SYLLABUS

DIPLOMA IN MECHANICAL ENGINEERING (DAY COURSE)

w.e.f. 2012

**UNIVERSITY POLYTECHNIC
FACULTY OF ENGG. & TECHNOLOGY
JAMIA MILLIA ISLAMIA
NEW DELHI-110025**

First Semester

S. No	Code	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods /Week
Theory Courses							
1	DMES-101	Communication Skills-I	4	40	60	100	4
2	DMEP-102	Applied Physics	4	40	60	100	4
3	DMEM-104	Applied Maths -I	4	40	60	100	4
4	DCE-105	Applied Mechanics	4	40	60	100	4
5	DME-106	Workshop Technology	4	40	60	100	4
Practical Courses							
1	DMEP-112	Applied Physics	2	30	20	50	2
2	DME-115	Applied Mechanics	2	30	20	50	2
3	DME-116	Workshop Practice-I	2	30	20	50	3
4	DME-117	Engg. Drawing-I	2	30	20	50	3
Total			**28**	**320**	**380**	**700**	**30**

Second Semester

S. No	Code	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods /Week
Theory Courses							
1	DMEM-201	Applied Maths-II	4	40	60	100	4
2	DMEC-202	Applied Chemistry	4	40	60	100	4
3	DEE-203	Elements of Electrical Engg.	4	40	60	100	4
	DME-204	Engg. Drawing-II	4	40	60	100	4
5	DME-205	Applied Thermodynamics	4	40	60	100	4
Practical Courses							
1	DMEC-212	Applied Chemistry	2	30	20	50	2
2	DEE-213	Elements of Electrical Engg	2	30	20	50	2
3	DME-214	W/S Practice-II	2	30	20	50	3
4	DME-215	Applied Thermodynamics	2	30	20	50	2
Total			**28**	**320**	**380**	**700**	**29**

Syllabus-Three Year Diploma in Mechanical Engineering

Third Semester

S. No	Code	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods /Week
Theory Courses							
1	DEE-301	Electrical Technology	4	40	60	100	4
2	DME-302	Fluid Mechanics& Fluid Machines	4	40	60	100	4
3	DME-303	Thermal Engineering	4	40	60	100	4
4	DME-304	Machine Drawing	4	40	60	100	4
5	DCA-305	Computer Applications	4	40	60	100	4
Practical Courses							
1	DEE-311	Electrical Technology	2	30	20	50	2
2	DME-312	Fluid Mechanics & Fluid Machines	2	30	20	50	2
3	DME-313	Thermal Engineering	2	30	20	50	2
4	DCA-315	Computer Applications	2	30	20	50	2
Total			**28**	**320**	**380**	**700**	**28**

Fourth Semester

S. No	Code	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods /Week
Theory Courses							
1	DMES-401	Communication Skills-II	4	40	60	100	4
2	DME-402	Manufacturing Process-I	4	40	60	100	4
3	DME-403	Mechanics of Solid	4	40	60	100	4
4	DME-404	Material Science	4	40	60	100	4
5	DME-405	Theory of Machine	4	40	60	100	4
Practical Courses							
1	DME-412	Manufacturing Process-I	2	30	20	50	3
2	DME-413	Mechanics of Solid	2	30	20	50	2
3	DME-414	Material Science	2	30	20	50	2
4	DME-415	Theory of Machine	2	30	20	50	2
Total			**28**	**320**	**380**	**700**	**29**

Fifth Semester

S. No	Code	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods /Week
Theory Courses							
1	DME-501	Computer Aided Design &Manufacturing	4	40	60	100	4
2	DME-502	Manufacturing Process-II	4	40	60	100	4
3	DME-503	Estimating & Costing	4	40	60	100	4
4	DME-504	Automobile Engineering	4	40	60	100	4
5	DME-505	Renewable Energy Sources	4	40	60	100	4
Practical Courses							
1	DME-512	Manufacturing Process-II	2	30	20	50	3
2	DME-513	Auto Cad	2	30	20	50	2
3	DME-514	Automobile Engineering	2	30	20	50	2
4	DME-515	Renewable Energy Sources	2	30	20	50	2
		Total	**28**	**320**	**380**	**700**	**29**

Sixth Semester

S. No	Code	Subject	Credit Hrs	Sessional	Univ. Exam	Total	Periods /Week
Theory Courses							
1	DME-601	Industrial Management	4	40	60	100	4
2	DME-602	Machine Design	4	40	60	100	4
3	DME-603	Power Plant Engineering	4	40	60	100	4
4	DME-604	Metrology and Measurement	4	40	60	100	4
5	DME-605	Refrigeration & Air-Conditioning	4	40	60	100	4
Practical Courses							
1	DME-614	Metrology and Measurement	2	30	20	50	2
2	DME-615	Refrigeration & Air-Conditioning	2	30	20	50	2
3	DME-620	Project	8	120	80	200	6
4	DME-630	Industrial Training & Visits	2	50	-	50	-
		Total	**33**	**430**	**420**	**850**	**30**

Note: Project Topics (DME-620) shall be assigned to the students at the commencement of 5th Semester.

Syllabus-Three Year Diploma in Mechanical Engineering

Contents

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Syllabus-Three Year Diploma in Mechanical Engineering

COMMUNICATION SKILLS -I
DMES-101

UNIT	Topic	Marks
I.	Reading *a. Comprehension (Beginner)*	10
II.	Grammar *a. Tenses , Active , Passive* *b. Vocabulary*	20
III.	Structure *a. Sentence Formation* *b. Word Formation*	10
IV.	Writing - I *a. Report Writing* *b. Curriculum Vitae*	10
V.	Writing - II *a. Application* *b. Business Letter*	10

APPLIED PHYSICS
DMEP-102

UNIT-I

Unit and Dimensions:- Fundamental and derived Units (SI system), Dimension of various physical quantities, uses of dimensional analysis and its limitations.

Oscillations:- Periodic motion, simple harmonic motion (SHM),derivation of velocity, acceleration, time period and frequency; vibration of simple spring mass system (vertical and horizontal), spring constant of two or more springs in series and parallel, vibration of bodies supported on more than one identical springs.

Unit-II

Electrostatics :- Coulomb law, electric field, potential due to a point charge and number of point charges, potential difference between two points, equipotential surfaces ,electric field at a point due to a uniformly charged thin sheet, capacitor, capacitance of a parallel plate capacitor, energy stored in a capacitor, combination of capacitors(series and parallel).

D.C. Circuits:- Kirchhoff's law, application of Kirchhoff's law to the wheat-stone bridge, post office box, meter bridge and potentio meter. Heating effect of current, heat produced by electric current in a conductor and Joules law of electrical heating.

Unit-III

Electromagnetism:- Motion of charged particle in uniform magnetic field and electric field: Biot-Savart law, magnetic field around a current carrying conductor at the centre of circular loop and at any point on the axis of circular loop, force experienced by a moving charge and a current carrying conductor in a uniform magnetic field, Torque: on current loop force between two parallel current carrying conductors, definition of an ampere, principle and working of a moving coil galvanometer, conversion of galvanometer into ammeter and voltmeter.

Unit-IV

Temperature and its Measurement:- Concept of heat and temperature, basic principle for temperature measurement, thermoelectric, platinum resistance thermometer and pyrometers.

Expansion of solids:- concept of linear expansion (α) superficial expansion (β) and cubical expansion (γ).Relation between (α), (β) and (γ); Experimental determination of coefficient of linear expansion (α).

Heat Transfer:- Modes of heat transfer, coefficient of thermal conductivity and its determination by Searle's and Lee's disc methods, transmission of heat through compound media (both series and parallel).

Unit-V

Geometrical Optics:- Refraction through compound media, concept of apparent depth, total internal reflection, application of total internal reflection; refraction through prism, lens formula, principle working and magnifying power of telescope and microscope (simple and compound).

Wave Optics: - Huygens's principle, reflection and refraction of a wave at plane surface, Interference of light waves; Young Experiment and Newton ring Experiment, basic ideas about diffraction and polarization of light waves.

APPLIED MATHEMATICS-I
DMEM -104

UNIT-I   ALGEBRA

Arithmetic progression, its nth term, sum to n terms. Geometric progression, its nth term, sum to n terms and sum of infinite tirms. Binomial theorem (without proof) for any index, General and middle term, terms independent of x, First and second binomial approximation.

UNIT-II   DETERMINANTS

Determinants (upto 3rd order only), minors, co-factors, Properties of determinants, solution of linear simultaneous equations in three variables by Cramer's rule.

UNIT-III   MATRICES

Definition and examples of matrices, types of matrices, basic operations, equality of matrices, addition, multiplication and scalar multiplication of matrices, transpose of a matrix, symmetric, skew-symmetric matrices, singular and non-singular matrices, cofactor matrix, adjoint of a matrix, inverse of a matrix, solutions of simultaneous equations in three variables by matrix inverse methods.

UNIT-IV   CO-ORDINATE GEOMETRY OF TWO DIMENSIONS

Definition of locus with problems, Equations of straight lines in various forms. Angle between two lines, Perpendicular distance formula, Conic sections, Circle, Parabola, Ellipse and Hyperbola.

UNIT-V   VECTORS

Scalar and vectors, addition and subtraction of vectors and their simple applications, multiplication of vector by scalar, Scalar and vector product of two vectors. Scalar product of three vectors, Geometrical interpretation.

APPLIED MECHANICS
DCE 105

Unit- I
Introduction: Concept of engineering mechanics, its importance and necessity, giving suitable examples on bodies at rest and motion, concept of rigid bodies.
Laws of forces: Principles of mechanics- superposition, transmissibility etc, types of forces, systems of forces, principles of forces, resultant of forces. Parallelogram law, triangle law, polygon law of forces, resolution of forces, free body diagram, equilibrium force and its determination, Lami's theorem.

Unit- II
Moments: Concept of moment, laws of moment, Varignon's theorem. Application of moment to simple mechanism, resultant of parallel/ non-parallel forces, reaction at support in statically determinate beam due to point load, u.d.l and triangular load.

Unit- III
Centre of gravity: Centre of gravity and centroid of regular bodies (cone, cylinder, sphere and hemisphere), areas (rectangle, circle and triangle), composite bodies, composite areas, remainder.
Moment of Inertia: Moment of inertia of Lamina- rectangular, circular (solid/hollow), triangular, parallel axis theorem, perpendicular axis theorem.

Unit- IV
Laws of motion: Newton's laws of motion, momentum, impulse, torque, linear and angular motion.
Circular motion: centripetal and centrifugal force.
Work, Power & Energy: Definition of terms, simple numerical problems

Unit- V
Friction: Concept of friction, laws of friction- static and dynamic, limiting friction, coefficient of friction, angle of friction. Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane.
Simple lifting Machines: Concept of machine, mechanical advantage, velocity ratio and efficiency of machine, their, relationship , laws of machine, Simple machine winch crab, wheel and axle, simple screw jacks. System of pulley – first, second and third system of pulleys.

Reference Books:
1. A Text Book of Engineering Mechanics by A.R Basu, Dhanpat Rai & Co., New Delhi
2. A Text Book of Engineering Mechanics by R.K. Khurmi, S. Chand and Co., New Delhi
3. Applied Mechanics by A.K. Upadhay, S.K. Kataria & Sons, New Delhi

WORKSHOP TECHNOLOGY
DME-106

UNIT-I **Carpentry shop:** Timer , classification of timber, structure and defects, conversion and selection timber, seasoning and protection, plywood and it advantages, tools : marking and measuring tools holding and supporting tools, cutting tools, planning tools, striking tools, boring tools and miscellaneous tools.

UNIT-II **Fitting Shop:** Material for tools, Vices, V block, surface plate, try square, combination set, files, scrapers, chisels, hacksaw, surface gauge, universal surface gauge, punches, hammers, calipers and dividers.

UNIT-III **Smithy Shop:** tools and equipments, hammers, swage block, anvil, tongs, chisels, hardie, gauges, fullers, flatters, set hammer, open fire and stock fire, fuel and blowers, Processes: forging upsetting welding in forging Sheet metal process.

UNIT-IV **Welding Shop:** Types of welding Arc welding and gas welding, tools and equipment used in arc and gas welding, types of flames, working pressure, use of A.C. and D.C., electrode , soldering and brazing, precautions.

UNIT-V **Metal Cutting Shop:** various metal cutting machines pertaining sawing shearing, plain turning, drilling, grinding milling and shaping.

Reference Books:
1. A Course in workshop Technology, by B.S. Raghuwanshi, Dhanpat Rai & Co., New Delhi
2. Workshop Technology by Hazra & Chaudhry, New Delhi
3. Workshop Technology by Chapman, ELBS
4. **Mechanical Workshop Practice,** K. C. John, **PHI Learning Pvt. Ltd**.

WORKSHOP PRACTICE –I
DME-116

Carpentry shop:

Introduction of tools. Making of various joints- Cross lap joint, Half lap joint, Mortise and tenon joint, Dovetail joint.

Fitting shop:

Introduction of tools

Cutting and filing practice as per drawing

Drilling

Smithy Shop:

Introduction of tools

Hot working and cold working

Making of U clamp, fan hook

Making of sheet metal Joints

Welding Shop:

 A/C welding and gas welding

Preparation of lap joint and but joints

Preparation of Oxy acetylene gas welding joints

Sheet Metal Shop:

Preparation of joints and making standard items.

ENGINEERING DRAWING -I
DME-117

Unit-I Introduction:

a. Drawing Instruments ,Drawing instruments, Sizes and layout of standard drawing sheets, Sizes of drawing boards.

b. Lines, Lettering and Dimensioning :

Different types of lines and freehand Sketching **,** Different types of lines in engineering drawing as per BIS Specifications**,** Practice in free hand sketching of vertical , horizontal and inclined lines, geometrical figures such as triangles, rectangles, small and large circles, parabolas', curves and ellipses .

Unit-II Lettering techniques and Practice : Instrumental single stroke vertical and inclined) lettering of 3to 7.mm. heigh . Instrumental double stroke lettering of 35 mm height in the ratio of 7:4 vertical

Unit-III Dimensioning: Necessity of dimensioning, terms and notations-methods and principles, dimensioning small components as in 4.2. below(mainly theoretical instructions) , Dimensioning of overall sizes, circles thread holes, chamfered surfaces, angles tapered surface holes equally spaced on PCD counter sunk hole counter bored holes, cylindrical parts narrow. Space and gaps radii curves and arches chain and parallel dimensioning.

Unit-IV Scale : Scales and their need and importance, Definition of representative fraction (RF) find RF of a given scale , Types of scales , Construction of plain and diagonal scales.

Unit-V Constructions of curbs such as ellipse, parabola, hyperbola, cycolise epicycloids hypocycloid and involutes .

APPLIED MATHEMATICS-II
DCEM-201

UNIT-I   DIFFERENTIAL CALCULUS

Limit and continuity (without problems), Differentiation of functions by First Principle, Differential of sum, product and quotient functions, Differential of a function of a function (Chain rule), Logarithmic differential, Higher order derivatives.

UNIT-II   INTEGRAL CALCULUS

Indefinite integral, Integration of a function, standard formulae, the fundamental laws of integration, Integration by substitution method, by parts method and partial fractions method.

UNIT-III   APPLICATIONS OF CALCULUS

Maxima and minima, Tangent and normal, Evaluation of definite integral. Properties of definite integral, Area bounded by a curve between two ordinates and x-axis.

UNIT-IV   DIFFERENTIAL EQUATIONS

Differential equation, Order and degree of differential equations, Solution of differential equations of first order and first degree, variable separable, Homogeneous and linear differential equations, Solution of linear differential equations of 2nd order with constant co-efficient.

UNIT-V   COMPLEX NUMBERS

Complex Number, representation of a complex number (Argand Diagram), Complex number in rectangular, polar and exponential forms, Conversion from one form to another form. De Moiver's Theorem, Roots of complex number.

APPLIED CHEMISTRY
DMEC-202

Unit I: Problems based on Volumetric and Gravimetric analysis and Polymerization

   1. Molecular mass, mole, weak and strong electrolytes Equivalent mass and Gram-equivalent

   2. Strength, Normality and Molarity of a solution, Normality equation

   3. Problems based on Volumetric and Gravimetric analysis.

Unit II: Analysis and Treatment of Water

   1.Impuriteis in water, Hardness, Units of Hardness and Calcium carbonate equivalent.

   2. Estimation of Dissolved Oxygen, Alkalinity and Hardness by EDTA method

   3.Problems in Boilers, Ion-Exchange Process for softening of water

Unit III: Fuel and Combustion

   1. Units of Heat, Characteristics of good fuel, Calorific value, Calculation and determination of Calorific value, types of coal, petroleum, LPG, CNG,

   2. Producer gas, Water gas and Coal gas

   3. Problems based on combustion of solid, liquid and gaseous fuels. Analysis of Flue   gases by Orsat apparatus

Unit IV: Corrosion and Lubricants

   1. Dry and Wet corrosion, Galvanic corrosion, Concentration corrosion, Pitting corrosion   and Stress corrosion.

   2. Protection of corrosion by Proper designing, Alloying, Cathode protection and Coating   methods

   3. Types and Mechanism of Lubricants, Characteristics of lubricants like Viscosity, Acid value, Saponification value, Cloud point, Pour point, Flash point and Fire point.

Unit V: Polymerization, Metal and Alloys

   1. Polymers, addition and condensation polymerization, co-polymerization Examples

   2. Cast iron, Steel and Heat treatment

   3. Necessity of making alloys, Composition, properties and uses of Brass, Bronze, Gun Metal, Invar and Duralumin

ELEMENTS OF ELECTRICAL ENGG
DEE-203

Unit-I   DC CIRCUITS:
Basic concepts of current, voltage, resistance, power and energy, ohm's law , resistances in series and parallel, laws of resistances, Kirchoff's laws & their applications, cells in series, parallel & mixed grouping, simple numerical problems, simple numerical problems.

Unit-II   AC CIRCUITS:
Concepts of alternating current & voltage, equations of instantaneous values, AC through pure resistance, inductance & capacitance, concept of conductance, susceptance and admittance; RL, RC & RLC series and parallel circuits, Different methods for solving parallel ac circuits, simple numerical problems.

Unit-III   ELECTROMAGNETIC INDUCTION:
Faradays law of electromagnetic induction, Lenz's law, Fleming's rules, statistically induced the emf and Dynamically induced the emf, Inductances in series and parallel, coefficient of coupling, concept of eddy current and hysteresis, Hysteresis loop, Eddy current and hysteresis losses, simple numerical problems.

Unit-IV   POLYPHASE CIRCUITS:
Advantages of 3-ph over 1-ph system, Star and delta connections (relationship between phase & line voltages, phase & line current) power in 3ph circuits, power measurement by 2 wattmeter method , star delta transformation, simple numerical problems.

Unit-V   DOMESTIC INSTALLATION & SAFETY MEASURES:
Different types of wiring systems, knowledge of different accessories used in different types of wiring, Types of earthing, construction & its function, IE rules for installation, common safety measures & shock treatment.

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ENGINEERING DRAWING- II
DME-204

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UNIT-1   Principle of Projections strictly in first angle projection

Projection of solids , such a Prism, Cube, Cylinder and Cones with axis perpendicular to horizontal plane or parallel to horizontal plane/vertical plane or both. Drawing 3 orthographic views of given objects (at least five objections). Identification of surfaces of drawn orthographic views from isometric object. Sketching practice of pictorial views from isometric objects.

UNIT-II   Sectional Views:

Need for sectional views – cutting planes methods of representing sections, conventional sections of various materials, classification of sections, conventions in sectioning. Drawing of full section, half section, partial broken out sections offset sections, revolved section and removed sections. Exercises on sectional views of different   objects..Drawing of different conventions for materials in section conventional breaks for shafts pipes rectangular , square, angle, channel, rolled sections .

UNIT-III   Isometric View:

Fundamentals of isometric projections (theoretical instructions).   Free hand sketching of Isometric views from 2or 3 given orthographic views.

Recommended Books:
1.   Elementary Engineering Drawing (in first angle projection) by ND Bhatt Charotar Publishing House
2.   A text book of engineering drawing by Surjit Singh published by DhanpatRai and Co. Delhi R.B. Gupta N.D Bhatt.
3.   Engineering Drawing by PS Gill published by SK Kataria and sons. Delhi.

APPLIED THERMODYNAMICS
DME-205

Unit- I
Basic Concepts: **Definitions and laws** Definition of thermodynamics, State of a system. Path, Process, Cycle and medium, concept of a system. Units of pressure . Gauge and absolute pressure. Types of thermodynamic systems and properties of a system definition of thermodynamics property: Extensive and Intensive properties, Types of thermodynamics processes. Flow and non-flow process Isothermal Isochoric, Isobaric and Adiabatic process, Quasi-static process, work done during a quasi-static process, Zeroth law of thermodynamics, first and second law of thermodynamics equivalence of Kelvin - Plank and Claussius statement .Concept of perfect   gas . Laws of perfect gases and properties of gas mixtures third law of thermodynamics. Specific heats, types of specific heats, Relation between two specific heats of a gas , energy Potential energy, Law of conservation of energy , Specific volume, Concept of enthalpy Simple numerical problems based o the above topics.

Unit-II
Properties of Gases:
 Expansion and compression of gases, first law of thermodynamics applied to no flow processes, isothermal Isobaric, Isentropic (reversible adiabatic), Polytrophic processes, first law applied to flow process, Derivation of steady flow energy equation and its application to boiler, turbine, Compressor, Nozzle and throttle valve, Concept of entropy T-s diagram. Expressions for the change of the entropy   of a perfect gas, Simple numerical problems on the above topics.

Unit-III
Properties of Steam and Boilers : Formation of steam, Conditions of steam, Wet steam, Saturted, Dry saturated and Superheated steam, Properties of steam. Dryness fraction and its measurement by barrel calorimeter, Use of steam tables, Enthalpy of steam. T-s charts for generation of steam. Both fire tube and water tube boilers, Comparison of fire tube and water tube boilers. Simple Vertical boiler, Cochran boiler, Lancashire boiler, Cornish boiler . Nestler boiler, Babcock and Wilcox boiler, Critical temperature and pressure, Benson boiler, La -mont boiler, Loeffer boiler, Velox boiler. Details of boiler mountings and accessories , boiler draft, Performance of boilers, Evaporative capacity, actual evaporation. Equivalent evaporation, Factor of evaporation, Boiler efficiency, Boiler horse power, Heat balance sheet. Simple numerical problems on the above topics.

Unit-IV
Steam Nozzles and Turbines: Steam nozzles, types of steam nozzles flow of steam through nozzles, Velocity of expanding steam, Wight od discharge through nozzles. Condition of maximum discharge and critical pressure ratio. Area of cross section of Nozzle, effect of friction , simple numerical problems.

Turbines: Principles of turbines, Classification, construction and working of impulse and reaction turbines, Pressure and velocity compounding. Its advantages and disadvantages. Bleeding of steam and its effects on turbine efficiency, Limits on number of bleedings. Pressure and velocity of steam in both impulse and reaction turbines, Velocity triangles of moving blades of both impulse and reaction turbines, Combined velocity triangle for moving blades, power produced by both impulse and reaction turbines, Effect of friction on the combined velocity triangle, Combined velocity triangle, Combined velocity diagram for axial

discharge, Velocity diagram for two stage impulse turbine, Height of blades of a reaction turbine, Efficiencies of a steam turbine, Diagram efficiency, Gross efficiency, Nozzle efficiency, Condition for maximum efficiency of a reaction turbine, Losses in steam turbine, Governing , Simple numerical problems based on the above topics.

Unit-V

Heat Transfer: Introduction Modes of heat transfer, Conduction, basic equation, temperature gradient, Thermal Conductivity , Conduction through a uniform wall and composite wall through a hollow cylinder, Logarithmic mean radius, Pipe lagging, Conduction through a thick sphere, Convection, types of convection, basi equation of convection coefficient, Overall efficiency of heat transfer, Radiation Absorption reflection and transmission of radiation Concept of black white and opaque bodies, Emissive power, emissivity. Wein's law, Kirchhoff's law Stefan Boltzmann law. Heat transfer between parallel black planes . Simple numerical problems based of the above topics.

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WORKSHOP PRACTICE –II
DME-214

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Metal Cutting Shop: Introduction of lathe and its operation

Introduction of drilling machine and its operations.

Introduction of milling machine and its operations

Introduction of shaping machine and its operations.

Paint Shop

Introduction of painting and necessity, Different type of prints. Introduction of powder coating and their uses.

Practice of Policing and painting on wooden and metallic surfaces.

Painting practice by brush on metal sheets

Plumbing Shop :

Introduction of Plumbing tools and pipe fittings

Practice of pipe fitting joints

Sheet metal shop: Introduction of tools, making of sheet metal joints

Practice: Prepare a lap riveting joint of sheet metal pieces.

Making of sheet metal trey or a funnel.

Brazing and soldering:

Introduction of tools and practice

APPLIED THERMODYNAMICS
DME-215

List of Experiments

1. To determine the surface heat transfer coefficient for a heated vertical cylinder in natural convection.

2. To determine the thermal conductivity of a brass rod.

3. To determine the convection coefficient h heat loss, Q and efficiency to pin fin for forced convention.

4. To Measure the emissivity of the test – plate surface (Brass)

5. To perform the study of simple vertical boiler.

6. To perform the study of babcock and welcox boiler.

7. To perform the study of boiler mountings.

8. To perform the study of boiler accessories.

9. Study of steam turbine

ELECTRICAL TECHNOLOGY
DEE-301

Unit I   Transformer

Construction, Working and Working Principle of Transformer, E M F Equation of a Transformer, Voltage Transformation Ratio, Simplified Equivalent Circuit, Voltage Regulation. Losses in the Transformer, Efficiency of Transformer, Condition for Maximum Efficiency, All day Efficiency, Open Circuit Test, Short Circuit Test, Auto Transformer, and Simple numerical problems.

Unit II   D C Machines

D C Generators- Main Constructional Features, Working Principle ,Commutation Action, E M F Equation, Types of D C Generators, Armature Reaction, Characteristics of D C Generators, Application of DC Generator, D C Motors-Working Principle of D C Motors, Types of D C Motors, Characteristics of D C Motors, Application of D C Motors, and Simple numerical problems.

Unit III   Induction & Synchronous Machines

Constructional Features of Three Phase Induction Motors, Production of Revolving Field, Principle of Operation, Slip, Frequency of Rotor Current, Alternators-Constructional Features, Generator and Motor Action, Synchronous Motors-Working Principle of Synchronous Motor, Characteristics of Synchronous Motor, Application of Synchronous Motor sand Simple numerical problems.

Unit IV   Measuring Instrument and Basics of Electronics

Measuring Instrument-Classification of Instruments, Essentials of Indicating Instruments, Moving Iron Instruments, Types of Moving Iron Instruments, Merits and Demerits of Moving Iron Instruments, Application of Moving Iron Instruments, Moving Coil Instruments, Difference Between Moving Iron and Moving Coil Instruments, Extension of Range of Ammeter and Voltmeter, Dynamometer Type Instruments, Semi-Conductors and Semi-Conductor Diodes, n-p-n Transistor, p-n-p Transistor, Transistor Connections and Characteristics, and Simple numerical problems.

Unit V   Basic Electronics:

Semiconductor Diodes, HWR & FWR, Types of Transistors, Transistor configuration, Diac, Triac & SCR, Simple problems

FLUID MECHANICS AND FLUID MACHINES
DME-302

UNIT- I
Introduction: Concept of fluid, mechanics and hydraulics. Properties of fluid (viscosity, specific weight, specific volume, specific gravity, surface tension) Static Pressure: Pascal's law (with proof), static pressure, intensity of pressure and pressure head , total pressure and centre of pressure on vertical and inclined plane surfaces, walls and gate. Measurement of Pressure: Atmospheric pressure gauge pressure, vacuum pressure absolute pressure and differential pressure, Piezometer tube manometers (simple and differential type) Burden's tube pressure gauge.

UNIT -II
Flow of liquids: Types of flow (laminar and turbulent, rational and irrotational steady and unsteady, uniforms and non uniform) Concept of Reynolds's number. Rate of discharges, continuity equation. Bernoulli's theorem (without proof), its limitations and practical applications . discharge through venturimeter and orifice meter, Pitot tube.
Flow through Orifice: Hydraulic coefficients (Cd,Cv, Cc) and their relationship discharge through a small orifice, through a large rectangular orifice, fully submerged, partially submerged and free conditions. Time of emptying a tank of uniform area through a rectangular orifice at the bottom.

UNIT –III
Flow through Pipes: Loss of energy in a pipe flow, major loses, factors influencing the loss due to friction, Darcy's and Chezy's equation (without proof) Minor energy losses (without Proof.) Hydraulic gradient line and total energy line. Flow through series, parallel and branched pipes .flow through siphon pipe . Water hammer concept. work done on a fixed ad moving vertical and inclined plate Impact of jet: impact of jet on a fixed moving vertical flat plate.

UNIT -IV
Hydraulic turbines: types of turbines, impulse and reaction type (Concept only). Introduction and working of pelton wheel, Francis and Kaplan turbines. Performance of water turbines, Hydraulic Pumps : Introduction working and application of single acting reciprocating and single stage centrifugal pumps. Power requirements for these pumps

UNIT –V
Working and applications of Hydraulic press, Hydraulic ram, Intensifier, Hydraulic accumulator and Hydraulic jack.

THARMAL ENGINEERING
DME-303

Unit – I
I.C. Engines: Introduction, Classification of I.C Engines, Comparisons between S.I. and C.I. engines, petrol and diesel engines ,4-strock and 2-strock engines. valve diagram of 2- stroke and 4 – stroke C.I. engine Derivation of Air Standard efficiencies of Carnot cycle, Otto cycle and Diesel cycle . Simple numerical problems. Various components of I.C. engines, their functions and composition.

Unit – II
Systems In I.C. Engines:
Carburetion: Definition of carburettor, it function and classification. A/F Mixture requirements under different loads, Simple Carburettor, its limitations, Compensation in carburettors.

Ignition: Principal of mutual induction, Battery ignition system of 4-strock, 4- cylinder engine, Magneto ignition system, Spark plug, Ignition timings, Automatic ignition timing devices. Vacuum advance and centrifugal advance mechanism. Distributor less ignition system.

Cooling Systems: Necessity of cooling, properties of an efficient cooling system, Types of cooling systems, Air Cooling, Water cooling, Different methods of water cooling, types of radiators, Use of antifreeze compounds, Defects in cooling system and their rectification.
Lubrication : Functions of lubrication, Crank- case ventilation.

Unit – III
Combustion in I.C. Engines: General Combustion Theory, Normal combustion and flame front propagation, factors effecting flame speed, Rate of pressure rise. Abnormal combustion pre ignition, detonation Engine operating variables effecting detonation. C.I. Engines: Combustion in C.I engines, lgnition delay, Combustion knock in, Variables effecting ignition delay, Fuel Supply and Injection system in C.I. engines. Effect of pollutants from petrol and diesel engines on human beings and other materials . use of alternative fuels for automotive engines methyl and ethyl alcohols, Hydrogen, LPG,CNG, and biodiesel . Study of catalytic converters and hybrid systems.

Unit –IV
Air Compressor : Introduction and applications of compressed air, Classification of compressors, reciprocating compressors, single stage, single acting single stage, double acting single stage Multi stage air compressors. Best value for index of compression, Isothermal efficiency, Effect of clearance volume, volumetric efficiency work input in single stage and multi-stage compression, Rotary compressors, roots blower, Vane blower, Lysholm compressor, Screw compressor, Static and total head values, adiabatic and isentropic process, Centrifugal compressor , ratio of Compression in a centrifugal compressor, pressure coefficient , axial flow compressor, air motors , simple numerical problems based on the above topics**.**

Unit-V
Gas Turbines And Jet Propulsion : Introduction and applications of G.T., System operation, Advantage of gas turbine over other prime movers, classifications of gas turbines P-V., T-S, diagram of Brayton cycle advantage of closed cycle gas turbine over open cycle G.T. combustion chamber. Jet Propulsion, Turbo jet unit, Advantages and disadvantages of jet propulsion, thrust augmentation for turbo jet engines, Rocket propulsion, classification of rockets , solid propellant and liquid propellant rockets. simple numerical problems.

MACHINE DRAWING
DME 304

Unit-I
Threads (one sheet)
Screw thread nomenclature, different forms right hand and left hand
Nut and Bolts (one sheet)
Hexagonal and square hade d nut and bold.
Locking Devices & Screws (one sheet)
Different types of locking devices and screws.

Unit –II
Limits And fits (One Sheet)
Limit system tolerance, limits, deviation, allowance, basic size. Tolerances fundamental tolerances, fundamental deviation, method of placing limit dimensions.
Fits: Clearance fit transition fit. Interference fit hole basis system shaft basis system
Calculating values of clearance/interference, hole tolerance and shaft tolerance with given basic size for common assemblies like H7/g6, H7/m6 H8u7
Surface roughness: (One sheet)
Sketch of the following:
Introduction, actual profile, surface roughness number, indication of machining symbols and allowances. Indication of surface roughness symbols on drawing.

Unit III
Details of Assembling Drawing: practical exercises on drawing from details to assemble of the following .
I.C. engine Parts & Steam Engine : (2 Sheets)
Stuffing Box. Eccentric, connecting and rod I.C. Engine piston.
Boiler Mountings: (2 Sheets)
Non-Return Valves, Stop Valve, Blow of Cock.
Machine tool Parts :(02 Sheets)Screw Jack, Flanged coupling , Flexible type.

Books for references:
1. Machine Drawing by R.K. Dhawan (S. Chand publishers)
2. Machine Drawing by NarayanaKanaiha (Willey Publications)

COMPUTER APPLICATIONS
DCA-305

UNIT–I

Digital Computer systems, Characteristics, History, Computer Generations, Types of computers & their classifications, application of Computer in various fields, Computer Hardware & Software, Elements of computer hardware-CPU, I/O devices, storage media, Computer Software-Types of Software, System Software, Application Software.

UNIT-II

Basic concept & functions of an operating system, textual Vs GUI Interface, type of Operating Systems, concept of multiprogramming, multitasking, multiprocessing, Introduction to disk operating system (DOS), Commands and utilities, working with MS Windows, Unix and Linux, Working knowledge of PC Software Word Processor.

UNIT–III

Computer Languages, Generation of Languages, Translators- Assemblers, Interpreters, Compilers, Algorithm, Pseudo-code, Flowcharts- rules & symbols, Structured Programming concepts, various techniques of programming, Use of programming.

UNIT–IV

Introduction to 'C', importance of C, basic structure of a C program, constants, variables and data types, operators and expressions, managing I/O operators, Control Statement: 'IF' statement and its various forms, goto statement, for, while and do-while loops, switch decision making statement, Arrays: Array notation, storage and representation, Functions: user defined functions and their use.

FLUID MECHANICS LAB
DME-312

LIST OF EXPERIMENTS

1. To verify the Bernoulli's theorem and plot the following graphs:
   i.   Static head VS length of passage
   ii.   Velocity head VS length of passage
   iii.   Total head VS length of passage

2. To Determine   the coefficient of friction' f'' in a given pipe line using dracy's formula

3. To determine the coefficient of contraction Cc due to sudden contraction and enlargement in a given pipe line

4. To determine the coefficient of 'Kb in a given pipe line

5. To determine the coefficient of discharge Cd of á venture meter

6. To determine the values of hydraulic coefficient (Cc, Cv& Cd) through circular orifice.

7. To study the characteristic of centrifugal pump

8. To study the characteristic of pelton wheel turbine.

9. To determine the coefficient of discharge (Cd) through V- notch apparthus.

10. To determine the force exerted by a jet of water on a stationary vane.

THARMAL ENGINEERING
DME-313

LIST OF EXPERIMENTS

1. To conduct a performance test on a 2 stage reciprocating Air compressor and to determine its volumetric efficiency and isothermal efficiency.

2. To conduct a load test on a single cylinder 4 stroke diesel Engine and to study its performance under load .

3. To conduct a performance test on a 4 cylinder 4 stroke, Petrol engine to determine its efficiency and to draw the various performance curves.

4. To conduct mores test on 4- stroke 4 cylinder Petrol Engine and determine the indicated horse power (IHP) frictional horse power (FHP) and mechanical efficiency.

5. Study of Roots Blower of ammonia air conditioning plant by dismantling and assembling the Blower.

6. Study of single acting single cylinder reciprocating air-compressor by dismantling and assembling the Compressor.

COMMUNICATION SKILLS-II
DMES-401

UNIT	Topic	Marks
I.	Reading *a. Comprehension (Advanced)*	10
II.	Grammar *a. Direct & Indirect*	5
III.	Writing *a. Dialogue* *b. Paragraph*	15
IV.	Speaking - I *a. Presentation Skills*	15
V.	Speaking - II *a. Interview*	15

MANUFACTURING PROCESS –I
DME-402

Unit I: Manufacturing concepts, Manufacturing Processes, Pattern Making (Types of patterns, Patterns materials – relative advantages, Patterns allowances, Coloring codes for patterns, Introductions to cores and core boxes, Preservation and storage of patterns).

Unit-II: Introductions to moulding, Types of moulding sands and their properties, Synthetic sand moulds, Core materials, Core making, Position of cores, Types of core prints, Types of moulds, Gating systems, Moulding processes (Bench moulding, floor moulding, Pit moulding and Machine moulding), Melting furnaces (Pit furnace, Cupola furnace, Electrical furnace), Fettling of castings, Defects in casting and remedies

Unit-III: Working principle of Lathe machine, Description and function of main parts of centre Lathe, Specifications of Lathe, Lathe accessories and attachments, Lathe Tools (Types their angle and materials). Lathe operations (Plain turning, facing, different systems of taper turning, thread cutting, knurling, chamfering, grooving or necking, forming, drilling, boring, reaming, speed, feed and depth of cut, cutting fluid, safety guide lines for working on Lathe.

Unit-IV: Principle of drilling, classification of drilling machines and their description, operations performed on drilling machines, speeds and feeds during drilling, Types of drills and their features, drill holding devices, cutting fluid used in drilling

Principle of boring, Classification of boring machines and their description, Specifications of boring machines, Boring tools, Boring bars and boring heads, Alignment of bores and its importance

Unit-V: Introduction to shaping, Principle parts features and use of shaper, Specifications of a shaper, Quick return mechanism, Methods of job holding, Shaper tools- types, angles and materials, Operations performed on shaper, Description of slotter, its tools and uses, Drive mechanism of a slotter, Cutting fluid used in shaping and slotting.

Comparison of shaping and planning, Main parts and features of planer, its working and use, Specification of planer, Types of planer, Quick return mechanism of table, Planer tools, Job holding devices.

MECHANICS OF SOLID
DME-403

UNIT –I   Stresses and Strains
Concept of load, stresses and strains, Tensile, Compressive and shear stresses and strains. Concept of Elasticity , Elastic limit and Limit of proportionality, Hook's Law, Young Modulus of elasticity, nominal stress, Yield point, Plastic stage, Strain hardening, Ultimate strength and breaking stress, Percentage elongation, Proof stress and working stress, Factor of safety, Lateral strain, poisson's ratio, Volumetric strain, Shear modulus strain energy due to direct stresses, Proof resilience and modulus of resilience, Stresses due to gradual, sudden and falling load, Longitudinal and circumferential stresses in seamless thin walled cylindrical shells (derivation of these formulae not required)

Unit-II   Beam and Bending Stress
Bending and Shearing Force– Concept of beam, form of loading, Concept of end supports roller , Hinged and fixed, Concept of bending moment and shearing force, B.M. and S.F. Diagram for cantilever and simple supported beams with and without overhang subjected to concentrate and U.D.L. Determination of position of maximum B M & S.F in a beam, point of contra flexure

Bending Stresses- Concept of bending stresses, theory of simple bending , Use of the equation $\sigma/Y = M/I = E/R$, Concept of moment of resistance, bending stress diagram, calculation of maximum bending stress in beams of rectangular, circular, I and T section permissible bending stress section modulus for rectangular circular and symmetrical section. Comparison between I, rectangular and circular section with regard to their strength & flexural formula.

Unit-III   Columns
Concept of column, modes of failure, types of columns, Buckling load, crushing load, slenderness ratio, Factors effecting strength of a column, End restraints, Effective length , strength of column by Euler Formula without derivation, Rankin- Gourdan (without derivation)

Unit –IV   Torsion
Concept of torsion – difference between torque and torsion , Derivation and use of torque equation $T/J = I / R = G0/1$ for circular shaft, shear stress diagram for solid and hollow shaft, Comparison between solid and hollow shaft with regard to their strength and weight. Power transmitted by shaft, concept of mean and maximum torque.

Unit-V   Springs
Closed coil helical springs subjected to axial load, stress deformation, stiffness and angle of twist and strain energy, falling load on springs.
Slop and deflection
Simple cases of slope and deflection in simply supported beam with UDL on whole of the length and point load at the center , Cantilever with UDL on whole length and point load at the end(without derivation), Simple problems.
Combined direct and bending stresses: Simple cases of short columns of uniform section subject to eccentric loading with stress diagram.
Slope and deflection of beams, combined and bending stress.

MATERIAL SCIENCE
DME-404

UNIT-I
Classification of Materials; Thermal, Chemical, Electrical and Mechanical Properties of Materials, structure of materials, metallic bonding, solid solution and their types, Uniary and Binary diagrams, Phase rule, degree of freedom ,Types of equilibrium diagrams. Concept of unit cell space lattice, Bravaislattices, common crystal structures, Atomic packing factor and density. Imperfections & Defects in crystal structures

UNIT-II
Ferrous materials, Manufacture of Pig Iron, Wrought Iron, Cast Iron and Steel, Various types of Cast Iron(White, Malleable, Grey, Mottled, Modular and Alloy) and their usage types of carbon steels, alloy steels and its properties and uses. Effect of different alloying elements on the properties of steel. Iron carbon diagram

UNIT-III
Heat Treatment, Purpose of Heat Treatment, Various types of heat treatment processes such as Annealing, Normalizing, Quenching, Tempering and Case hardening (carburizing, nitriding, cyaniding, induction hardening, flame hardening). Time Temperature Transformation (TTT) diagrams.

UNIT -IV
Non-Ferrous metals and alloys : Properties and Uses of Aluminium and Al Alloys(Duralumin, Y alloy etc), Properties and Uses of Copper, various types of brasses and bronzes, Properties and Uses of Zinc& Zinc Alloys, Properties and Uses of nickel and nickel Alloys; Bearing Metals.

UNIT-V
Miscellaneous materials: Plastics (Thermoplastic and Thermo-set), Ceramics (types, properties and applications).
Various Heat Insulating Material and their Usage(Asbestos, Glass Wool, Thermocole, Cork), refractory materials.

Text books
1. Text book of Material Science, R.K. Rajput, Kaston Pubs.
2. Text book of Material Science, Varinder Kumar, Eagle Publisher.
3. Material and metallurgy by O.P. KhannaDhanpatrai& sons

THEORY OF MACHINE
DME-405

UNIT-I   Simple Mechanisms
Introduction to link, kinematic pair, lower and higher pair, Kinematic chain, mechanism, Inversions. Inversions of slider crank chain. Velocity and acceleration in mechanisms (instantaneous Centre method and relative velocity method), Kennedy's theorem, Coriolis component of acceleration

UNIT-II   Friction
Definition and its necessity, Horizontal force required to move a body on an inclined plane both upward   and downward, Frictional torque in screws (both for square and V threads), Screw jack (Simple numerical only). Friction in pivots and collars, power lost in friction in pivots and collars (derivation and simple numerical), introduction to clutches, disc clutches, conical clutches and centrifugal clutches (simple numerical)
Different types of bearings and their application

UNIT-III Power Transmission
Introduction to Belt and Rope drives, Types of belt drives and types of pulleys, Concept of velocity ratio, slip and creep; crowning of pulleys, Flat and V belt drive, Ratio of driving tensions, H.P. transmitted, centrifugal tension, and condition for maximum horse power, Different types of chains and their terminology Gear terminology, types of gears and their applications; simple and compound gear trains, epicyclic gear trains.

UINT-IV Flywheel
Principle and applications of flywheel(engines and power press), Turning moment diagram of flywheel for different engines, Fluctuation of speed and fluctuation of energy, Coefficient of fluctuation of speed and coefficient of fluctuation of energy, determination of the mass of flywheel.
Governor
Principal of governor, Simple description and working of Watt, Porter and Hartnel governor (simple numerical based on watt and porter governor), Hunting, isochronisms, stability, sensitiveness of a governor

UNIT-V   Balancing
 Concept of balancing, Introduction to balancing of rotating masses, balancing of rotating masses in the same plane, concept of reference plane, balancing of rotating masses in the different planes.(simple numerical
Vibrations :
Types of vibrations longitudinal, transverse and torsional vibrations, Dampening of vibrations, concept of free and force vibrations free, natural frequency of vibrations, (simple numerical)
Causes of vibrations in machines, their harmful effects and remedies

RECOMMENDED BOOKS
1.   Theory of Machines by D.R. Malhotra; SatyaPrakashan, New Delhi.
2. Theory of Machines by V.P Singh; DhanpatRai and sons, New Delhi.
3. Theory of Machines JagdishLal; Metropolitan Publishers, New Delhi.
4.   Theory of Machines by Bharat Bhushan& Jindal., Ishan Publication
5.   Theory of Machines by R. S KhurmiSchand publication, New Delhi

MANUFACTURING PROCESS –I
DME-412

PRACTICAL EXERCISES / PRACTICE

MACHINE SHOP
1. Lathe -job mounting and tool holding devices
2. Turning practice involving straight and steps turning, facing, chamfering, parting forming and drilling.
3. Drilling
4. Boring
5. Slotting
6. Planning

PATTERN MAKING SHOP
1. Introduction to pattern making tools and equipment.
2. Preparing single solid pattern with allowances, method of finishing pattern.
3. Preparation of split and loose piece pattern with all allowances.
4. Making pattern with core print and preparing a core box.
5. Use of wood working machines for pattern making.

FOUNDRY SHOP
1. Introduction to tools and equipment in a foundry shop.
2. Preparation of moulding sand to prepare open sand mould of a simple pattern.
3. To prepare floor mould using cope, cutting gates and risers.
4. To prepare a mould of split pattern in cope and drag.
5. To prepare a mould of step pulley and prepare the core for the same.
6. Prepare a mould in three moulding boxes.
7. To operate a pit furnace, melt metal in a crucible and carry out the pouring in a mould to get a casting.
8. Study defects in castings.

FITTING SHOP
Least count and other instrument
 Advance Fitting Practice

Note:
*   An expert may be invited from the industry to deliver the lecture.
**   An industrial visit may be planned to explain and show the facilities of the industry
***   Making a record of exercise / job completed by the student in a part of the work for
Internal evaluation.

MECHANICS OF SOLIDS LAB
DME-413

List of practical

1. Tensile test on bars of Mild steel and Aluminum.

2. Shear test of specimen of two different metals.

3. Bending test on a steel bar or a wooden beam.

4. Impact test on metals –(a) Izod test (b) Charpy test

5. Torsion test on specimens of different metals for determining the angle of twist for a given torque.

6. To determine thestiffness of a helical spring and to plot a graph between load and extension .

7. Hardness test on mental and finding the Brinel and Rockwell hardness.

LIST OF EXPERIMENTS

1. Identification of materials from fifty items in a box

2. Study of a metallurgical microscope

3. Study of heat treatment furnaces and heat treatment process

4. Study of a wet grinding apparatus

5. Study of thermocouple/pyrometer used in heat treatment furnaces

6. Identification of metals through sound and spark test

7. Study of a diamond polishing apparatus

8. To prepare a specimen for microscopic examination under a metallurgical microscope

THEORY OF MACHE LAB
DME-415

LIST OF EXPERIMENTS

1. Study of simple linkage models/mechanisms

2. Study of inversions of four bar linkage

3. Study of inversions of single/double slider crank mechanisms

4 Study on Gears tooth profile, interference etc.

5. Study on Gear trains

6. Experiment on longitudinal vibration

7. Experiment on transverse vibration

8. Study on dead weight type governor

9. Study of centrifugal type governor

COMPUTER AIDED DESIGN & MANUFACTURING
DME-501

UNIT-I   Introduction:
Introduction to CAD/CAED/CAE/CIM, Elements of CAD and CAM, Essential requirements of CAD, Concepts of integrated CAD/CAM, Necessity & its importance, Engineering Applications CAD/CAM systems, Graphics Input devices-cursor control Devices, Digitizers, Keyboard terminals, Image scanner, Speech control devices and Touch, panels, Graphics display devices-Cathode Ray Tube, Random & Raster scan display, Colour CRT monitors, Direct View Storage Tubes, Flat Panel display, Hard copy printers and plotters

UNIT-II   3D Graphics:
Polygon surfaces-Polygon mesh representations, Quadric and Superquadric surfaces and blobby objects; Solid modeling-Solid entities, Fundamentals of Solid modeling-Set theory, regularized set operations; Half spaces, Boundary representation, Constructive solid geometry, Sweep representation, Color models, Application commands for AutoCAD &ProE software

UNIT-III   Finite Element Method:
Introduction, Principles of Finite elements modeling, Stiffness matrix/displacement matrix, Stiffness matrix for spring system, bar & beam elements, bar elements in 2D
space (truss element)
CAD of Machine Elements
Basics of programming in MatLab, writing a program in MatLab for machine elements like shaft, keys, couplings, knuckle joint, welded joints etc.

UNIT-IV
Fundamental of Numerical Control, elements of NC machine tools, classification of NC machine tools, Advantages, suitability and limitations of NC machine tools, Application ofNC system. Manual (word address format) programming. Examples Drilling, Turning and Milling,Canned cycles, Subroutine, and Macro. APT programming.Geometry, Motion and Additional statements, Macro- statement.CNC, DNC, FMC, FMS, CIM, Concepts of AGV &Robots

UNIT-V   System Devices
Introduction to DC motors, stepping motors, feed back devices such as encoder, counting devices, digital to analog converter and vice versa.
Control of NC Systems
Open and closed loops. Control of point to point systems- Incremental open loop control, Incremental close loop, Absolute close loop; Control loop in contouring systems;
Adaptive control

Books/References-
1. Computer Aided Manufacturing by Kundra and Rao
2. Computer control of Manufacturing systems by Koren   TMH
3. Computer Aided Engineering Design by AnupamSaxena&B.SahayAnamaya Publishers
4. CAD/CAM by HPGroover& EW Zimmers, Jr.Prentice Hall India Ltd.
5. CAD/CAM Theory and Practice by Ibrahim Zeid& R Sivasubramaniam McGraw Hill
6. Computer Aided Design by RK SrivastavaUmesh Publications

MANUFACTURING PROCESSES – II
DME-502

Unit-I   METAL FORMING PROCESSES:

Die stamping, Rolling,Wire drawing, Sheet metal spinning, Extrusion (direct and indirect),Forging,Tubedrawing,Powder Metallurgy.

Unit-II   MILLING:

Introduction of milling, Type of milling machines, principle of working, Description and construction of universal milling machines, specifications of milling machine, Milling operations, Milling cutters, Cutting speed, feed, depth of cut, Material removal rate, Indexing, Universal dividing head, indexing plate, Type of indexing methods – simple, compound, differential and angular (Simple numerical).

Unit –III   ADVANCE WELDING TECHNIQUES:

Welding principle, process, equipment used, advantages, limitations and applications of submerged arc welding, TIG welding, MIG welding, Laser beam welding, Atomic Hydrogen welding, Thermite welding, welding defects, Testing and inspection of welding joints, Defects in welding joints, Soldering and Brazing, Advantages, limitations and applications of soldering ad brazing.

Unit- IV   GRINDING:

Types of grinding machines and their working – cylindrical, surface centreless tool and cutter grinder, jig grinder, Shapes of grinding wheels, Various elements of grinding wheel – abrasive grade, structure, bond, Codification of grinding wheel, Dressing, truing, balancing and mounting of grinding wheel, selection of grinding wheel, Honing process: its applications, Brief idea of lapping machines, lapping process, its applications, Polishing, Buffing.

JIGS AND FIXTURES: Importance and use of jigs and fixtures, principles of location, locating devices, purpose of clamping elements, types of clamps, Types of drilling jigs and milling jigs

WORKING WITH PLASTICS: Industrial uses of plastics, situation where used, Injection moulding principle, working of injection moulding machine, Compression moulding principle, working of compression moulding machine, potential and limitations in the use of plastics.

Unit- V   MODERN MACHINING METHODS :

Electro discharge machining, Electric chemical machining, Ultrasonic machining, Laser beam machining, Plasma arc machining, Abrasive jet machining, Introduction t NC & CNC MACHINES: working of NC machine tools, Classification of NC MACHINE tools, programming for NC machine, advantages of NC machines: CNC AND DNC; Transfer machines and their types.

ESTIMATING AND COSTING
DME-503

Unit-I

Definition and importance of Estimating and Costing, Estimating Procedure Elements of Cost : Direct material, direct labour, direct expenses, Overhead expenses. Ladder of Cost: Prime cost, production cost, factory cost, ultimate cost, selling price. Exide and Variable Cost: Fixed cost, depreciation and interest, operations, charges, supervisory charges. Variable cost, power /fuel consumed, tooling (for machine tools), consumable stores and spares. Calculation of hourly cost of running and maintenance of machines. Machines tools, Numerical problems.

Unit-II

Cycle time unit time and total time, set up time, operation time and tear down time. Operational allowances for calculation of standard time (personal, fatigue, tool sharpening of changing, checking and allied operations) machining time calculation for all lathe operations, drilling, shaping planning, milling and grinding. Numerical problems.

Unit-III

Welding (Electric arc welding and gas welding) Estimation of gas welding and cutting cost, Estimation of arc- welding cost, factors affecting welding cost electrodes Consumed, Power consumed, gas consumed calculation of welding charges.

Forging: Forging operations and losses Estimation of net weight Estimation of losses(e.g tong loss, scale loss, flash loss, shear loss sprue loss) Estimation time. Simple problem related to forging operation and cost.

Unit-IV

Salvage value of different machine tools and equipment's To draw detailed dimensioned/views (full and sectional for Common mechanical devices such as M/c vice, Screw jack Spur gear, engine pats (fuel injector, fuel pump and simple jet carburettor) Production M/c parts (tail stock , tool post elc.) Specifications of material for these parts.

Unit-V: Depreciation: Definition methods, Salvage value , Price, Determination of salvage value reserve price machinery and equipment's

AUTOMOBILE ENGINEERING
DME-504

Unit-I

Introduction: Classification of vehicles on the basis of load, drive, fuel used, position of engine, axles, steering, transmission, suspension and body. Layout of an automobile chassis. Function of major Components of a vehicle and introduction to their different systems such as frame, Clutch, gear box, braking system, front axle, steering and suspension system, final drive.

Power Plants: Performance parameters and characteristics-engine power, mean effective pressure, efficiencies, torque, specific fuel consumption, mean piston speed, specific output, A/F ratio etc. Engine performance characteristics (RPM Vs Horse Powers ,mean effective pressure, fuel consumption)

Multi-cylinder Engine: Firing order, power balance charts.

Engine components – Piston , Connecting rod , Crank shaft, Bearing and Journals , Flywheel , Cam shaft, Valve gear, Cylinder Block, Cylinder head, Manifold , Ignition System, Spark Ignition engines and related components, Injection system of diesel engine, engine lubrication

Unit-II

Transmission System: Resistances affecting the movement of a vehicle, wind, gradient, rolling ,resistance, tractive effort. Single plate and multi plate clutches, Gear box and its types-sliding mesh & constant mesh gear boxes, synchronizing unit, fluid coupling , brief introduction to automatic transmission. Overdrive and torque converter.

Final Drive: Function and working of universal joints, propeller shaft final drive and differential, rear axle

Unit-III

Electrical System: lighting system , Dash board instrument Horn, charging circuits line diagram of electrical system of a car, function and working principle of a self-starter or cranking motor, drives: bendix drive & overrunning clutch drive, dynamo., alternator, battery function and storage of cells .

Braking system: Function and principle of braking system, classification of brakes:mechanical brakes, hydraulic brakes, internal expanding brake shoes, brake drum, disc brakes, braking materials, wheel cylinder, master cylinder. Bleeding and adjustment of hydraulic brake.

Unit-IV

Steering System: Introduction, layout of steering system, steering gear box and linkages. Ackermann's steering mechanism, factors affecting steering, Introduction to power steering. Wheel alignment & steering geometry: Castor, Camber, king pin inclination, included angle, toe-in & toe-out.. Under steering & over-steering.

Unit-V

Frame &suspension: Frame and frame-less construction, description of suspension system as leaf springs, coil springs and torsion bar, function and working of shock absorber (telescopic).Front axle-Live and dead front axle, stub axle: Elliot and Lamoin stub axle .

Tyres and Tubes :Tyres-Types, specification, and causes of wear and their remedies.

RENEWABLE ENERGY SOURCES
DME-505

UNIT-I
Energy resources and their utilization:
Indian and global energy sources, Energy exploited, Energy planning, Energy parameters (energy intensity, energy-GDP elasticity)

Solar radiations:
Solar radiation on earth, Extra terrestrial radiation, Spectral distribution, Solar constant, clarity index, Measurement of solar radiations, Solar radiation geometry, Latitude, Declination angle, Surface azimuth angle, Hour angle, Zenith angle, Solar altitude angle, Local apparent time, Apparent motion of sun, Day length, solar radiation data for India

UNIT-II
Solar energy:
Introduction, Solar Thermal collectors, Flat plate collector, Parabolic Trough collector, Parabolic Dish collector, Heliostats, Solar Central receiver, limitation of solar energy, Applications of solar energy Solar still (single and double slope, Water heater, Cookers, Dryers.

Solar photovoltaic system:
Introduction to Photo-Voltaic system, merits & demerits of P-V system, Principle of P-V cell,V-I characteristics of a solar cell, Efficiency of solar cells, PV hybrid system.

UNIT-III
Biomass:
Introduction, Raw materials, Biomass conversion techniques, Biomass resource development in India.

Biogas:
Introduction to biogas generation, Classification of Biogas digesters, KVIC digester, Bio gas applications

Wind energy:
Introduction, Properties of wind, Availability of wind energy in India, Merits and limitations of wind energy, Wind machine fundamentals, Three blade Horizontal axis wind turbine, and Verticalaxis Darrieus rotor wind turbine, Selection of a wind mill

UNIT-4
Magneto-hydrodynamics (MHD) Energy:
Introduction, Basic Principles of MHD generation, advantages of MHD generation
Fuel cells power plants:
Introduction, Principle and operation of fuel cell, acidic and alkaline electrolyte fuel cells, Advantages and disadvantages of fuel cell
Hydrogen Energy:
Properties of hydrogen in respect of it's use as source of renewable energy, Sources of hydrogen, Production of hydrogen, Storage and transportation, Problems with hydrogen as fuel

UNIT-5
Geothermal energy:
Introduction, Geo thermal resources, Principal of working, Types of geothermal station with schematic representation.

Tidal power:
Introduction, Tides and waves as sources of energy, Fundamentals of tidal power, Use of tidal energy, Limitations of tidal energy conversion systems
Ocean energy;
Introduction, Principle of ocean thermal energy conversion, open cycle OTEC, closed cycle OTEC

Books / Reference:

1. S. Rao, B. B. Parulekar, "Energy Technology" Khanna Publishers New Delhi
2. BansalKeemann, Meliss," Renewable energy sources and conversion technology", Tata Mc Graw Hill.
3. Rai G.D, "Non-Conventional energy Sources", Khanna Publishers New Delhi.
4. Ashok V. Desai, "Nonconventional Energy", New Age International Publishers Ltd

MANUFACTURING PROCESS-II LAB
DME-512

PRACTICAL EXERCISES / PRACTICS

MACHINE SHOP:

LATHE - Exercise on Lathe involving taper turning by swiveling compound rest and tail stock off set, exercise on making V- Threads, exercise on profile turning, Knurling, exercise on form turning.

SHAPER – Introduction to parts and operations of shaper, shaper tools, job holding methods and safety precautions, Exercise on shaping horizontal and vertical surfaces, Make a hexagon from round bar.

SLOTTER - Introduction to parts and operations ofslotter, tools and job holding methods and safety precautions, Exercise involving cutting of key ways and slots.

PLANER – Introduction to parts and operations of a planer, Exercise involving planning of casting.

DRILLING - Introduction to parts and operations of drill machine, drills, job holding methods and safety precautions, Exercise involving different diameters holes in a given MS flats.

GRINDING PRACTICE – Introduction to parts and operations of a cylindrical surface grinder, tool and cutter grinder, grinding a job to close tolerances on surface grinder, grinding milling cutter on tool and cutter grinder.

Note:
* An experts may be invited from an industry to deliver expert lecture.
**   Relevant industrial visit may be planned.
*** Making a record of exercises / job completed by the student is a part of the work for Internal evaluation.

AUTO CAD LAB
DME- 513

1. Fundamentals of AutoCAD

2. Dimension & annotations

3. Use of Layers

4. Working with constraint in dimension

5. Creating assembly

6. Axi-symmetrical parts

7. Creating surface features

Drawing of the following using AUTOCAD: (Any two)

1. Projection of solids

2. Nut & bolt and Fasteners

3. Cotter joint

4. Expansion joint

5. Shaft coupling

Text Books:
1. Machine Drawing with AutoCAD by Goutam Pohit and Goutam Ghosh, Pearson
Education
2. Machine Drawing includes AutoCAD by Ajeet Singh, Tata MacGraw Hill

Reference Books:
1. Engineering Drawing and Graphics using AUTOCAD by T.Jayapoovan, Vikas Publishing
2. Engineering Drawing and Graphics + AutoCAD by K.Venugopal, New Age International

AUTOMOBILE ENGINEERING LAB
DME-514

LIST OF EXPERIMENTS

1. Study of 4 –Stroke Cycle Petrol Engine

   Indentify various parts & study their functions
   Working cycle & P-V diagram (Otto Cycle)
   Actual & theoretical valve   timing diagram and comparison.

2. Study of 4 Stroke Cycle diesel Engine.

   Identify various parts & study their functions
   Working cycle & P-V diagram (Diesel Cycle)
   Calculation of cooperation ratio

3. Study of 2 Stroke Cycle Petrol Engine.

   Identify various parts, stock, and port & study their functions,
   Port timing diagram
   Petro-oil system
   Splash system

4. Study of Battery Ignition system for 4 –Cylinder SI engine

5. Study of Cooling system in IC Engine

Air –cooled engine, Water cooled engine

6. Study of Lubricating System in 4 stroke Cycle I.C. engine.

   Pressure feed system and splash system
7. Study of Clutch

   Single plate clutch
8. Study of Synchromesh and sliding mesh 4 speed Gear Box

   Determination of speed ratios in I st , 2nd , 3rd gears

9. Study of Differential in vetches

10. Study of different type of Brakes: Mechanical and Hydraulic

RENEWABLE ENERGY SOURCES LAB
DME-515

LIST OF EXPERIMENTS:

1. Measurement of solar radiation on horizontal and inclined surfaces.
2. To determine the overall heat transfer coefficient for a fluid flowing through a cylindrical tube and verify it with the value determined by formula.
3. To find the transient variation in plate temperature in a flat-plate solar collector.
4. To find the efficiency and characteristic curve of a flat-plate solar collector in outdoor condition.
5. To study the heat and mass transfer for single slope solar still under outdoor condition.
6. To study the heat and mass transfer for distillation under outdoor conditions for a double slope solar still arrangement.
7. To study the performance of solar still coupled with flat-collector (active solar still).
8. To study the transient performance of a built in storage water heater.
9. To study the transient performance of solar water heater: forced circulation method.
10. To determine I-V characteristics of a solar cell.
11. To study the I-V characteristics of two solar photo voltaic (SPV) modules individual, connected id series and then in parallel under shaded and un-shaded conditions.
12. To determine the following pollutants in atmosphere: SPM, RSPM, NOX, SOX and CO.

INDUSTRIAL MANAGEMENT
DME-601

UNIT-I
Management, Industrial Management, Different functions of Management, Planning, Organizing, Co-ordination, Controlling, Structure of an Industrial Organization, Functions of different departments, Human relations and performance in organizations.

UNIT-II
Trade Union, Grievances, Handling of grievances, Agitations, Lockouts. Labour welfare. Workers participation in management. Labour laws and disputes. Wages: types of wages , wage & incentive plants .Factory act 1948, Payment of wages act 1936. Industrial dispute act 1947.

UNIT- III
Business ethics, Managerial ethics, Codes of ethics. Causes of accidents, Safety consciousness, Safety measures, Factors causing pollution, Effect of pollution on human health. Noise pollution.

UNIT-IV
Entrepreneurship Development, Entrepreneur, Modern concept of entrepreneur, Entrepreneurship, Qualities to becomes entrepreneur, Classifications of Entrepreneurs. EDP training. Small scale industry, Characteristics of small scale industries. Classifications of small scale industries. Project report guidelines, Content of project report, Project appraisal. Market survey. Preparation of project report. Role of financial institutions.

UNIT-V
Types of Production, Job, Batch, Mass production. Concept of Total Quality Management, six Sigma concept Just in Time (JIT), ISO-9000 and ISO-14000 series. Concept of intellectual property right and patents. Breakeven analysis, Marketing management, Price Analysis, Determination of Economic order Quantity

MACHINE DESIGN
DME-602

UNIT- I
Introduction
Definition, Design requirements of machine elements, Design procedure, Standards in design, Selection of preferred sizes, Indian Standards designation of carbon & alloy steels, Selection of materials for static and fatigue loads, Design against Static Load Modes of failure, Factor of safety, Principal Stresses, Stresses due to bending and torsion, Theories of failure.

UNIT- II
Bolted joints- Types of threads, types of screw fasteners, failure of bolted joints, Eccentric loaded bolted joints, Design of cotter and knuckle joint

Unit-III
Riveted Joints- Types of riveted joints, Failure of riveted joint, Efficiency of riveted joint, Design of boiler joints
Welded joints- Types of welded joints, design of welded joints, Eccentric loaded welded joint.

UNIT- IV
Shafts
Cause of failure in shafts, Materials for shaft, Stresses in shafts, Design of shafts subjected to twisting moment, bending moment and combined twisting and bending moments, Shafts bjected to fatigue loads, Design for rigidity

UNIT- V
Keys and Couplings
Types of keys, , Strength of sunk key, Couplings-, Meterias, Function and their design Design of rigid and flexible couplings

Text books
1.   Machine Design-Sharma and Agrawal, S.K. Katara& Sons
2.   Design of Machine Elements-V.B. Bhandari, Tata McGraw Hill Co
3.   Machine Design- R.S.Khurmi, S.Chand

References books:
1. Mechanical Engineering Design – Joseph E. Shigely, McGraw Hill Publications
2. Design of Machine Memebers-Alex Valance and VI Doughtie, McGraw Hill Co.
3. Machine design-M.F. Spott, Prentice Hall India
4. Machine Design-Maleev and Hartman, CBS
5. Machine design -Black & Adams, McGraw Hill

POWER PLANT ENGINEERING
DME-603

Unit-I
Introduction
Power and Power plant, Concept of power plant, Classification of power plants, Selection of power plant, Introduction to Power Corporation in India.
Power plant cycles: Rankine cycle, Reheat cycle, Regenerative cycle, Binary vapour cycle, Reheat-regenerative cycle, simple numerical

Unit-II
Economics of power generation
Introduction, cost analysis, estimation and prediction of load, factors affecting the economy and generation and distribution of power, Terms and definitions: Maximum demand, demand factor, diversity factor, load curve, load factor, capacity factor, utilization factor ,tariffs, Simple numerical

Unit-III
Steam power plant
General layout of a steam power plant, Coal handling system: belt conveyor, screw conveyor
 Pulverizing mills: Principle of impact mill, ball mill, roller mill, pulverized coal firing system,
Ash handling system: Pneumatic conveyor system and hydraulic system,
 Dust collection system: Principle of electrostatic precipitator (ESP) Feed water treatment
Condensers: surface condenser, simple numerical on condenser efficiency, vacuum efficiency, and requirement on cooling water, Safety methods

Unit-IV
Diesel power plant
General layout, Components of Diesel power plant, Performance of diesel power plant, Comparative study of diesel power plant with steam, Safety methods
Gas turbine power plant
Introduction, general layout, Basic principle of open cycle and closed cycle gas turbine plants, cogeneration, combined cycle power plants, Safety methods

Unit-V
Nuclear power plant
Introduction, nuclear fission, nuclear fusion, nuclear chain reaction, Basic components of nuclear reactor, PWR, BWR, FBR, Nuclear waste disposal, Safety methods Importance of safety   precautions.
Hydro electric station
Introduction, layout of hydro-electric plants, essential components of hydro-electric plants, safety measures in hydro plants
Pollution and Control Methology: Identification of various pollutants and control methods
References
1. "Power Plant Technology" El-Vakil, McGraw Hill.
2. Power Plant Engineering by P.K. Nag, Tata McGraw Hill.
3. "Power Plant Engineering" A. K. Raja, AmitPrakashSrivastava, Manish Dwivedi, New Age Internation (P) publishers, New Delhi
4. "An Introduction to Power Plant Technology" G. D. Rai, Khanna Publishers Pvt. Ltd.

Metrology and Measurements
DME-604

Unit-I
Introduction: Introduction to instrumentation and measurement,
Definition of terms calibration, standards, generalised measurement systems, static and dynamic performance characteristics, Analysis of experimental data, concept of error, sources of error.
Devices and systems, Signal Display & Recording Devices, Concept of feedback; Open and closed loop control systems,

Unit -II
Sensors and Transducers:
Types of sensors, types of transducers and their characteristics, Transducers and devices for engineering applications, Measurement of pressure: Gravitational, directing acting, elastic and indirect type pressure transducers, Measurement of very low pressures, Measurement of displacement, Measurements of force and torque.

Unit-III
Strain measurement:Types of strain gauges and their working, strain gauge circuits, temperature compensation. Strain rosettes, calibration.
Temperature measurement: Thermometers, bimetallic thermocouples, thermistor and pyrometers
Vibration: Seismic instruments, vibration pick ups and decibel meters, vibrometers accelerometers

Unit-IV:
Standards of linear measurement, line and end standards.
Limit fits and tolerances. Interchangeability and standarisation,
Linear and angular measurements devices, Limit gauges classification, Taylor's Principle of Gauge Design.

Unit-V
Measurement of geometric forms like straightness, flatness, roundness.
Tool makers microscope, profile project autocollimator.
Interferometry: principle and use of interferometry, optical flat.
Measurement of screw threads and gears.
Surface texture: quantitative evaluation of surface roughness and its measurement.

References
1. Beckwith Thomas G., Mechanical Measurements, Narosa Publishing House, N. Delhi.
2. Doeblein E.O., "Measurement Systems, Application Design", McGraw Hill, 1990.
3. Kumar D.S., "Mechanical Measurements and Control", Metropolitan, N. Delhi.
4. Hume K.J., "Engineering Metrology", MacDonald and Co. 1963
5. Gupta, I.C., "Engineering Metrology", DhanpatRai& Sons, New Delhi, 1994
6. Sirohi, "Mechanical Measurement" New Age Publishers
7. Jain, R.K., "Engineering Metrology" Khanna Publishers
8. Jain, R.K., "Mechanical Measurement" Khanna Publishers

REFRIGERATION & AIR CONDITIONING
DME-605

Unit-I
Principals of refrigeration: Meaning of refrigeration, Refrigeration methods, Unit of refrigeration. Reversed cannot cycle and Bell Coleman Cycle. Heat Pump, coefficient of performance. Rating of refrigeration machines, refrigeration systems. Air refrigeration cycle, applications and its limitations, vapour compression cycle. P-H. Chart, effect of sub cooling and super heating, Effect of varying condensing and suction temperature on COP, Simple mathematical calculation with pressure enthalpy chars. Vapour absorption cycle and its applications.

Unit-II
Introduction to refrigerants and their desirable properties, primary and secondary refrigerants Nomenclature of refrigerants. Important properties of some common refrigerants such as R-11, R-22, R-502 R-134a. NH3 and brine. Environmental effects of refrigerants and need for alternatives refrigerants
Refrigeration Components and Controls. Function , type, Specifications and Constructional details of components and controls such as compressor, Condensers , throttling device evaporator, oil separator, accumulator, spray ponds, cooling towers Solenoid valve, thermostat low pressure and high pressure cut out. Solenoid value etc.

Unit-III
Psychometry: Gibbs Dalton's law of partial pressure, psychometric Properties , Enthalpy of moist air, psychometric processes,(e.g. Mixing of airstreams) representation of psychometric processes on psychometric chart. Working of simple problems solution based on Psy. Chart.
Metabolism in human body, Introduction to human comfort and comfort air- conditioning , physiological requirements of human body, Effective temperature. Applications of air-conditioning, factors affecting optimum effective temperature.

Unit IV
Description of various types of loads, Sensible and latent heat loads. Cooling and heating load calculations, Sensible heat factor (SHF) and by pass factor (BPF) of cooling and heating coil. Efficiency of cooling and heating coil, Apparatus dew point (ADP) Supply air and recirculated air, Air conditioning systems, Summer and winter A/C systems, Room air conditioner, Automobile A/C round the year system, Air distribution system, Simple description of filters, dampers, fans, blowers air ducts, air register (grilles) diffusers and strip heaters.

Unit-V
Miscellaneous: Principle of evaporative cooling, desert coolers, layout and working of ice plant and cold storage plant. Domestic Refrigerator, water cooler (Storage type), Deep freezer , Thermal insulating materials such as puff, glass wood etc.
Effect of moisture in a refrigeration system, Different methods of defrosting, Methods of removing moisture form the refrigeration system.
Books:
1. *Refrigeration and Air-conditioning*   *By R.K. Rajpoot*
2. *Refrigeration and Air-conditioning*   *By C.P. Arora*
3. *Refrigeration and Air-conditioning*   *By Dr. S.S. Thipse*
4. *Refrigeration and Air-conditioning*   *By S. Domkundwar*

METROLOGY AND MEASUREMENT LAB
DME-614

List of Experiments:

Minimum 8 out of following (or such experiments)

1. Measurement of effective diameter of a screw thread using 3 wire method.

2. Measurement of angle using sinebar& slip gauges, Study of limit gauges.

3. Study & angular measurement using level protector

4. Adjustment of spark plug gap using feeler gauges.

5.   Study of dial indicator & its constructional details.

6. Use of dial indicator to check a shape run use.

7. Study and understanding of limits, fits & tolerances

8. Study of Pressure & Temperature measuring equipment.

9. Strain gauge measurement.

10. Speed measurement using stroboscope.

11. Flow measurement experiment

12. Vibration/work measuring experiment.

13. Experiment on Dynamometers.

List of Experiments

1. Study of a vapour compression system

2. Study of refrigeration components with the help of cut section

3. To determine cop and cycle efficiency of refrigerator with the help of refrigerator trainer.

4. To study the actual and theoretical refrigeration cycle on p-h, diagram using refrigeration trainer.

5. To determine thermal energy balance at evaporator condenser and over all using refrigeration trainer.

6. To study the summer mode operation of the heat pump and calculate actual cop, theoretical cop and cycle efficiency of the given machine.

7. To study the winter mode operation of the heat pump and calculate EPR.

8. To determine cop and cycle efficiency of the system using capillary tube as an expansion device . using window A.C trainer.

9. To study the psychometric processes using window A/C trainer.

10. To determine the COP of refrigeration system used in ice plant trainer.

11. To determine the capacity of ice plant.

12. To study the gas charging process in the given refrigeration system.

13. To study the storage type water cooler.

14. To study the domestic refrigerator.

PROJECT
DME-620

Any one of the following Projects can be identified by a student or a group of students

1. **Manufacturing /fabrication**

2. **Service sector**

Specifications, Process, Methods, Summary, Estimating & Costing of the Project

Report contains information requirements, working capital, and cost of land running cost, manpower requirement and marketing methodology

INDUSTRIAL TRAINING & VISITS
DME-630

Industrial Training aims at exposing at exposing the students   to filed practices, size and scale of operation and work culture at practical sites. For this purpose students at the end of fourth semester are required to complete training on their own for a period of 4 weeks to any industry.

 Each student is supposed to study the material and technology used at site and prepares a detailed report of the observation of process seen by him/her the students will submit the report any long with report to the deptt.The teachers along with field supervisors   will conduct performance assessment of students. The components of evaluation will include the following.

  a) Punctuality and regularity   15%
  b) Initiative in learning new things.   15%
  c) Relationship with workers   15%
  d) Industrial training report.   55%