

**UNIT I****Chapter 1 : Work Study (Method Study and Work Measurement)****1-1 to 1-46****Syllabus :**

- 1.1 Industrial Engineering** : Definition, Need, Objectives and Scope.
- 1.2 Work study** : Method study (Motion Study) and Time study (Work Measurement).
- 1.3 Method study** : Definition, Objectives, Procedure, Selection of work.
- 1.4 Recording Techniques** : Process Charts - Outline process chart, Flow process chart, Two handed process chart/Simo Chart, Multiple activity chart, Flow diagram, String diagram, Therbligs, Travel chart.
- 1.5 Work Measurement** : Objectives, Procedure, Time Study, Time Study Equipment. Stopwatch Time Study, Allowances, Calculation of Standard Time.

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**UNIT II****Chapter 2 : Process Engineering****2-1 to 2-26****Syllabus :**

- 2.1 Production** : Concept, Factors of production, Supply Chain Management.
- 2.2 Process Engineering** : Functions, Preliminary part print analysis, Selecting and planning manufacturing process; Determining manufacturing sequence.
- 2.3 Line Balancing** : Heuristic approach of line balancing.
- 2.4 Critical Path Method (CPM)** and its application related to Project completion.

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UNIT III**Chapter 3 : Ergonomics****3-1 to 3-14****Syllabus :**

- 3.1 Ergonomics** : Concept, Need, Man-machine relationship, Anthropometric and functional anatomy data.
- 3.2 Ergonomic in design of control members** : Push button, Knob, Levers, Cranks, Hand wheel.
- 3.3** Ergonomic considerations applied to types and Location of display.
- 3.4** Compatibility in the design of control members.

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UNIT IV

Chapter 4 : Quality Control and Inspection

4-1 to 4-53

Syllabus :

- 4.1** Meaning of quality of produce and services, Quality characteristics, Quality of design, Quality of conformance, Quality of performance, Concept of reliability, Cost, Quality assurance, Cost of rework and repair, Quality and Inspection, Quality Circle.
- 4.2 Total Quality Management; Six sigma :** Statistical meaning and methodology, Six sigma Black Belt concept.
- 4.3** KAIZEN, POKA-YOKE, 5S Techniques.
- 4.4** Introduction of ISO 9000, ISO-14000.
- 4.5 Quality Economics :** Cost of quality, Value of quality, Economics of quality confirmation, Cost of quality appraisal, prevention, external and internal failure cost. Quality function deployment : Basic concept and areas of application.
- 4.6 Various Q-C tools :** Cause-and-effect diagram (Fishbone or Ishikawa diagram), Check sheet, Histogram, Pareto chart and Scatter diagram.
- 4.7** Inspection Definition and meaning, Difference between Inspection and quality control, Classification of Inspection - (i) Process Inspection (ii) Final Inspection (iii) Raw Material (finished/semi-finished) Inspection (iv) Tool and Gauge Inspection. Role of Quality Control Inspector/Supervisor.

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UNIT V

Chapter 5 : Statistical Quality Control**5-1 to 5-76****Syllabus :**

- 5.1** Basics of Statistical concepts, Meaning and importance of SQC.
- 5.2** Variable and attribute Measurement. Control charts - Inherent and assignable sources of variation. Control charts for variables - \bar{X} and R charts, Control charts for attributes P, np, C charts.
- 5.3** Process capability of machine ($\pm 3\sigma$ or $\pm 6\sigma$), C_p and C_{pk} calculations.
- 5.4** Acceptance Sampling Concept, Comparison with 100% inspection, Operating characteristics curve.
- 5.5** Different types of sampling plans, Sampling methods.
- 5.6** Merits and demerits of acceptance sampling.

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