

GUJARAT TECHNOLOGICAL UNIVERSITY

PRODUCTION ENGINEERING

PLANT MAINTENANCE AND SAFETY ENGINEERING

SUBJECT CODE: 2162509

B.E. 6th SEMESTER

Type of course: Elective

Prerequisite: Enthusiasm to learn the subject

Rationale: The present course intends to give the exposure of various methods of plant maintenance and safety engineering which is an important manufacturing route to fabricate bulk storage and processing equipment's in industries for production engineering students. The subject focuses on knowledge and understanding of various layout techniques the underlying principles, Group Technology, flow design, material handling, plant maintenance and industrial safety.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks					Total Marks	
L	T	P		Theory Marks			Practical Marks			
			ESE (E)	PA (M) PA ALA		PA (V) ESE OEP		PA (I)		
3	1	0	4	70	20	10	30	0	20	150

Content:

Sr. No.	Subject Contain	Total Hrs.	Module Weightage
1	INTRODUCTION Concept of Plant Facility, It's Scope, Importance and objectives	04	06
2	PLANT FACILITY LOCATION Nature of Location Decision, Need for facility location planning, General procedures and Factors influencing location decisions, Facility Location Models, economics and cost analysis, Rural and urban location pattern in India.	10	16
3	LAYOUT DESIGNS Industrial plant design considerations, types of production types of layout, factors affecting layout tools, Techniques & procedure used in workstation and plant layout, quantitative techniques in plant layout, developing Product and Process Layouts, Comparing Layouts, criteria for computerized facility layout, concept of computerized layout programs like CRAFT, CORELAP, ALDEP & PLANTET.	12	18
4	FLOW PATTERNS DESIGNS Overall system flow cycle, Need and advantages of planned material flow, factors for consideration, designing flow patterns, Flow patterns for production lines and assembly lines.	08	14

5	MATERIAL HANDLING Scope and functions of Material handling , Manual mechanical Handling ratio, Principles of material handling , Analysis of material handling problem, Classification of Material Handling system, salient features and applications of general purpose Material Handling equipment , Material Handling in stores and warehouses , automation in part handling ,handling and industrial robots, Optimum allocation of Material Handling equipment.	10	16
6	PLANT MAINTENANCE Role of maintenance management , Organization & systems of maintenance management , Different types of maintenance management , Their purpose and features, Preventive and Predictive maintenance techniques, Introduction to Total Productive Maintenance: Concepts, Tools and Procedure.	10	18
7	INDUSTRIAL ACTS AND SAFETY Background of Industrial hazards and safety, Safety equipment's, effect of accidents- their causes and prevention measures, safety planning and plant maintenance. Industrial Acts and Industrial Labor Regulations: Importance and necessity of labor regulations, labor laws, Factory Act-1948, Payment of Wages Act- 1936, Industrial Dispute Act-1947, Compensation Act-1923, Collective bargaining	06	12

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
14	7	14	14	21	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. Practical Plant layout By Multher
2. Plant layout and design By James More
3. Manufacturing management a Quantitative Approach By Robert A Olsem
4. Productions & Operations Management by Lockyer Mulleman & Oakland
5. Operations and Industrial Management by Del mar
6. Plant Layout and Material Handling By James M Apple

Course Outcome:

After learning the course the students should be able to:

- Indicate various plant engineering and safety aspects
- Identify and determine plant facility location

- Identify and determine various types of plant layout and flow patterns.
- Identify and determine Group technology and Flexible Manufacturing System.
- Identify and determine material handling equipment's
- Identify and determine plant maintenance
- Identify and determine industrial acts and safety.

List of Tutorials:

1. To Study about plant facility (02 hours)
2. To Study about facility location(02 hours)
3. To Study about different layout design(02 hours)
4. To Study about flow pattern design (02 hours)
5. To Study about material handling (02 hours)
6. To Study about plant maintenance (02 hours)
7. To Study about Industrial Act and Safety. (02 hours)
8. Industrial Visit with student's individual report (8 Hrs)

List of Open Source Software/learning website:

<http://nptel.ac.in/>

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.