

COURSE TITLE : **INDUSTRIAL ENGINEERING**
COURSE CODE : **4023**
COURSE CATEGORY : **A**
PERIODS/WEEK : **5**
PERIODS/SEMESTER : **90**
CREDITS : **4**

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Production planning and control Value Engineering Plant Location and Layout, maintenance	22
2	Method study Work measurement Work sampling	22
	TEST I	2
3	Inspection Fundamentals of statistical concepts Construction of x –R chart Control chart for defectives C-chart	22
4	1 Estimation costing	20
	TEST II	2
	Total	90

OBJECTIVES

Upon completion of the study of this subject the student will be able to:

MODULE - I

- 1.1.0 Appreciate the scope of the subject Industrial Engineering
 - 1.1.1 Explain the concept of industry, industrial engg., Production and Productivity
 - 1.1.2 Differentiate production and productivity with examples
 - 1.1.3 Identify the importance of productivity
 - 1.1.4 Name the various methods of increasing productivity
- 1.2.0 Understand the procedure to implement production planning and control programme in Industries
 - 1.2.1 Explain the types of production
 - 1.2.2 List the characteristics of various types of production
 - 1.2.3 Explain the concepts of P.P.C
 - 1.2.4 Explain the benefits of P.P.C
 - 1.2.5 Identify the various functions of P.P.C
 - 1.2.6 Explain Pre-planning
 - 1.2.7 List various activities of pre-planning
 - 1.2.8 Illustrate Routing and Routing procedure
 - 1.2.9 Illustrate scheduling
 - 1.2.10 Identify the three types of schedule charts

- 1.2.11 Prepare master schedule, parts schedule and machine loading schedule and machine loading schedule in the form of Gantt chart
- 1.2.12 Define Dispatching
- 1.2.13 List various documents in dispatching
- 1.2.14 Explain value engineering
- 1.2.15 Plant layout
- 1.2.16 Explain briefly the various factors to be considered in locating industrial plants
- 1.2.17 Explain the different types of plant layout adopted in modern industries
- 1.2.18 Explain briefly the various factors influencing the plant layout
- 1.2.19 Explain the procedure of preventive and predictive maintenance
- 1.2.20 Explain cost of maintenance
- 1.2.21 State the function and principle of material handling
- 1.2.22 List the factors effecting material handling to plant layout

MODULE – II

- 2.1.0 Justify the Procedure for the conduct of Method study
- 2.1.1 Explain work study
- 2.1.2 Illustrate the application of work study to increase productivity
 - 2.1.3 Explain the procedure for the conduct of method study
 - 2.1.4 Prepare various process charts and diagrams
 - 2.1.5 Explain the concepts of Therbligs
 - 2.1.6 List the various Therbligs and its symbols
 - 2.1.7 Prepare Simo chart
 - 2.1.8 State the objectives of method study
 - 2.1.9 principles of motion economy
- 2.2.0 Justify the procedure for calculating standard time
 - 2.2.1 Explain the procedure for the conduct of stop watch time study
 - 2.2.2 Compute standard time (simple problem)
 - 2.2.3 Describe the concept of production study
 - 2.2.4 State the various steps to develop standard data
 - 2.2.5 Explain the concepts of analytical estimating
- 2.3.0 Understand the Principles of work sampling
 - 2.3.1 Explain the term work sampling
 - 2.3.2 State the application of work sampling
 - 2.3.3 List the various steps required in making a work sampling study

MODULE – III

- 3.1.0 Appreciate the importance of quality control and inspection methods
 - 3.1.1 Explain the concepts of 'Quality' and 'Quality Control'
 - 3.1.2 List the objectives of Quality control
 - 3.1.3 Explain briefly the areas of application of Quality control programmes
 - 3.1.4 State the three components of Quality costs
 - 3.1.5 Identify the benefits of Q.C. programme
 - 3.1.6 Explain the concepts on Inspection
 - 3.1.7 Explain the inspection of incoming materials
 - 3.1.8 Compare floor inspection and centralized inspection
- 3.2.0 Understand the fundamentals of Statistical concepts
 - 3.2.1 Explain the concept of variability in measurement
 - 3.2.2 Explain the terms variable and attribute with example
 - 3.2.3 Explain the terms frequency, frequency distribution and frequency plot
 - 3.2.4 Construct frequency plot and tally sheet

- 3.2.5 Construct histogram and frequency polygon
- 3.2.6 Explain normal distribution curve
- 3.2.7 Explain the terms mean, mode, median and standard deviation.
- 3.2.8 Compute mean, mode and standard deviation

3.3.0 Justify the Procedure of Constructing X and R Charts

- 3.3.1 Describe the method of calculating mean and range
- 3.3.2 Explain the points to be considered for making X-R chart
- 3.3.3 Explain X & R control charts data calculation sheet
- 3.3.4 Explain the steps in the calculation of control limits
Plot the X & R chart

3.4.0 Justify the control chart for defective

- 3.4.1 Define fraction defective and percent defective
- 3.4.2 Compute average fraction defective
- 3.4.3 Compute the control limits
- 3.4.4 Construct the P chart and 100P chart
- 3.4.5 Analyse and interpret the control chart

3.5.0 Justify the construction of 'C' Chart

- 3.5.1 Explain the terms defects and defective
- 3.5.2 Explain the characteristic of a 'C'; Chart
- 3.5.3 Compute the average of defects
- 3.5.4 Compute control limit for 'C' chart
- 3.5.5 Construct 'C' chart
- 3.5.6 Interpret the chart
- 3.5.7 State the advantages of 'C' chart

MODULE- IV

4.1.0 Compute the Selling Price of a Product

- 4.1.1 Explain the term costing
- 4.1.2 State the objectives of costing
- 4.1.3 Identify the elements of cost
- 4.1.4 Explain the classification of costs
- 4.1.5 Compute selling price of a product given examples
- 4.1.6 Explain the various methods of allocation of over heads
- 4.1.7 Explain the term 'Depreciation'
- 4.1.8 List the various causes for depreciation
- 4.1.9 Explain the various methods of calculating depreciation
- 4.1.10 Compute the depreciation in the given examples
- 4.1.11. Outline the need, scope and functions of estimating department in industry
- 4.1.12 Write down the objectives of estimate
- 4.1.13 Write the principal constituents of estimating
- 4.1.14 Explain estimating procedures
- 4.1.15 Distinguish between estimating and costing
- 4.1.16 Compute the machining times for various operations like turning, drilling, shaping.
- 4.1.17 Compute cost of a component including material and labour cost.

CONTENT DETAILS

MODULE- I

Introduction

Explanation of the scope of the subject industrial engineering – concepts of industry – production and productivity – difference – importance – methods of increasing productivity – expectations form productivity.

Production planning and control

Meaning of the term production – types of production – job production batch production, mass production, continuous production – one time large production – explanation of production planning control – benefits of PPC – functions of PPC

Pre-planning activities – forecasting, plant location, product planning, design and development, material selection, process planning, determination of men, machines, material and tool requirements.

process palnning – choice of machine in process planning – break even analysis – process sheet – process planning procedure

Routing – explain routing – routing procedure – route sheet – comparison of route sheet and process sheet

Scheduling – factors affecting scheduling – types – master schedule parts schedule, m/c loading schedule – preparation of schedule chart in Gantt chart form

Dispatching – functions – work in dispatching – list various documents prepared in dispatching - Follow up and control

Value Engineering - Explain value engineering – applications of value engineering – advantages -Plant location and layout- Factors to be considered in locating industrial plants – plant layout – types of layouts – compare the advantages and disadvantages of each type – factors influencing the plant layout – plant maintenance – types of maintenance – maintenance cost - material handling –functions and principles of material handling – factors effecting material handling

MODULE– II

Method study

Introduction to work study – advantages – application of work study to increase productivity

Introduction to method study – objectives of method study – method study procedure – state therblings and their symbols – process chart symbols – preparation of charts operation process chart, flow process chart, man-machine chart, right hand left hand chart, and simo chart – flow diagram – string diagram

Principles of motion economy – Rules concerning Human body, work place layout and amterial handling, tools and equipment design .

Work measurement

Objectives of work measurement – procedure of stop watch time study

Standard time calculation – production study

Work Sampling

Explain work sampling – applications – steps in work sampling –

MODULE– III

1. Inspection and Quality control

- a. Concept of Quality and Quality control – objectives of quality control – applications – material, process and product control – benefits of a quality control programme. State the components of qualities cost
- b. Concepts of inspection – objectives – inspection of incoming materials – manufacturing inspection. Types of inspection – first piece inspection, working inspection, sample inspection, operation inspection, key operation inspection.
Floor or patrolling inspection – centralized inspection – advantages and limitations

2. **Fundamental statistical concepts**

Explain the term variability in measurements – explain the terms variable, attribute, frequency, frequency distribution and frequency plot – normal distribution curve – tally sheet – explanation of the terms mean, mode, median and standard deviation – calculation of mean, mode, median and standard deviation

3. **Construction of \bar{X} & \bar{R} Chart**

Explain mean (\bar{X}) and Range (\bar{R}) preliminary consideration of making \bar{X} and \bar{R} charts – components of \bar{X} & \bar{R} charts – procedure for constructing \bar{X} & \bar{R} charts – plot \bar{X} & \bar{R} chart – simple examples.

4. **Control Chart for defectives**

Purpose of selection of P chart – determination – of size and frequency of samples – construction of P chart and 100 P chart – analyses and interpret.

5. **'C' Chart**

C chart – characteristic – defectives and defect – control limits – construct – C chart – advantages of C chart

MODULE– IV

Project analysis – need and scope for project analysis - Explanation of the constituents elements of project analysis – production cost – market survey – selling price – capital investment – return on investment – element of costing – material – labour – expenses – classification of costs – explanation of the terms prime costs – total costs – method of allocation of overhead expenses – simple problems – depreciation – list the various causes for depreciation – types of depreciation –methods of calculating depreciation – obsolescence – simple problems – Calculation of machine hour rate – various factors that comes into calculations – simple problems- objective and functions of cost estimating .Basic formulae for calculation of machining times for the operation such as turning – drilling – shaping – use of standard tables for feeds and cutting speeds – exercises in calculating the machine times for the above mentioned operations – simple problems.

TEXT BOOK

1. Industrial Engineering and Management – Dr. O.P. Khanna
2. Industrial Organisation and Engineering Economics – T.R. Banga & S.C. Sharma.

REFERENCE BOOKS

1. Industrial Engineering and Production management – Martand Telsang
2. Industrial Engineering & Management – Dr. Balasundaram
3. Quality control – T.T.T.I
4. Mechanical Estimating and Costing – T.T.T.I
5. Mechanical Estimating and Costing – T.R. Banga & S.C. Sharma
6. Industrial engineering and cost analysis - C.K.M.Sagir.

