

VIII Semester

MAINTENANCE ENGINEERING & MANAGEMENT

M 451

UNIT - I

Introduction -Fundamentals of Maintenance Engineering. Maintenance Engineering its importance in material & energy conservation, inventory control, productivity, safety, pollution control etc.

Safety Regulations, pollution problems, human reliability, total quality management (TQM), total productivity maintenance (TPM), environmental issues in maintenance, ISO 9000.

UNIT - II

Maintenance Management - types of maintenance strategies, Planned and unplanned maintenance, breakdown, preventive & predictive maintenance. Their comparison, advantages & disadvantages. Limitations, computer aided maintenance, maintenance scheduling, spare part management, inventory control, organisation of maintenance department.

UNIT - III

Tribology in Maintenance, friction wear and lubrication, friction & wear mechanisms, prevention of wear, types of lubrication mechanisms, lubrication processes. Lubricants - types, general and special purpose, additives, testing of lubricants, degradation of lubricants, seal & packings.

UNIT- IV

Machine Health Monitoring - Condition based maintenance, signature analysis, oil analysis, vibration, noise and thermal signatures, on line & off line techniques, Instrumentation & equipment used in machine health monitoring. Instrumentation in maintenance, signal processing, data acquisition and analysis, application of intelligent systems, data base design.

UNIT - V

Reliability, availability & maintainability (RAM) Analysis - Introduction to RAM failure mechanism, failure data analysis, failure distribution, reliability of repairable and non repairable systems, Improvement in reliability, reliability testing, reliability prediction, utilisation factor, system reliability by Monte Carlo Simulation Technique.

Books and References:

- | | |
|---|------------------|
| 1. Maintenance Engineering Hand Book | Higgins |
| 2. Maintenance & Spare parts Management | Gopal Krishnan |
| 3. Industrial Maintenance Management | S.K. Shrivastava |
| 4. Hand book of Condition Monitoring | CNR Rao |
-

INDUSTRIAL ENGINEERING M 452

UNIT I :

Introduction to Industrial Engineering, Concept of Productivity, Work Study : Introduction and advantages of work study, work study procedure.

Method Study : Introduction, objectives and scope of method study, method study procedure, various recording techniques : Different types of charts and diagrams, fundamental hand motion, Micro-motion study, Cycle graph and crono cycle graph, principles of motion economy.

UNIT II

Work Measurement : Work measurement techniques, time study equipment, number of cycles to be timed, performance rating systems, allowances, computation of standard time, work sampling, synthetic data, predetermined motion time analysis.

UNIT: III

Ergonomics fundamentals applications of Ergonomics in layout of equipment, design of seating display, design characteristics of control, fatigue, physiological and other causes of fatigue, environmental condition of fatigue.

UNIT: IV

Inspection and quality Control : Objectives and functions of inspection, inspections standards, quality control factors, S.Q.C. fundamentals distributions, control charts for variables and attributes, acceptance sampling, single and double sampling plan.

UNIT V:

Product Design and Development : Effect of design on cost requirements of a good product design, factors affecting product design, product development, product life cycle, standardization, simplification and specialization. Value Analysis : Definition, VA & VE, Job plan of VA, FAST diagram.

Books & Reference:

- | | |
|--|-----------------|
| 1. Motion and time study | R.M. Barnes |
| 2. Work Study | ILO |
| 3. Industrial Engineering and Management | Martand Telsang |
| 4. Statistical Quality Control | E.L. Grant |
| 5. Industrial Engineering and Management | M M Mahajan |
| 6. Industrial Engineering and Management | O.P.Khanna |
-

**ELECTIVE - III INSTRUMENTATION & AUTOMATIC CONTROL
M 461**

UNIT-I:

Instrumentation: Basic principles pressure measurement, liquid and gas flow measurement. accuracy, Precision & errors, Temperature measurement instruments, static & dynamic temp., devices, transducers for temperature & pressure measurement.

UNIT-II:

Liquid level measurement, temperature measurement, indicating and registering equipment as applied to engines, humidity measurement.

UNIT-III:

Motion measurement vibration m pickups, noise level measurement.

UNIT-IV:

Automatic Controls: Introduction to the concept of automatic control, fundamentals of two position control.

UNIT-V:

Proportional controls, floating controls, rate controls, pneumatic control circuits, hydraulic control circuits.

Books and References:

1. Mechanical Measurements Backwith & Buck
 2. Mechanical Measurements Sirohi & Radhakrishnan
 3. Instrumentation Measurements & Analysis Nakra & Choudhary
 4. Automatic Control
-

ELECTIVE – III ROBOTICS, PRACTICES & PRINCIPLES
M 462

UNIT I:

Introduction: Robot, classification of robot, characteristics of robot, performance, advantages and disadvantages of robot, application of robot.

UNIT II:

Fundamentals of robot: Various system, structure and definition, terms relating to type of industrial robots, basic term relating to robot performance and characteristics

UNIT III:

Controlling the robot systems: Introduction to drives, mechanical, hydraulic, pneumatic drives, electric drive, feed back control

UNIT IV:

Sensing System: Introduction, types of sensor, machine vision, artificial intelligence, control techniques, robot language features.

UNIT V:

Robot safety: Introduction, potential safety hazards, safety planning check list, safety guide lines, latest development in safety measurement.

References: -

- 1.) John J. Craig, Introduction to robotics: mechanics and control, Perason ed.
- 2.) Y. Koren , Robotics for Engineers, McGraw Hill.

Elective III : TECHNOLOGY ENTREPRENEURSHIP

M 464

UNIT-I : The Entrepreneurial Perspective

Introduction to entrepreneurship, need and importance of entrepreneurship, charms of becoming entrepreneur, evolution of entrepreneurship, characteristics of an entrepreneur, barriers of entrepreneurship, achievement motivation to become entrepreneur, creativity & innovation, decision making and other behavioral aspects of entrepreneurship.

UNIT-II : Opportunity Recognition and Planning to establish SSI

Opportunity identification process, opportunity evaluation process, market research, market survey, Identification of relevant resources, Steps in establishing an enterprise / industry, procedure and formalities to establish a SSI or business enterprise, Incentives and benefits available to SSI units and new entrepreneurs, Information about various support agencies.

UNIT-III : Formulation of Business Plan

Preparation of market survey report, techno economic feasibility assessment, preparation of preliminary and detailed business plan,

UNIT IV : Marketing Management

Marketing and sales management, demand forecasting, advertising, product mix, characteristics of a good sales person, Govt support in marketing.

UNIT-V : Financial Management of small scale industries

Sources of finance, Debt financing, Venture capital sources, Lease finance, Banking policies & incentives available to entrepreneurs, Loans-types and benefits, Book keeping and accountancy, working capital management, various financial ratios, Costing, Break-Even-Analysis

Books and References:

1. Managing innovation and entrepreneurship in technology-based firms : Martin, Michael J.C
2. Technological entrepreneurship : enterprise formation, financing and growth : Cardullo, Mario W.
3. Growing new ventures, creating new jobs : : Rice, Mark P
4. Entrepreneurship development programme in India and its relevance to developing countries : Patel, V.G.
5. INNOVATION AND ENTREPRENEURSHIP : DRUCKER, P.F.

**ELECTIVE – IV COMPUTER AIDED MANUFACTURING
M 471**

UNIT-I

Hardware and software description of computer aided design and manufacturing (CAD/CAM).

UNIT-II

Details of modules of computerized numerical control (CNC) which are used in machine tools.

UNIT-III

Robot axes and configurations.

UNIT-IV

Flexible Manufacturing System (FMS) technology and its building blocks.

UNIT-V

Computer Integrated Manufacturing Systems (CIMS)

Books and References:

- | | |
|---|-------------------|
| 1. Numerically Controlled M/C. Tools | H.M.T. |
| 2. Numerically Controlled & CNC Machines. | Kundra |
| 3. CAD/CAM | Pujara & P.N. Rao |
-
-

ELECTIVE – IV ADVANCED METALLURGY
M 472

UNIT - I :

Crystal structure, crystal imperfection, microstructure and their effect on the properties of metals and alloys, strengthening mechanisms.

UNIT - II :

Diffusion, diffusion mechanism, diffusion rate, factors affecting diffusion, application of diffusion on carburising, nitriding, cyaniding, phase transformation, rate of transformation, factors affecting phase transformation.

UNIT - III :

Heat treatment of steels, cast iron and non - ferrous metals and alloys, phase transformations during heat treatment. Effects of heat treatment on the properties, heat treatment of production toolings, measuring tools, spring, sheets.

UNIT - IV :

Mechanical behaviour of metals and alloys, types of failure, details to brittle transition, fatigue failure, P.H. curve, factors affecting fatigue-failure, creep and stress rupture, mechanism of creep, factors affecting creep.

UNIT - V :

Principles of mechanical working, deformation mechanisms, rolling, classification of rolling processes, rolling mills, roll pass design, draft, production of seamless pipes and tubings, drawing of rods, wires and tubes, sheet metal forming.

Books and References:

- | | | |
|----|-------------------------------------|------------------------|
| 1. | Material Science. | Narula, Narula & Gupta |
| 2. | A first course on Material Science. | Raghuvan |
| 3. | Principles of Physical Metallurgy. | Reedhill |

ELECTIVE – IV

**NUCLEAR POWER ENGINEERING
M 473**

UNIT I :

Atomic structure, properties of sub-atomic particles, isotopes, radiation quanta, mass-energy equivalence, radio-active decay, nuclear reactions, artificial radioactivity, nuclear equations, nuclear fission, the mononuclear fission, particle acceleration.

UNIT II :

Neutron Physics: Fission process and reactor behavior, reactor classification, fast and breeder reactors, thermal reactors, critical size, effect of delayed neutrons, reactor control.

UNIT III :

Construction and design of nuclear reactors, materials fuels, moderator, coolant, stainless steels and special metals.

UNIT IV :

Generation and transfer of heat. Comparison of cooling methods, electromagnetic pumps, liquid metal techniques, radiation detectors, shielding.

UNIT V :

Handling of fuel elements and fission products, disposal of radioactive wastes, radiation hazard and health physics, use of products their separation and use of nuclear power economics, comparison with conventional methods.

Books and References:

- | | |
|----------------------------|------------|
| 1. Power plant Engineering | Domkundwar |
| 2. Power plant Engineering | G.D. Rai |



MAJOR PROJECT
495

Each student shall work on an approved project on any machine or machine component/accessory or any other project involving sufficient work. He shall have to complete the work of literature surgery, preliminary design estimation, costing and submit a report on the work completed.

GENERAL PROFICIENCY
M 499