

Syllabus of B. Tech. in Mechanical Engineering

Semester V

HS1501 MANAGEMENT SCIENCE

(2-1-0)

Basic Concepts and Functions of Management

Planning

Nature, Purpose and Objectives of Planning, Organizing: nature and Purpose, Authority and Responsibility, Staffing, Supply of Human Resources, Performance Appraisal, Controlling: System and Process of Controlling, Control Techniques.

Human Resource Management

Nature and Scope of Human Resource Planning, Training and Development, Recruitment and Selection, Career Growth, Grievances, Motivation and its types, Need for Motivation, Reward and Punishment, Models for Motivation, Leaders:

Kind of Leaders, leadership styles, Roles and Function of Leaders, Conflict Management, Kinds and Cause of Conflict, Settlement of Conflict, Group and Team working, Organizational Design and Development.

Marketing Management

Marketing Environment: Consumer Markets and Buyer Behavior, Marketing Mix, Advertising and Sales Promotion, Channels of Distribution

Financial Management and Accounting Concepts

Book Keeping, Financial Statement Analysis, Financial Ratios, Capital Budgeting, Break-Even Analysis.

Production/Operation Management:

Planning and Design of Production and Operation Systems, Facilities Planning, Location, Layout and Movement of Materials, Materials Management and Inventory Control, Maintenance management, PERT & CPM.

Management Information System:

Role of information in decision making, Information system planning, Design and Implementation, Evaluation and Effectiveness of Information System.

Statistical Quality Control, TQM and ISO Certification

Social and Ethical Issues in Management ,

Ethics in management, Social Factors, Unfair and Restrictive Trade Practices.

Strategic and Technology Management:

Need, Nature, Scope and Strategy, SWOT analysis, value and concepts

Background for design, design theory, design materials, human factors in design, applied ergonomics, product development processes and organisations, identifying customer needs, establishing product specifications, concept generation and selection, product architecture.

Product design methods

Creative and rational, clarifying objectives - the objective trees method, establishing functions -the function analysis Method, setting requirements - the performance specification method, determining characteristics -the QFD method, generating alternatives - the morphological chart method, evaluating alternatives - the weighted objectives method, improving details - the value engineering method and design strategies.

Design for manufacture

Estimating manufacturing costs, reducing component, assembly and support costs, design for assembly, design for disassembly, design for environment, design for graphics and packaging, effective proto typing - principles and planning.

Industrial design

Its need, impact and quality, industrial design process and its management.

Legal issues in product design, design resources, economics and management of product development projects.

Materials

Properties and IS coding of various materials. Selection of material from properties and economic aspects.

Design for Strength

Allowable stresses, detailed discussion on factor of safety (factor of ignorance). Stress concentration-causes, Introduction of various design considerations like Strength stiffness, weight, cost, space etc., Concept of fatigue failures.

Design of pin, cotter and keyed joints, screw fastenings, subjected to direct stress; Levers, laminated springs under bending; Shafts and shaft couplings in torsion. Design of shafts and brackets subjected to combined stresses. Design of thin and thick cylinders, power screws, lead screws.

Design of weldments subjected to eccentric loading and combined stresses

Gears

Laws of gearing, gears terminology, tooth form, standard interchangeable tooth profile, minimum number of teeth on pinion in contact with a gear, interference and under cutting, bevel, helical and spiral gears. (7 lectures)

Gear Trains

Simple, compound, reverted and epicyclic gear trains. analytical, tabular, graphical and vector methods for velocity ratio, gear boxes-sliding and constant mesh gear box for automobiles (7 lectures)

Vibrations

One dimensional longitudinal, transverse and torsional vibration, natural frequency, effect of damping on vibration, different types of damping. Forced vibrations, force and displacement transmissibility, vibration Isolation, vibration measuring instruments. (8 lectures)

Many Degree of Freedom System

Exact analysis of undamped and damped continuous systems subjected to periodic force, influence numbers, analysis of two and three degree of freedom lumped mass system, principle of tuned absorbers. (7 lectures)

Numerical Methods

Raleigh, Dunkerley Stodola, Rayleigh-Ritz and Holtzer methods for finding natural frequency of continuous / lumped mass systems for different types of end conditions. (6 lectures)

Critical Speeds of Shafts

Critical speeds of shaft having multiple discs with and without Jumping, secondary critical speed. (5 lectures)

Classification of metal removal processes and machines

Mechanics of metal cutting

Geometry of single point cutting tool and tool angles. Tool nomenclature in ASA, ORS & NRS and interrelationship. Mechanism of chip formation and types of chips, chip breakers. Orthogonal and oblique cutting, cutting forces and power required, theories of metal cutting. Thermal aspects of machining and measurement of chip tool interface temperature. Friction in metal cutting. (9 lectures)

Machinability Concept and evaluation of machinability, tool life, mechanisms of tool failure, tool life and cutting parameters, machinability index, factors affecting machinability. (6 lectures)

Cutting fluids Types, selection and application methods. (1 lectures)

General purpose machine tools Constructional details of, lathe, drilling, milling, shaping and planning machines. Tooling, attachments and operations performed, selection of cutting parameters, calculation of forces and time for machining. Broaching operation.

Capston and turret lathes, single and multiple spindle automates, operations planning and tool layout. (9 lectures)

Abrasive processes Abrasives: natural and synthetic, manufacturing, nomenclature, selection of grinding wheels, wheel mounting and dressing. Machines for surface and cylindrical grinding, their constructional details and processes. (6 lectures)

Surface finishing Honing, lapping, superfinishing, polishing and buffing processes. (2 lectures)

Screw threads and gear manufacturing methods. (2 lectures)

Introduction to Jigs and fixture and their use for productivity improvement. (3 lectures)

Non-conventional machining Benefits, general applications and survey of Non-conventional machining processes. Mechanisms of metal removal, tooling and equipments, process parameters, surface finishing obtained, and specific applications of EDM, LBM, EBM, ECM, USM, AJM processes. (6 lectures)

Introduction

Various modes of heat transfer, Fourier's, Newton's and Stefan Boltzman's Law. Combined modes of heat transfer, thermal diffusivity, overall heat transfer coefficient

(3 lectures)

Conduction

The thermal conductivity of solids, liquids and gases, factors influencing conductivity, measurement. The general differential equation of conduction. One dimensional steady state conduction, linear heat flow through a plane and composite wall, tube and sphere, critical thickness of insulation, Effect of variable thermal conductivity, Conduction with heat sources, heat transfer from rods heated at one both ends. Heat transfer from fins of uniform cross-section. Errors of measurement of temperature in thermometer wells.

(12 lectures)

Convection (Forced)

Introduction, laminar boundary layer equations on a flat plate and in a tube. laminar forced convection on a flat plate and in a tube, simple Reynold's analogy, Dimensional analysis of forced convection, empirical relationship for forced convection.

(6 lectures)

Convection (Natural)

Dimensional analysis of natural convection; empirical relationship for natural convection. Convection with phase change. Description of condensing flow. A theoretical model of condensing flow, Boiling heat transfer, Empirical relationships for convection with phase change.

(6 lectures)

Heat Exchangers

Different types of heat exchangers; Determination of heat exchanger performance. Heat exchanger transfer units, Analysis restricted to parallel and counter flow heat exchanger.

(4 lectures)

Thermal Radiation

Introduction, absorption and reflection of radiant energy. Emission, Radiosity and irradiation, Black and non black bodies, Krichoff's law; intensity of radiation. radiation exchange between black surface, geometric configuration factor. grey body relation exchange between surfaces of unit configuration factors. Electrical analogy to simple problems. Non-luminous gas radiation. Errors in temperature measurement due to radiation.

(7 lectures)

Introduction to Mass Transfer

Mass and mole concentrations, molecular diffusion, eddy, diffusion. Molecular diffusion from an evaporating fluid surface, Introduction to mass transfer in laminar and turbulent convection Combined heat and mass transfer, the wet and dry bulb thermometer.

(6 lectures)

ME1507-P MACHINE DESIGN I LAB

(0-0-3)

List of Experiments

- 1 Design of Cotter & Pin Joint.
- 2 Design of a Knuckle Joint.
- 3 Design of a Shaft.
- 4 Design of Spring.
- 5 Design of Coupling.
- 6 Design of Screw Jack.
- 7 Design of Weld Joints

ME1508-P DYNAMICS OF MACHINES LAB

(0-0-3)

List of Experiments

- 1 To draw the involute profile of a gear.
- 2 To determine gear ration of epicyclic gear train by graphical method.
- 3 Study & use of vibration measuring instruments.
- 4 To determine natural frequency of longitudinal vibration.
- 5 To determine critical speed of shaft.
- 6 To study the Fatigue Testing Machine & to find the no. of cycles at which a material fails

ME1511-P HEAT & MASS TRANSFER LAB

(0-0-3)

List of Experiments

1. Determination of Thermal conductivity of Metal Bar
2. Determination of Stefan Boltzman Constant
3. Determination of Heat Transfer co-efficient in natural convection.
4. To determine effectiveness of Tubular Heat Exchanger (Parallel flow & counter flow)
5. To determine the emissivity of a plate at various temperature.
6. To determine the Steady State Heat flow through composite bar.

ME1509-P MANUFACTURING SCIENCE II LAB

(0-0-3)

List of Experiments

1. Boring & threading.
2. Making T –slot by milling.
3. Shaping V – groove.
4. Polishing of Mild Steel & Aluminium workpiece
Tool – grinding.
Thread cutting.

List of Experiments

- 1 To learn various commands used in AUTOCAD
- 2 To practice for dimensioning.
- 3 To draw machining & welding symbols in drawing
- 4 To draw a component of Machine part
- 5 To draw assembly drawing.
- 6 Autolist program for Tetrahedron/rectangular box
- 7 Autolist program of a single slider crank mechanism.
- 8 Autolist program for drawing "Mohr's circle"
- 9 Autolist program to calculate VEL, ACC & DISPL

HS1505-P GENERAL PROFICIENCY V (0-0-0)

Debate, Elocution, Extempore, Group Discussion, Panel Discussion, Presentation – Paper & oral, Allegation & clarification, Quiz / Brain Teaser, Survey Report / Project Report / Case Study, Dissertation, Mock Interview, Expository / Argumentative Report & National Service Scheme (NSS).