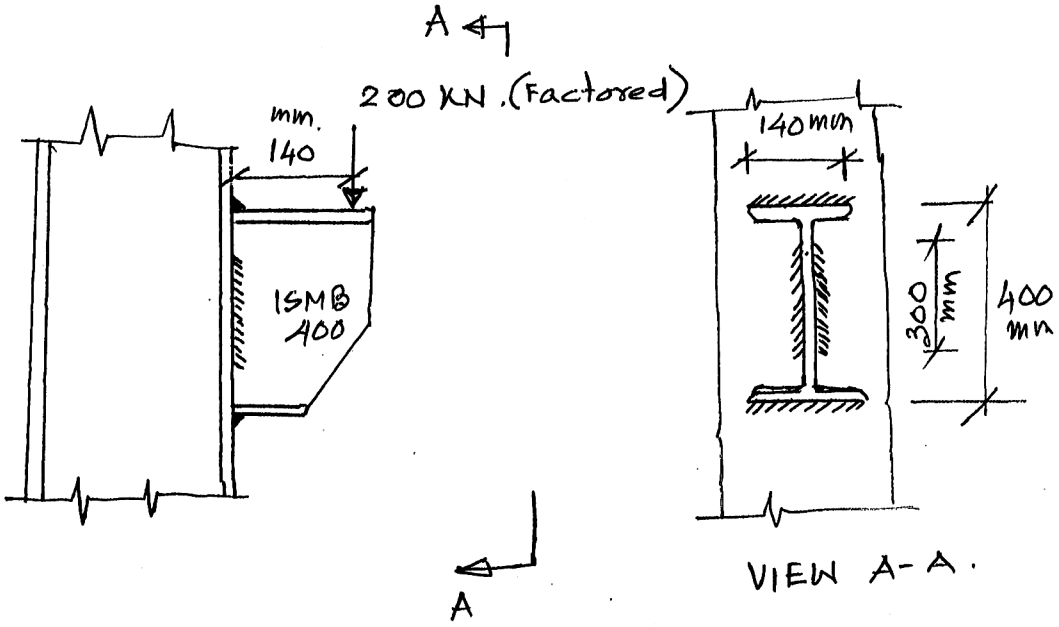

Fig-3.

Ref. No. **Ex/CE/PC/B/T/323/2023(S)**

B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER SUPPLEMENTARY EXAM 2023

Subject: DESIGN OF STRUCTURES II

Full Marks 100
(50 marks for each part)

Time: **Three hours**

Use a separate Answer-Script for each part

No. of Questions	PART II	Marks
	[Use of I.S. 800 and SP-6(1) are allowed in the examination hall.] (Consider Fe410 steel i.e. 'yield stress' of steel = 250MPa) **Answer [Q1 or Q2], Q3 and Q4**	
Q1. [CO:4]	A steel floor beam is simply supported over a span of **4.4m**. It is subjected to a uniformly distributed load of intensity of **48kN/m** acting over the entire span of the beam. Design a rolled steel **ISMB-section** for this beam if the compression flange of the beam is '**NOT laterally restrained or NOT supported**' along its length. Stiff bearing length is **150mm**. Show all checks. Assume any reasonable data, if required.	[30]
2. [CO:4]	Design a rolled steel **ISMC section**, under '**dead load and wind load (suction)**' and '**dead load, live load and wind load (thrust)**' combination, for a purlin member in an industrial shed having the following data: a) Angle of truss = $\mathbf{20^0}$; b) Spacing of truss = **4.5 m** c/c; c) Span of truss = **25.0 m**; d) Spacing of purlins = **1.7 m** c/c; e) Net intensity of wind pressure = **2.2 kN/m^2**; f) Weight of galvanized sheet = **150 N/m^2**, g) Intensity of live load = **0.65 kN/m^2**. Assume any reasonable data, if required.	[30]
3.a) [CO:5]	An **ISMB 600 @122.6kg/m** has been used as a column of effective length **4.5m** about both the axes. Calculate the load carrying capacity ($\mathbf{P_d}$) of the column.	[5]
3.b) [CO:6]	Design a suitable 'bolted / welded gusseted base plate' for the above mentioned column (in Q.3a) if it subjected to **maximum axial load as calculated above.** The base plate is to rest on a concrete pedestal having the safe bearing capacity of 9.0MPa. Assume any reasonable data, if required. Draw a neat sketch to show the details of the column with base-plate. Use 20mm diameter bolts of grade 4.6 having A_{nb} = 245mm^2 for bolted connection and 'shop weld' for welded connection.	[15]
	===END===	