

## DME-601-DESIGN OF MACHINE ELEMENTS

### Unit-I

**Introduction to Machine Design:** Machine and machine elements, Factors influencing design of machine elements Basic design procedure. Selection of mechanism. Factors influencing selection of materials. Type of failures, types of forces. Types of loading. Safe design stress and factors of safety.

### Unit-II

**Design of Machine Elements Subjected to Direct and Shear Loads:** Introduction members subjected to direct loads – bolt, column, rod, cotter and knuckle joints, members subjected to shear loads rivet, cotter knuckle pin, root of threaded bolt , coupling, bolt, key. Function, application and design of knuckle and cotter joint.

### Unit-III

#### Design of Joints

**Riveted Joint:** types of riveted joint - lap and butt joint, definition of Modes of failure of riveted joints.

**Simple Welded Joints:** advantages of welding over riveted joints, types of welded joints, strength of the butt weld, types of fillet joints and strength of fillet joint .

**Threaded Joints:** Types of threads, proportion of nut and bolt dimensions, design of bolt.

### Unit- IV

#### Design of Machine Elements Subjected to Bending Moment, Twisting Moment and Combined Bending and Twisting Moment

Design of shaft, key, flange coupling, leaf and helical spring, pulley arms, axle

### Unit-V

**Design of Clutch:** Pivots and Collars friction. Clutch- need, classification and construction and working of single and multi plate clutches, horse power transmitted by single and multi plate clutches.

**Selection of Rolling and Sliding contact Bearing:** Types of rolling contact bearing , Ball bearing Roller bearing, bearing designation, bearing installation. Application of bearing. Basic principle of Hydrodynamic and Hydro static bearing. Bearing modulus and Bearing characteristics number.

**REFERENCE BOOKS**

1. Machine Design by Sharma and Agrawal.
2. Machine Design by R.K. Jain.
3. Machine Design by Shigley..
4. Machine Design by R S Khurmi
5. Introduction to Machine Design by Bhandari Tata Mcgraw Hill
6. Machine Design by Pandya and Shah

## DME-602- Refrigeration & air conditioning

### Unit- I

**Introduction & Thermodynamics of Refrigeration:** History of refrigeration, meaning and need of refrigeration. Unit of refrigeration, refrigeration effect, work input, co-efficient of performance, Reversed Carnot cycle with gas and vapour as working substance. P-V, T-S and schematic diagrams. Practical difficulties with Carnot cycle. with gas and vapour as working substance. Wet, dry and superheated vapour compression

### Unit-II

#### Vapour Compression Vapour Absorption Refrigeration System

Basic components of vapour compression refrigeration system and their function- compressor, condenser, expansion device and evaporator. Comparison between vapour compression and vapour absorption system, the theoretical and practical vapour absorption system, Lithium bromide- water absorption system. Three fluid system. ( Electrolux systems)

### Unit-III

**Refrigerants:** Definition, primary and secondary refrigerants, examples of each type. Desirable properties of good refrigerant.

**Refrigeration Plants:** Layout and working of Ice plant, cold storage. Water cooler and household refrigerator.

### Unit- IV

**Introduction to Air Conditioning :** Meaning of air conditioning, application of Air conditioning in theatres, community halls, industry, restaurants, hospitals and windows air conditioner.

**Air Conditioning Systems:** Central and unit air conditioning, residential and commercial air conditioning system. Types of fans and ducts - air distribution systems. Thermal insulator, methods and insulation cladding

**Psychometry:** psychometric - definition, terminology, psychometric charts and tables, using psychometric charts for solving simple problems.

### Unit- V

#### Refrigeration Fittings, Charging and Leak Detection Tools:

**Fittings:** Flared tube fittings, unions, elbows tee.

**Joints:** Making soldered and brazed joints. Installation and removal of servicing gauge and testing manifold: Working of suction and discharge compressor service valves.

**Charging of Refrigerant:** evacuating a refrigeration system, removing, refrigerant from a refrigeration system leak detection methods.

#### Maintenance and Repairing of Refrigeration and Air

**Conditioning Units:** Fault location in vapor compression system and air conditions. Repair and maintenance of house hold refrigerators. Water coolers and air conditioners

### REFERENCE BOOKS

- 1 Refrigeration and Air Conditioning by C.P. Arora ( Tata Mc Graw Hill)
- 2 Ashrae Guide and Data Book by Ashrae ( Ashrae)
- 3 Basic Refrigeration and Air Conditioning by D. Hazre & D.N. Chakravarty (Dhanpat Rai & Sons)
- 4 Refrigeration and Air Conditioning by A.S. Sarao & P.C. Gaabi ( Satya Prakashan)
- 5 Refrigeration and Air Conditioning by P.L . Ballancey. ( Khanna Publishers)

### List Of Experiment:-

1. General Study of vapor compression refrigeration system.
2. General Study of Ice Plant
3. General Study and working of cold storage
4. General Study Trane Air Condition (Package Type).
5. General Study of Electrolux Refrigeration

## **DME-603 CAD/CAM**

### **Unit-I**

#### **Introduction to CAD/ CAM :**

- (i) Automation and its types
- (ii) Definitions: CAD, CAAD CAM, CIM and CAE
- (iii) Concept of CAD/CAM
- (iv) Computers in industrial Manufacturing
- (v) General Design procedure and application of computers in it.
- (vi) Benefits of CAD/CAM.

### **Unit-II**

#### **Hardware of CAD/CAM System**

- (i) Basic structure
- (ii) Hardware components of CAD workstations and their functions: CPU, Memory devices, input devices, display devices, output devices and storage devices
- (iii) Hardware components of CAM system and their functions: CNC controller and CAD interfacing, CNC components. Conveyers and robot units

### **Unit-III**

#### **Geometric Modeling**

- (i) Requirements of Geometric Modeling
- (ii) Geometric Construction Methods
- (iii) Other Modeling Methods
- (iv) 3D Modeling: Wire frame and solid type.

### **Unit-IV**

#### **Introduction to Conventional Numerical Control:**

- (i) Definition of NC
- (ii) Numerical Control Modes
- (iii) Numerical Control Elements
- (iv) NC Machine Tools

### **Unit-V**

#### **CNC**

- (i) CNC Hardware Basics
- (ii) CNC Tooling
- (iii) CNC Machine Tools and Control Systems
- (iv) CNC Programming

**REFERENCE BOOKS**

- 1** CAD/CAM Computer- Aided Design and Manufacturing by M.P. Groover, & E.W. Zimmer, Sr. ( Prentice-Hall of India pvt. Ltd. (EEE), New Delhi, 1986)
- 2** Introduction to Computer Aided Drafting by Donald D. Voisinet ( 2nd fd. ) McGraw Hill.
- 3** Understanding CAD/CAM- Design with Computer by D.J. Bowman, and R.N. MC- Dougal (BPB Publications, Delhi) .
- 4** CAD/CAM by Kuldeep Sareen & Chandadeep Grewal ( S,Chamd & Co, Delhi)
- 5** CAD/CAM by P.N .Rao McGraw Hill.

**List Of Experiment :-**

1. 2D and 3D modeling on CAD software
2. Use of CAD software using CNC programming
3. Demonstration on methods of CNC Turning operation
4. Demonstration on methods of CNC Milling operation
5. Study of auto CAD commands

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## **DME-604-(A) MANUFACTURING PROCESS**

### **Unit-I**

#### **Introduction**

Unconventional machining process – Need – Classification – Brief overview of all techniques – Merits and demerits.

### **Unit-II**

#### **Mechanical Energy Based Processes**

Abrasive Jet Machining (AJM) – Water Jet Machining (WJM) – Ultrasonic Machining (USM) – Working principles – Equipment used – Process parameters – MRR – Variation in techniques used – Applications

### **Unit-III**

**CNC milling machines** • Concept of CNC milling machine • Vertical and horizontal machining center: Constructional features, Axis identification, Electronic control system. Automatic tool changer and tool magazine. • CNC programming: Preparatory functions (G code), miscellaneous functions (M code), Part programming including subroutines and canned cycles. • Specific programming examples like simple curvilinear milling, use of sub-routine, use of canned cycle • Principles of computer aided part programming.

### **Unit-IV**

**. Special Purpose Machines (SPM)** • Concept, General elements of SPM, elementary SPM machines like Turret and Capstan lathe • Principles of SPM design, Productivity improvement by using SPM

### **Unit-V**

**Maintenance of Machine Tools:** • Need and importance of maintenance activity • Types of maintenance. • Basic maintenance practices for simple machine element, viz Bearing, Coupling, Shaft and pulley etc. • Repair cycle analysis, Repair complexity, Maintenance manual, Maintenance records, Housekeeping. • Introduction to Total Productive Maintenance

**REFERENCE BOOKS**

1. Manufacturing Science (Amitabh Ghosh , Mallik) East-West Press Pvt. Ltd.
2. Production Technology (HMT, Bangalore) Tata Mc-Graw Hill
3. CNC machines (Pabla B. S. M. Adithan) New Age international limited.
4. Industrial maintenance (H.P.Garg) S. Chand & Co. Ltd.
5. Non conventional Machining (P. K. Mistra) Narvasa Publishining House
6. Maintenance Engg. Handbook (Lindley R. Higgins) Mc-Graw Hill
7. Manufacturing Processes (Begman, Amsted) John Willey and Sons.



## **DME-604 (B) Automobile Engineering**

### **Unit-I**

**Introduction:** Meaning of automobile, elements of automobile, classification of automobile, layout of chassis, various operating systems used in automobile  
Meaning of I.C. Engines, Classification on the basis of cycle, fuel used, ignition system, number of cylinders, number of strokes etc. Otto/ Diesel cycles. Two stroke and four stroke engines, comparison of petrol and diesel engine. Engine rating. Lubrication, Fuel Supply system, Carburetor

### **Unit-II**

**Braking and Steering system:** Introduction, classification of brakes, construction & working of mechanical brake, hydraulic brake, Electric brake advantages and disadvantages of each type of brakes, Servo brake system. Ackerman steering principle. Elements of steering - types and working, Under and over steering, power steering and advanced steering

### **Unit-III**

**Transmission System:** Clutch : necessity, function of its components, Types Gear Boxes : necessity, Types of gear boxes and their working..

**Suspension System:** Suspension system, types, leaf, coil spring. Telescopic shock absorber. Air suspension, independent suspension system. Tyres : structure of tyre section, rating of tyres, tyre-pressure measurement, material and specification. Tyre wear and remedies

### **Unit-IV**

**Auto Electric System:** Wiring diagram of a car and functions of various components used in the electric circuits, function and working principle of a starter and generator, function of voltage current regulator, ignition timing, spark plugs- their classification, gap setting and common ignition troubles, their causes and remedies. Automobile battery - construction and working, electronic ignition system of modern vehicles.

### **Unit-V**

**Miscellaneous:(i) Maintenance of Vehicles :** need, classification maintenance procedure of engine, transmission system, electrical system, braking system and steering mechanism.

**(ii) Garage and Service Station:** Types, layout, equipment tools and service procedure.

**(iii) Exhaust Gas, Pollutants:** Their hazards and controls with reference to motor vehicle act. Motor Vehicle act, registration of vehicles, driving license and Traffic Signals.

**REFERENCE BOOKS**

- 1 Automobiles Engineering Vol. I & II by Dr. Kirpal Singh. ( Standard Publisher)
- 2 Automobiles Engineering by R.S. Gupta ( Satya Prakashan)
- 3 Automobile mechanism by Joseph Heither
- 4 Automobile Engineering by R. P. Sharma ( Dhanpat Rai & Sons)
- 5 Automobile Mechanism by William H. Crouse
- 6 I.C. Engines by Dr. A.C. Rad and S.B. Bechar
- 7 Automobile Engineering- T.R. Banga & Nathu Singh (Khanna Publicers)
- 8 Automobile Engg. – RB. Gupta

## **DME-605 MAJOR PROJECT**

The aim of the final year project is to develop student's knowledge for solving technical problems through structure project research study in order to produce competent and sound engineers. It provides the students with the opportunity to design undertake or conduct an independent research or study related to their degree course.

### **Following are the compulsory objectives to be needed :**

1. It should be from the approved area of the subject.
2. Students must submit a written report of the same.
3. Students must submit outline and action plan for the project execution
4. Each student is required to prepare a project report and present the same at the final examination with a ppt. demonstration.
5. The project should be authentic and must not be copied from anywhere and it should be working.