

B.E. Civil Engineering Third Year Second Semester

Examination ,2022

ref Ex/CE/PC/B/T/323/2022

Design of structures-II

Time 3 hours

Full Marks 100

Use separate answer script for each part

(50 marks for each part)

Part -I

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. Assume E250BR grade of steel

Q.1 (CO1) A 20 m X60m 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 span of the truss is 20m. Column height above GL is 6 m. Galvanised corrugated iron sheet will be used. Maximum spacing of the purlin is 1.8m. Propose a suitable type of roof truss and calculate the wind load acting at the nodal point for the design. 20

Q2 (CO2) The design member forces of vertical member (nodal length of 2.5m) in a typical pitched roof truss of a factory shed are as follows:

Compressive force (factored) = 300 KN (DL + WL)

Tensile force (factored) = 225 KN (DL + LL)

Design the member using double angle section having gusset plate of thickness of 10 mm. Use limit state method of design. Assume 3 bolts of 12 mm dia. of 10.9 grade at each end. Edge distance = 30 mm and pitch = 50 mm. 15

Or

In a steel truss tower, the vertical member composed of two angle sections (ISA 75x75x8) are to be placed to obtain the maximum compressive force capacity with gusset plate thickness of 12 mm. The nodal length of the member is 3.0m. Determine the compressive force capacity. 15

Q 3. (CO3) Determine the maximum load P (factored) that could be resisted by the bracket as shown in fig 3. Assume weld size is 5 mm 10

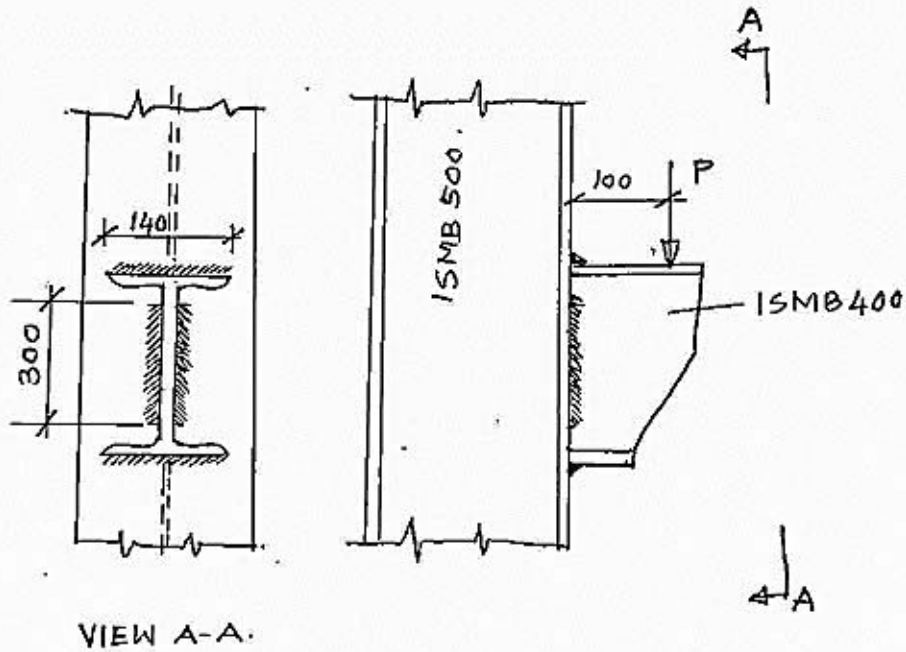


fig-3 .

Q.4 (C05) A column of height 6m consists of two nos of ISMC 300 placed back to back with a clear spacing of 400mm . Draw a proportionate neat sketch (elevation) showing the single lacing system using plate having width 60mm and thickness 10mm considering the codal stipulations. Assume welded connection. Checking of the design of the lacing member is not needed.

B.E. CIVIL ENGINEERING THIRD YEAR SECOND SEMESTER EXAM 2022**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	<u>PART II</u>	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)	
	<u>Answer [Q1 or Q2] and Q3</u>	
Q1. [CO:4]	A steel floor beam is simply supported over a span of 4.50m. It is subjected to two concentrated loads of magnitude 40kN (D.L.+ L.L.) each acting at a distance 1.25m from either end of the beam and a uniformly distributed load of intensity of 24kN/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 = 22°; b) Spacing of truss = 4.5 m c/c; c) Span of truss = 24.0 m; d) Spacing of purlins = 1.5 m c/c; e) Net intensity of wind pressure = 1.3 kN/m ² ; f) Weight of galvanized sheet = 150 N/m ² , g) Intensity of live load = 0.51 kN/m ² . Assume any reasonable data, if required.	[30]
3. [CO:6]	An ISMB 500 @86.9kg/m used as a column is subjected to an axial load of 1450kN. Design a suitable ' gusseted base plate with connection ' for the above mentioned column. 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 connections between the column and base-plate.	[20]
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