

Jigs & Fixtures: Principal of design and construction, Location and clamping

Basic concept for design of turning, Milling, Drilling & Indexing Jigs and fixtures

Classification of dies, components of dies assembly, Simple dies, compound dies, combination dies and progressive dies

Punch and die clearance, centre of pressure, calculation of blank diameter

Design of tools for the production of holes, surfaces of revolution, and flat surfaces like single point tools, form tools, drills, milling cutters

Materials for cutting tools, cutting dies and forming dies, Economics of Tooling

Text Books

1. Production Engineering Design (Tool Design) Umesh Chandra & Surender Kumar, Satya Prakashan, New Delhi
2. Tool Design by C. Donaldson G.H.Lecain and V.C.Goold, Tata McGraw Hill

Reference Books:

1. Principles of Tool Design S.K. Basu
2. Jigs & Fixtures Fred H. Colvin
3. Handbook, Fundamentals of Tool Design ASTM
4. Basic Die Making Osterguard E., Mc-Graw Hill Book Co.
5. Metal Cutting & Tool Design V.Arshinov, Mir Publication.
6. Design and Production of Metal-Cutting Tools P.Rodin, Mir Publishers, Moscow.
7. Fundamentals of Tool Design Frank W. Wilson
8. Properties and Selection of Tool Material Kortesoja, Victor A., ASM.

Definition and concept flexible automation and mechatronics, conventional vs mechatronics systems, need and role of mechatronics in flexible manufacturing and factory automation

Flexible manufacturing systems: concept, need, structure & operation, objectives and benefits

Computer integrated manufacturing and the factory of the future. Factory configuration, MAP/TOP

Robot technology: basic elements, classification, physical configuration and work volume, basic robot motions, concept of resolution, accuracy and repeatability of robot, end effector /grippers and tools

Robot applications: application characteristics and areas such as material handling, welding, assembly, inspection, processing operation, spray painting etc, economics of robots in industry

Planning and implementation of robotized and FMS projects, planning, system implementation, evaluation and justification, socio-economic impact

Text Books

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| 1. Industrial Robot & CIM Oxford | Surender Kumar , & IBH , New Delhi |
| 2. Robot Technology | M.P. Groover |

References

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| 1. Robotics for Engineers | Yoram Koren ,McGraw Hill ,USA |
| 2. Robot Technology Fundamentals | James G. Keramas |

EIGHTH SEMESTER

PE8205

PLANT ENGINEERING

1.0

Objectives and principles of facility design, facility design process, facility design problems and their analysis

Factors affecting the location and site selection, techno economic analysis, multi-plant location,

Concept of location theory and models – design and types of building

Plant layout, types of layout problems, objectives of good plant, factors affecting plant layout, types of plant layout, techniques and tools of layout

Types of flow patterns, material handling, types of load, objectives and principles of material handling, Diagnosis and analysis of handling problems, material handling equipment and their selection

Industrial applications, Interrelationship between material handling and plant layout, Design of an integrated plant/facility layout. Life cycle costing

Plant maintenance, importance of maintenance in plant, types of maintenance, preventive and breakdown maintenance, inspection decisions, economics of maintenance, evaluation of maintenance policy, terotechnology

Text Books:

1. Plant Layout Design

Moore, J.N. MacMuller Co.

Introduction to Quality Control, Objective, Applications and Cost Consideration, Graphical and Analytical Methods for Central Tendency and Dispersion

General Theory of Control Charts, Theory and Application of Control Charts for Averages, Range, Standard Deviation, Fraction Defective and Number of Defects, Process Capability Study, Interpretation of Control Chart

100% Sampling Vs. Statistical Sampling, Elementary Concepts of Acceptance Sampling by Attributes, Concept and Characteristics of O.C. Curves

Single, Double and Multiple Sampling Plans, Construction and Use of O.C. Curves for Sampling Plans, MIL – STD Plans, Sequential Sampling Plan

Basic Concept of Reliability, Reliability and Hazard Functions for Well-Known Distributions, System Reliability, Reliability Improvement

Concept of Quality Circle and Quality Loop, ISO–9000 Quality Systems, Quality Audit, Quality Costs and Cost of Quality, Six–Sigma Technique

Total Quality Control: Basic Approach, Deming Theory, Quality and Competitiveness in a Global Market Place, Establishing a Quality Culture and Customer Focus, Employee Involvement

Text Books:

1. Statistical Quality control
2. Mechanical Reliability
3. Statistical Quality Control & Reliability
4. Total Quality Management

M. Mahajan, Dhanpat Rai & Sons
L.S. Srinath, Affiliated East – West Press
D.H. Besterfield, Prentice Hall
D.H. Besterfield, Prentice Hall

MODULE I**Introduction**

Environment and Ecology problem, Fossil fuel related pollutants in the environment, Environmental Impacts of Hydro-electric, Nuclear energy and Chemicals, forwards a solution.

(4 Lectures)

MODULE II**Air Pollution:**

Definition and Scales of concentration, classification and properties of air pollutants, Emission on sources and their classification. Air pollution laws and standards, Inversion. Ambient air sampling, stack sampling, sampling system, analysis of air pollutants.

(6 Lectures)

MODULE III**Air Pollution Control Methods And Equipments**

Source correction methods, cleaning of gaseous effluents, particulate emission control, selection of a particulate collector, control of gaseous emission, combustion.

(9 Lectures)

MODULE IV**Water Pollution:**

Hydrologic cycle and water quality, origin of waste water and its composition, Type of water pollutants and their effects, water pollution laws and standards, waste water sampling and analysis, water quality standard, waste water treatment, Biological systems (Aerobic and Faculative Ponds), Recovery of material from process effluents.

(10 Lectures)

MODULE V**Noise Pollution:**

Different noise environments and their sources, measurement of noise and the equipments, Noise pollution laws and standards, vibration isolation and noise control in industries.

(5 Lectures)

MODULE VI**Solid Waste Management:**

Sources and classification, public health aspect, effluent treatment processes and solid waste management, solid-solid separation technique for recovery and reuse.

(5 Lectures)

MODULE VII**Case Study:**

Modern environmental assessment method, Pollution control in steel plants, coal industries, chemical industries, etc.

(6 Lectures)

BOOKS RECOMMENDED:

1. Introduction to Environmental Sciences and Technology by G.M. Masters.
2. System Approach to Air Pollution Control by Bibbero, R.J. & I.G. Young.

Manufacturing, agile manufacturing, lean manufacturing, rapid response manufacturing, and molecular manufacturing

Definition and concept of Eco friendly manufacturing, world-class manufacturing, manufacturing challenges, manufacturing audit, dynamic customer

Effect of industrial activity on environment, clean technologies; concepts, development and limitation

Design, planning and implementation of clean production technologies and process

Type of wastes, causes of waste generation and its elimination in manufacturing industries, impact on manufacturing cycle time, waste minimization programmed resource recovery and recycling

Lean vision and lean principles, value added and non-value added activities, JIT and waste, Core process reengineering, concept of KAIZFN & its impact on waste Minimization

Waste free manufacturing drivers, workplace organization, uninterrupted flow, error free processing and insignificant change over tools for waste free manufacturing, Hidden waste in industries

Text Books

1. Fast Track to Waste Free Manufacturing
2. Clean Production

J.W. Davis, Productivity Press USA
K.B. Misra, Springer – Verlog – 1996