

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - VII EXAMINATION - WINTER 2025

Subject Code: 117AC01

Date: 03-12-2025

Subject Name: Pre-engineered Buildings

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

	Marks
Q.1 (a) Define a Pre-Engineered Steel Building (PEB). Discuss the fundamental components that constitute its structural framework.	03
(b) Highlight the advantages of adopting PEB systems compared to conventional construction.	04
(c) Discuss the various applications of pre-engineered buildings in industrial, commercial, and residential sectors.	07
Q.2 (a) Give the evolution and historical development of pre-engineered buildings and their global adoption.	03
(b) Explain the concept of reduction of erection stresses and how it enhances structural stability in PEBs.	04
(c) Identify the main materials used in PEB construction and explain any two in detail, emphasizing their advantages and suitability.	07
OR	
(c) Compare pre-engineered buildings with conventional steel structures in terms of design, cost, and erection time.	07
Q.3 (a) Define dead load, live load, and collateral load as applicable in PEB design.	03
(b) Write a brief note on the serviceability limits that govern building design and performance.	04
(c) Describe in detail any three types of loads acting on pre-engineered buildings and their impact on structural behavior.	07
OR	
(a) Define wind load, thermal load, and seismic load in the context of PEB analysis.	03
(b) Explain the step-by-step procedure for determining various loads on a PEB frame.	04
(c) Analyze the following building based on the given data: Building Type: Warehouse Dimensions: Length = 52 m, Width = 18 m, Height = 6.5 m Location: Seismic Zone 2, Wind Zone II Roof Type: Metal sheeting	07

- Q.4 (a)** What are gable frames? Explain their purpose and list the main components involved. **03**
- (b)** Define portal bracing and discuss its advantages and disadvantages in PEB systems. **04**
- (c)** Explain the term roof sheeting. List the types of roof sheeting and elaborate on any two with their practical applications. **07**

OR

- (a)** Discuss the key differences between C-channel and Z-channel girts. **03**
- (b)** List the different bracing systems used in PEBs and describe the rod bracing system in detail. **04**
- (c)** What is wall sheeting? Describe its construction and importance in the PEB envelope. **07**
- Q.5 (a)** Identify the parameters affecting the design depth of sections in PEB frames. **03**
- (b)** Explain the role of project management consultancy (PMC) in ensuring the timely execution of PEB projects. **04**
- (c)** Discuss the critical elements of construction management in PEBs, covering planning, coordination, and safety. **07**

OR

- (a)** Consider a PEB factory with the following data: **03**
 Width: 35 m Length: 60 m Bay Spacing: 6 m Eave Height: 8.5 m Roof Slope: 1:12
 Dead Load: 0.40 kN/m² (excluding self-weight) Live Load: 0.85 kN/m² Wind Load: 1.3 kN/m² (as per IS 875 Part 3)
 Calculate:
 Depth of section
 Depth-to-flange width ratio
- (b)** From the data given in Question 5 a **04**
 compute:
 Flange thickness-to-web ratio
 Depth-to-web thickness ratio
- (c)** From the data given in Question 5 a **07**
 For the same structure, determine:
 Flange width-to-thickness ratio
 Suitable section dimensions considering manufacturing constraints
 Design of rigid frame members and moment connections
