



GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering (Part Time)

Subject Code: 2951905

Semester – V Mechanical

Subject Name: Basics of Industrial Engineering

Type of course: Professional Core Course

Prerequisite: Nil

Rationale:

Basics of Industrial Engineering course is to prepare students to understand different aspects like: Plant location and its selection, Plant layout within the plant. It also helps to understand and apply different concept of production planning and control. Study of productivity and Work-study are important tools, after studying it student are able to apply it in the industry for productivity improvement. This course gives idea about how to prepare job plan, and also gives knowledge of industrial legislation. Finally it provides knowledge about Statistical quality control, entrepreneurship and waste management.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	2	4	70	30	30	20	150

Content:

Sr. No.	Content	Total Hrs
1	Location Selection and Plant Layout: Nature of Location Decision, Importance of Plant Location, Dynamic Nature of Plant Location, Choice of site for selection, Comparison of location. Principles of Plant layout and Types, factors affecting layout, methods, factors governing flow pattern, travel chart, analytical tools of plant layout, layout of manufacturing shop floor, repair shop, services sectors and process plant. Quantitative methods of Plant layout: CRAFT and CORELAP, Relationship diagrams.	08
2	Production Planning and Control: Types of Production systems and their Characteristics, functions and objectives of Production Planning and Control, Sales forecasting: Techniques and Applications, Steps of Production Planning and Control: Process planning, Loading, Scheduling, Dispatching and Expediting with illustrative examples, Introduction to line of balance, assembly line balancing, and progress control.	06
3	Productivity and Work Study: Definition of productivity, application and advantages of productivity improvement tools, reasons for increase and decreases in productivity. Areas of application of work study in industry. Reaction of management and labour to work study.	08



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		<p>Method Study: Objectives and procedure for methods analysis, Recording techniques, Operations Process Chart, Flow Process Chart, Man-Machine, Multiple Activity Chart, Travel Chart, and Two Handed process chart, String Diagram, Therbligs.</p> <p>Micro motion and macro-motion study: Principles of motion economy, Normal work areas and work place design.</p> <p>Work Measurement: Objectives, Work measurement techniques – time study, work sampling, pre-determined motion time standards (PMTS) Determination of time standards. Observed time, basic time, normal time, rating factors, allowances, and standard time. Introduction to ergonomics.</p>	
4		<p>Job Evaluation and Wage Plan: Objective, Methods of job evaluation, job evaluation procedure, merit rating (Performance appraisal), method of merit rating, wage and wage incentive plans</p>	04
5		<p>Industrial Legislation: Need for Industrial legislation, Factories act 1948, Industrial dispute act 1947, The Indian trade unions act 1926, Industrial employment act 1946, Payment of wage act 1936, Workmen compensation act 1923, Payment of bonus act 1965, Employees provident fund scheme 1952.</p>	04
6		<p>Entrepreneurship: Concept, product identification, infrastructure facilities, preparation of project report, sources of industrial finance, Resources allocation, Government incentives to entrepreneurs.</p>	04
7		<p>Inspection and Quality Control: Inspection – functions, types, objectives and benefits, quality control principles, Concepts of quality circles, Total quality management, Quality assurance, Quality audit, Basic Concept ISO 9000, ISO 14000 and QS 9000, Six sigma: Concept, Principle, Methodology, Scope, Advantage and limitations.</p> <p>Statistical Quality Control: SQC Concept, variable and attributes, normal distribution curves and its property charts for variable and attributes and their applications and interpretation (analysis) process capability. Acceptance sampling, sampling plans, OC curves and AOQ curves.</p>	08
8		<p>Waste Management: Introduction and Meaning, Reasons for generation and accumulation of obsolete, Surplus and scrap Items, Identification and control of waste, disposal of scrap.</p>	03
		Total Hours	45

Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
10	15	25	20	15	15

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:



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1. Work study by International Labour Organization, ILO
2. Manufacturing Organization and Management, Harold Amrine, John Ritchey, Moodie, Kmec, 6th Ed., Pearson
3. Industrial Engineering and Management, by Praveenkumar, Pearson
4. Production System, Planning, Analysis and Control – By J.L. Riggs 3rd ed. Wiley
5. Production and Operations Management – By R. Panneerselvam, PHI Private Ltd.,
6. Production and Operations management by S Anilkumar, Suresh, New Age International Publications.

Course Outcomes: Students will be able to:

Sr. No.	CO statement	Marks % weightage
CO-1	Describe location decision, Site selection and Plant layout	20
CO-2	Demonstrate Production Planning and Control	25
CO-3	Analyse Productivity, Work study techniques, Job evaluation and Wage plan	20
CO-4	Illustrate Statistical Quality Control and Inspection	25
CO-5	Understand Industrial Legislation and Entrepreneurship and waste management.	10

Term Work:

The term work shall be based on the topics mentioned above.

List of Experiments:

1. Case study demonstration on location decision and site selection
2. Tutorials on Production Planning and Control
3. Case study on plant layout problem
4. Exercise on OPC, FPC, Travel chart
5. Exercise on Method study, Motion Study and work measurement
6. Problems on wage and incentive plans
7. Exercise on statistical quality control techniques
8. Case study analysis of Entrepreneurship
9. Exercise on Waste management

Major Equipment:

Nil

List of Open Source Software/learning website:

1. Report preparation on plant layout and site selection for different industries
2. Operation and flow process chart for different products
3. Work Measurement case study
4. Real life problems on statistical quality control problems