

.....B.E.(Civil Engineering) 4th Year 1st Semester..... EXAMINATION, 2025

SUBJECT Design of Structures - II

PAPER--.....

Full Marks 100
(50 marks for each part)

Time: Three hours

Use a separate Answer-Script for each part

No. of Questions	PART I	Marks
	[Use of I.S. 800 and SP-6(1) are allowed in the examination hall.] (Consider 'yield stress' of steel = 250MPa) <u>Answer any TWO questions</u>	
1.	A steel floor beam is simply supported over a span of 4.8m. It is subjected to one concentrated load of magnitude 72kN (D.L.+L.L.) acting at mid-span of the beam and uniformly distributed load of intensity 28kN/m (D.L.+L.L.) acting over the entire span. Stiff bearing length is 150mm. Consider $E=2 \times 10^5 \text{N/mm}^2$, $G=76923 \text{N/mm}^2$. Design a rolled steel ISMB-section for this beam if the compression flange of the beam is laterally unrestrained / laterally unsupported along its length. Show all checks. Assume any reasonable data, if required.	25
2.	Design a rolled steel ISMC section, that will be safe under 'dead load and wind load (suction)' combination and under '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 = 20°; b) Spacing of truss = 4.2 m c/c; c) Span of truss = 24.0 m; d) Spacing of purlins = 1.65 m c/c; e) Net intensity of wind pressure = 1.9 kN/m²; f) Weight of galvanized sheet = 150 N/m², g) Intensity of live load = 0.43 kN/m². Consider $E=2 \times 10^5 \text{N/mm}^2$, $G=76923 \text{N/mm}^2$. Assume any reasonable data, if required.	25
3.	a) An ISMB 450 @72.4kg/m has been used as a column of effective length 4.2m. Calculate the load carrying capacity (P_d) of the column. b) Design a suitable 'bolted gusseted base plate' for the above mentioned column 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 24mm diameter bolts of grade 4.6 having $A_{nb} = 353 \text{mm}^2$. === E N D ===	25

[Turn over

Ref. No.: Ex/CE/5/T/404/2025

BACHELOR OF ENGINEERING (CIVIL ENGINEERING) FOURTH YEAR FIRST SEMESTER EXAM 2025

Subject: DESIGN OF STRUCTURES-II

Full Marks: 100

Time: 3 hours

(Use Separate Answer scripts for each Part)

Part- II (Marks 50)

(IS 875 Part III, IS 800:2007, Steel table or SP 6 are allowed in the examination hall)

(Answer any two questions)

1. Determine the nodal wind load on the roof truss of a factory shed of following information. 25
 - a. Truss spacing-----4.25m
 - b. Span of truss-----16m
 - c. Pitch of truss-----0.20
 - d. Number of truss-----8
 - e. Eaves height-----8.5m
 - f. Node to node distance at rafter level-----1.32m
 - g. Location-----Vishakapatnam
2.
 - a) Design a single angle discontinuous strut to carry a factored compressive load of 310 kN. The length of the member is 2.6m between the intersections. Assume Fe 410 steel with $f_y=250\text{MPa}$. 12
 - b) A single equal angle **ISA 90×90×8** is connected to a 10mm gusset plate at the end with 6nos 16mm bolts to transfer tensile force. Determine the design tensile strength on the angle. 13
3.
 - a) A tie member of truss consist an angle section **ISA 100×100×10** of Fe 410 grade is welded to 10mm gusset plate. Design the weld to transmit a factored load of 425 kN. Assume shop weld. 10

b) Determine the number of bolts for the joint shown in Fig.1

15

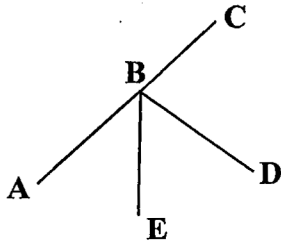


Fig. 1

Member	Maximum Force in kN	Section Provided
AB	176 Compressive	2no-ISA 60×60×6
BC	130 Compressive	2no-ISA 60×60×6
BD	95 Tensile	1no-ISA 80×80×8
BE	82 Compressive	1no-ISA 80×80×8

Use M20, 4.6 grade of bolt. Assume thickness of gusset as 10mm.