GUJARAT TECHNOLOGICAL UNIVERSITY

BACHELOR OF ENGINEERING SYLLABUS

Subject Code : N117AC01

Subject Name : Pre-engineered Buildings

WEF Academic Year :	2026-27
Semester :	7
Category of the Course :	Compulsory

Prerequisite : Elementary Structural Design, Structural Analysis I.

Rationale : The congestion in city area and requirements of development work within challenges the current construction practices. This situation requires speedy execution of construction work on site to have the minimum disturbance to activities of day to day life. Pre-engineered construction requires less time for onsite construction work. Of course this requires efficient planning and manufacturing of building components in advance. The pre-engineered construction from planning to design stage is included in this course.

Course Scheme :

Teaching Scheme			Total Credits	Assessment Pattern and Marks				Total Marks
				Theory		Practical		
L	T	PR	C	ESE (E)	PA(M)	ESE (V)	PA (I)	
3	0	2	4	70	00	30	00	100

Course Content :

Sr. No.	Course Content	No. of Hours	% of Weightage
1	**Introduction To Pre-Engineered Buildings :** Introduction, History and Advantages of PEB, Applications of PEB and Materials used for manufacturing of PEB, Difference between Conventional Steel Buildings and Pre-Engineered buildings, Different types of pre-engineered materials and its manufacturing process, Handling and erection stresses – Elimination of erection stresses.	8	20
2	**Pre-Engineered Building Components :** Primary System: Main frames, Gable End Frame, Secondary frame system: Sizes and Properties of Purlins & Girts, Bracing System: Rod, angle, Portal, Pipe bracing, Sheeting and Cladding: Roof Sheeting and Wall sheeting, Accessories: Turbo Ventilators, Ridge vents, Sky Lights, Louvers, Insulation, Stair cases.	10	25
3	**Design Loads on Pre-Engineered Buildings :** Design of PEB frame under the influence of Dead, Live, Collateral, Wind, Seismic and Other applicable Loads, Serviceability Limits as per code.	6	15
4	**PEB Design Methodology :** Design Parameters of PEB Frames - Depth of the section, Depth to Flange, width ratios, Thickness of Flange to thickness of Web ratio, d/tw, b_f/t_f ratios of sections as per IS code, Section Sizes as per Manufacturing Limitations,	10	25

	Analysis and Design of Rigid Frames, Rigid Frame Moment Connection, Shear Connection- Anchor bolt and base plate design (Pinned and Fixed). Construction management /PMC for Pre-engineering building.		
5	**PEB Design using STAAD Pro software :** Modeling of PEB steel structure and assign the properties to the members, Assign dead load, live load, wind load and earthquake load to the structural members, Analysis and design of all structural members for all possible load combinations.	8	15

Reference Book :

1. Alexander Newman, Metal Building Systems Design and Specifications, 2nd Edition
2. K.S.Vivek & P.Vaishavi – Pre Engineered Steel Buildings, Lambert Academic Publishing
3. Dr. N. Subramanian, 'Design of steel structures'
4. Dr. N. Subramanian (2008), "Pre-engineered Buildings Selection of Framing System, Roofing and Wall Materials", The Master builder, pp. 48.
5. Comparison of Design procedures for Pre Engineered Buildings (PEB): A Casy study, Authors: G Sai kiran, A Kailasa Rao, R. Pradeep kumar.
6. Indian Standard: 800 – 2007; General Construction in Steel — Code of Practice; 3rd S Revision, New Delhi: BIS

Course Outcome : After Completion of the Course, Student will able to :

No	Course Outcomes	RBT Level*
01	Classify different materials used for pre-engineered buildings.	UN, AP
02	Design pre-engineered building components.	AP, AN, CR
03	Identify different design loads on pre-engineered buildings.	UN, AP,
04	Apply pre-engineered building design methodology.	AP, AN, CR
05	Design simple pre-engineered industrial structure with help of software.	AP, AN, CR

*RM: Remember, UN: Understand, AP: Apply, AN: Analyze, EL: Evaluate, CR: Create

Suggested Course Practical List :

1. Introduction
2. Components of Pre-Engineered Building
3. Design Loads on Pre-Engineered Buildings
4. PEB Design Methodology, PEB Design using STAAD Pro software
5. Comparison of conventional and pre-engineered buildings design, cost ,technicality

List of Laboratory/Learning Resources Required :

1. STAAD Pro software
2. Building Information Modeling. http://www.laiserin.com
3. Automated Rule-Based Building Design and Engineering at Robertson Ceco Corporation, Lachmi Khemlani, 2005 http://www/aecbytes.com/buildingthefuture/2005/RCCstudy.html
4. International Alliance for Interoperability. http://www.buildingsmart.com

* * * * * * *