

Enrollment No./Seat No.:

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**Bachelor of Engineering - SEMESTER - VII EXAMINATION - SUMMER 2025**

**Subject Code: 117AC01**

**Date: 30-05-2025**

**Subject Name: Pre-engineered Buildings**

**Time: 02:30 PM TO 05:00 PM**

**Total Marks: 70**

**Instructions**

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**

|                                                                                                                                              | <b>Marks</b> |
|----------------------------------------------------------------------------------------------------------------------------------------------|--------------|
| <b>Q.1 (a)</b> What is a Pre-Engineered Building (PEB)? List any two advantages of PEB.                                                      | <b>03</b>    |
| <b>(b)</b> Briefly explain the difference between Pre-Engineered Buildings and Conventional Steel Buildings.                                 | <b>04</b>    |
| <b>(c)</b> Describe the history and development of Pre-Engineered Buildings and explain how they revolutionized the construction industry.   | <b>07</b>    |
| <b>Q.2 (a)</b> Mention any three materials commonly used in the manufacturing of PEBs.                                                       | <b>03</b>    |
| <b>(b)</b> State any four major applications of Pre-Engineered Buildings in various industries.                                              | <b>04</b>    |
| <b>(c)</b> Discuss different types of pre-engineered materials used in PEBs along with their manufacturing processes.                        | <b>07</b>    |
| <b>OR</b>                                                                                                                                    |              |
| <b>(c)</b> Explain the concept of erection stresses in PEBs. How are these stresses handled and eliminated during construction?              | <b>07</b>    |
| <b>Q.3 (a)</b> What are the functions of purlins and girts in a secondary framing system?                                                    | <b>03</b>    |
| <b>(b)</b> Explain the differences between rod bracing, angle bracing, and portal bracing in a PEB.                                          | <b>04</b>    |
| <b>(c)</b> Discuss the types, materials, and functional roles of bracing systems used in PEBs for structural stability.                      | <b>07</b>    |
| <b>OR</b>                                                                                                                                    |              |
| <b>(a)</b> List and briefly describe any three common accessories used in Pre-Engineered Buildings.                                          | <b>03</b>    |
| <b>(b)</b> Write a short note on roof sheeting and wall sheeting, mentioning materials and structural role.                                  | <b>04</b>    |
| <b>(c)</b> Describe the components of the primary framing system in PEBs, including the main frames and gable end frame, with neat sketches. | <b>07</b>    |
| <b>Q.4 (a)</b> List any three types of loads considered in the design of PEBs and explain their significance.                                | <b>03</b>    |
| <b>(b)</b> What is meant by serviceability limit state? Mention any two limits considered in PEB design.                                     | <b>04</b>    |

- (c) Discuss the various design parameters for PEB frames as per IS code, including ratios like  $d/t_w$  and  $b_f/t_f$ , and manufacturing limitations on section sizes. 07

**OR**

- (a) Explain the importance of anchor bolts and base plate design in PEB construction. 03
- (b) Differentiate between rigid frame moment connections and shear connections in PEBs. Provide sketches if required. 04
- (c) Explain the construction management process or PMC (Project Management Consultancy) in the context of Pre-Engineered Buildings, including planning, coordination, and quality control. 07

- Q.5** (a) List the basic steps involved in modeling a PEB steel structure in STAAD Pro. 03
- (b) Explain the procedure to assign dead and live loads to a PEB model in STAAD Pro. 04
- (c) Describe in detail the process of analyzing and designing structural members of a PEB using STAAD Pro, including output interpretation. 07

**OR**

- (a) Which types of loads can be assigned in STAAD Pro for PEB design? Mention any three with a brief description. 03
- (b) What are load combinations in STAAD Pro? How do they influence the design of structural members? 04
- (c) Discuss the modeling approach, load application, and structural member design for a typical PEB warehouse using STAAD Pro. Include key considerations and challenges. 07

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