EVALUATION SCHEME FOR THREE YEAR
DIPLOMA COURSE IN MECHANICAL ENGG. – I YR.
(Self Finance)

S. No.	Theory Paper		Periods per week			Marks		
	Subject Code	Subject	L	T	P	Sessional	Univ. Exam	Total
1.	DEN-101	English	2	-	-	50	100	150
2.	DPH-102	Applied Physics	2	-	-	50	100	150
3.	DCH-103	Applied Chemistry	2	-	-	50	100	150
4.	DMA-104	Applied Maths-I	2	-	-	50	100	150
5.	DCE-105	Applied Mechanics	2	-	-	50	100	150
6.	DCE-106	Civil Engg.	2	-	-	50	100	150
7.	DEE-106	Electrical Engg.	2	-	-	50	100	150
8.	DME-108	Engg. Drawing	3	-	-	100	100	200
9.	DME-109	W/S Technology	2	-	-	50	100	150
		Total	**19**	**-**	**-**	**500**	**900**	**1400**

Practical Courses :								
1.	DPH-112	Applied Physics	-	-	2	50	50	100
2.	DCH-113	Applied Chemistry	-	-	2	50	50	100
3.	DCE-115	Applied Mechanics	-	-	2	50	50	100
4.	DCE-116	Civil Engg.	-	-	2	50	50	100
5.	DEE-116	Electrical Engg.	-	-	2	50	50	100
6.	DME-119	W/S Practice	-	-	4	50	50	100
		Total	**-**	**-**	**14**	**300**	**300**	**600**
		Grand Total	**19**	**-**	**14**	**800**	**1200**	**2000**

Note : *In theory two Sessional tests and one assignment accounted for the purpose of assessment in each year.*

EVALUATION SCHEME FOR THREE YEAR
DIPLOMA COURSE IN MECHANICAL ENGG. – II YR.
(Self Finance)

S. No.	Theory Paper		Periods per week			Marks		
	Subject Code	Subject	L	T	P	Sessional	Univ. Exam	Total
1.	DME-201	Thermal Engg.-I	2	-	-	50	100	150
2.	DMA-202	Applied Maths-II	2	-	-	50	100	150
3.	DME-203	Fluid Mechanics and Fluid Machines	2	-	-	50	100	150
4.	DME-204	Manufacturing Process-I	2	-	-	50	100	150
5.	DEE-205	Electrical Technology	2	-	-	50	100	150
6.	DME-206	Engg. Drawing-II	3	-	-	100	100	200
7.	DME-207	Materials and Metallurgy	2	-	-	50	100	150
8.	DCA-209	Computer Application	2	-	-	50	100	150
9.	DCE-210	Strength of Materials	2	-	-	50	100	150
		Total	**19**	**-**	**-**	**500**	**900**	**1400**
Practical Courses :								
1.	DME-211	Thermal Engg.-I	-	-	2	50	50	100
2.	DME-213	Fluid Mechanics & Fluid Machines	-	-	2	50	50	100
3.	DME-214	Manufacturing Process–I	-	-	3	50	50	100
4.	DEE-215	Electrical Technology	-	-	2	50	50	100
5.	DCA-219	Computer Application	-	-	2	50	50	100
6.	DCE-220	Strength of Material	-	-	2	50	50	100
		Total	**-**	**-**	**13**	**300**	**300**	**600**
		Grand Total	**19**	**-**	**13**	**800**	**1200**	**2000**

Note : *In theory two sessional tests and one assignment accounted for the purpose of assessment in each year.*

EVALUATION SCHEME FOR THREE YEAR
DIPLOMA COURSE IN MECHANICAL ENGG. – III YR.
(Self Finance)

S. No.	Theory Paper		Periods per week			Marks		
	Subject Code	Subject	L	T	P	Sessional	Univ. Exam	Total
1.	DME-301	Dynamics of Machine	2	-	-	50	100	150
2.	DME-302	Manufacturing Process- II	2	-	-	50	100	150
3.	DME-303	Estg. Costing & Drawing	4	-	-	100	100	200
4.	DME-304	Thermal Engg.-II	2	-	-	50	100	150
5.	DME-305	Machine Design	2	-	-	50	100	150
6.	DME-306	Automobile Engg.	2	-	-	50	100	150
7.	DME-307	Refrig. & Airconditioning	2	-	-	50	100	150
8.	DME-308	Energy Sources	2	-	-	50	100	150
9.	DME-309	Entrepreneurship Development & Indl. Mgmt.	2	-	-	50	100	150
		Total :	**20**	**-**	**-**	**500**	**900**	**1400**

Practical Courses :								
1.	DME-312	Manufg. Process – II	-	-	3	50	50	100
2.	DME-314	Thermal Engg.-II	-	-	2	50	50	100
3.	DME-316	Automobile Engg.	-	-	2	50	50	100
4.	DME-317	Ref. & Airconditioning	-	-	2	50	50	100
5.	DME-320	Project	-	-	3	150	50	200
		Total	**-**	**-**	**12**	**350**	**250**	**600**
		Grand Total	**20**	**-**	**12**	**850**	**1150**	**2000**

Note : *In theory two sessional tests and one assignment accounted for the purpose of assessment in each year.*

EVALUATION SCHEME FOR FOUR - YEAR
DIPLOMA COURSE IN MECHANICAL ENGG. – III YR.
(Evening)

S. No.	Theory Paper		Periods / Week	Marks		
	Subject Code	**Subject**		**Sessional**	**Univ. Exam**	**Total**
1.	DEE-205	Electrical Technology	2	50	100	150
2.	DME-206	Engg. Drawing-II	3	100	100	200
3.	DCA-209	Computer Applications	2	50	100	150
4.	DME-301	Dynamics of Machine	2	50	100	150
5.	DME-302	Manufacturing Process-II	2	50	100	150
6.	DME-304	Thermal Engg.-II	2	50	100	150
7.	DME-305	Machine Design	2	50	100	150
		Total	**15**	**400**	**700**	**1100**

Practical Courses :						
1.	DME-214	Manufacturing Process-I	3	50	50	100
2	DEE-215	Electrical Technology	2	50	50	100
3.	DCA-219	Computer Applications	2	50	50	100
4.	DME-314	Thermal Engg.-II	2	50	50	100
		Total	**9**	**200**	**200**	**400**
		Grand Total	**24**	**600**	**900**	**1500**

Note : *In theory two sessional tests and one assignment accounted for the purpose of assessment each year. The practicals are based upon the content of theory courses.*

EVALUATION SCHEME FOR FOUR - YEAR
DIPLOMA COURSE IN MECHANICAL ENGG. – IV YR.
(Evening)

S. No.	Theory Paper		Periods / Week	Marks		
	Subject Code	Subject		Sessional	Univ. Exam	Total
1.	DME-203	Fluid Mechanics and Fluid Machines	2	50	100	150
2.	DME-303	Estimating , Costing and Drawing	2	50	100	150
3.	DME-306	Automobile Engg.	2	50	100	150
4.	DME-307	Refrigeration & Air-Conditioning	2	50	100	150
5.	DME-308	Energy Sources	2	50	100	150
6.	DME-309	Entrepreneurship Development & Indl. Mgmt.	2	50	100	150
		Total	**12**	**300**	**600**	**900**

Practical Courses :						
1.	DME-213	Fluid Mechanics and Fluid Machines	2	50	50	100
2.	DME-312	Manufacturing Process-II	2	50	50	100
3.	DME-316	Automobile Engg.	2	50	50	100
4.	DME-317	Refrigeration & Air Conditioning	2	50	50	100
5.	PME-320	Project	3	100	100	200
		Total	**11**	**300**	**300**	**600**
		Grand Total	**23**	**600**	**900**	**1500**

Note : *In theory two best sessional tests out of three will be accounted for the purpose of assessment. The practicals are based upon the content of theory courses.*

ENGLISH
DEN – 101

"Complete Course In English" by Robert J. Dixson **20 Marks**

CHAPTERS :

1. Two Thanks giving Day Gentlemen.
2. A Love Story.
3. The Gifts of Feoder Himkoff.
4. The Prince and The Judge.
5. Mr. Travers's First Hunt.
6. Portrait of a Teacher.

COMPOSITON

1.	Letter writing	**10 Marks**
2.	Technical Report	**10 Marks**
3.	Paragraph writing	**10 Marks**
4.	Construction of Dialogue	**20 Marks**

GRAMMER

1.	Direct to Indirect (speech)	**5 Marks**
2.	Change of Voice	**5 Marks**
3.	Transformation	**5 Marks**
4.	Tenses	**5 Marks**
5.	Comprehension (Passage)	**10 marks**

APPLIED PHYSICS

DPH-102

Unit – I

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

Surface Tension : Molecular forces, molecular theory of surface tension, surface energy, relation between surface tension and surface energy, angle of contact, shape of liquid surface in a capillary tube, rise of liquid in a capillary tube.

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

Unit – II

Electrostatics : Coulombs law, electric field, potential due to charge and number of charges, potential difference between two points, equipotential surface, 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 : Kirchoff's law, Application of Kirchoff's law to the Wheat-Stone bridge, post office box, meter bridge and potentiometer. Heating of effect of current-heat produced by electric current in a conductor and Joules law of electrical heating.

Unit – III

Electromagnetism : Biot-Savart law, magnetic field around a current carrying conductor and at the center of a circular loop, force experienced by a moving charge and a current carrying conductor in a uniform magnetic field, forces between two parallel current carrying conductor definition of 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 phyrometers. Expansions of solids - Concept of linear (α), spherical (β) and cubical (γ) expansion, relations among (α, β and γ).

Heat Transfer : Modes of heat transfer, coefficient of thermal conductivity and its determination by Searl's and Lee's disc methods, thermal conduction through compound media.

Optics : Huygen's principle, reflection & refraction of a wave at a plane surface, refraction through a prism, Lens formula, Principle of working and magnifying power of telescopes and microscopes.

Unit – V

Modern Physics : Atomic models J.J. Thomson model, Rutherfold model Bohars Model and its shortcomings, X-rays: production, properties and uses, LASERS types of lasers study of the He-Ne and Ruby lasers and their properties and applications.

Radioactivity : Natural radioactivity, half life, average life, mass defect & binding energy, nuclear stability, fission, fusion, energy generated in reactors and radiation hazard.

APPLIED CHEMISTRY

DCH - 103

Unit – I

Problems based on volumetric and gravimetric analysis.

Atomic Structure: Fundamental particles, Bohr's theory of electrons. Quantum numbers, electronic configuration of first thirty-six elements.

Electronic theory of valency: Electrovalency and covalency.

Polymerisation: Addition and condensation polymerisation, thermoplastic and thermosetting, examples.

Unit – II

Water Treatment: Hardness, units of hardness, estimation of alkalinity, free chlorine, chloride ions, dissolved oxygen and hardness, softening processes of hard water, sedimentation, filtration and sterilization.

Unit – III

Fuels: Classification of fuels, characteristics of good fuel, calorific value.

Solid fuels: Composition, properties and uses of peat, lignite, bituminous & Anthracite.

Liquid fuels: *Petroleum:* brief idea of refining into fractions with their uses and characteristics.

Gaseous fuels: Preparation, Properties, composition and uses of coal gas, producer gas, water gas and oil gas. Advantages and disadvantages of liquid, gaseous fuels over solid fuels. Combustion of gaseous, liquid and solid fuels. Problems, Analysis of flue gases.

Unit – IV

Corrosion: Its meaning, theory of corrosion, prevention of corrosion by various methods; metal and non-metal coatings.

Lubrication: Definition, theory and characteristics of lubricants (viscosity, viscosity index, oiliness, acid value and saponification value, cloud point, pourpoint, flash point and fire point). Effect of chemicals in lubricants, methods of lubrication.

Unit – V

Metals: Physical properties of cast iron and the effect of impurities such as sulpher, silicon, phosphorous on it.

Steel: Steel, Effect of carbon, nickel, chromium and manganese on steel. Elementary knowledge of its heat treatment, hardening, tempering, annealing, normalizing and case hardening.

Alloys: Definitions, classification and necessity of making alloys. Composition, properties and uses of brass, bronze, duralumin, gun metal, invar.

APPLIED MATHEMATICS-I

DMA-104

Unit-I

Algebra and Trigonometry

Algebra: Arithmetic progression, its n^{th} terms, sum to n terms. Geometric progression, its n^{th} term, sum to n terms and to infinity. Sum of the squares and cubes of finite natural numbers. Binomial theorem (without proof) for positive integral index (expansion and general term). Binomial theorem (without proof) for any index (expansion only). First, second Binomial approximation.

Trigonometry: Trigonometrical ratios of sum and differences of two angles. Multiple and sub-multiple angles, simple trigonometrical identities. Inverse trigonometric functions. Statement of cosine formula, sine formula, Napier's, half angle formula and its proof.

Unit-II

Coordinate Geometry : Cartesian coordinates, polar coordinates and their conversion to Cartesian formula. Area of a triangle. Coordinates of the centroid and incenter of a triangle. Simple problems on locus. Equations of straight lines in various forms. Intersection of two straight lines and angle between them. Perpendicular distance formula. General equation of circle, determination of radius and center. Simple problems. Definition of conic section, standard equations of parabola, ellipse and hyperbola and their simple problems.

Unit-III

Differential Calculus : Differential by first principle of x^n, sin x, cos x, log x and a^x. differential of sum, product and quotient function. Differential of function of a function, inverse trigonometric functions. Logarithmic differential. Successive Differentiation (excluding n^{th} order). Maxima and Minima. Equation of tangent and normal to a curve.

Unit-IV

Integral Calculus : Integration as inverse operation of differentiation. Simple integration by substitution, by parts and by partial fractions. Evaluation of definite integrals, properties of definite integrals. Application of Gamma function on simple problems. Area of plain curves, Volume of simple solids of revolution.

Unit-V

Differential Equation and Vectors : Order and degree of differential equations. Solution of differential equations of first order and first degree, variable separable. Homogeneous equations. Scalar and Vectors, addition and subtraction of vectors and their simple applications, multiplication of vector by a scalar. Scalar and Vector product of two vectors, Scalar triple product.

APPLIED MECHANICS
DCE-105

Unit–I

Introduction : Concept of Mechanics and Applied Mechanics, Explanation of Mechanics and Applied Mechanics, its importance and necessity, giving suitable examples on bodies at rest and motion, explanation of branches of this subject. Concept of rigid bodies.

Laws of forces : Force and its effects. Units and measurement of force. Vector representation. Bow's notation. Types of forces, action and reaction, tension and thrust and shear force.

Force system : coplanar, non-coplanar force systems. Free body diagrams. Resultant and components of forces. Concept of equilibrium. Parallelogram, Law of forces, equilibrium of two forces, super position and transmissibility of forces. Triangle of forces, different cases of concurrent coplanar two force systems, extension of parallelogram law and triangle law to many forces acting at one point. Polygon law of forces, method of resolution into orthogonal components for finding resultant, graphical methods.

Unit-II

Moments : Concept of moment, Varignon's theorem (statement only) Principle of moments, Application of moments to simple mechanism, Parallel forces, calculation of their resultant. Concept of couple-properties and effect, General cases of coplanar force system. General condition of equilibrium of bodies under coplanar forces, Lami's theorem.

Center of Gravity and Moment of inertia : Concept of gravity and center of gravity. Centroid for regular lamina and center of gravity for regular solids. Position of center of gravity of compound bodies and centroid of composite area. C.G. of reminders. Graphical determination of centroid. Concept of moment of inertia of regular bodies, rectangles and circles.

Unit-III

Motion: Concept of displacement, speed, velocity, acceleration, vector representation of velocity and acceleration, composition and resolution of velocities, Uniformly accelerated motion. Derivation of equations of motion and their application, motion of freely falling bodies. Relative motion. Relative velocity.

Laws of Motion: concept of momentum, Newton's Laws of motion, their application, derivation of force equation from second law of motion. Numerical problems on second law of motion. Piles, lifts, bodies tied with string. Newton's third law of motion, numerical problems. Conservation of momentum, impulse and impulse force.

Unit-IV

Work, Power & Energy: Review of the concept of the work, power & energy. Types of energy, conservation of energy. Horse-power, work done against gravity and work done against friction. Problems pertaining to all types of energy including the nuclear energy.

Circular motion: Curvilinear motion, angular velocity and acceleration, derivation of equation for angular velocity, relation between angular and rectilinear motion, concept of torque and angular momentum, Centripetal and centrifugal forces.

Unit-V

Simple Machines: Concept of machine, mechanical advantage, velocity and efficiency of a machine, their relationship, law of machine, Simple machine (lever, wheel and axle, pulleys, jacks, winch crabs only). Concept of friction, laws of friction, limiting friction and coefficient of friction. Friction in machines. Elasticity, stress, strain, Hook's law, Young's Modulus, Shear Modulus and Poisson's ratio elastic limit, Yield, Ultimate stress & breaking point.

CIVIL ENGINEERING
DCE-106

Unit – I

Elementary Surveying : Concept and Purpose of Surveying: Plane and Geodetic Surveys. Classification of surveys based on instruments used. Basic principles of surveying.

Chain Surveying: Principle and suitability, equipments used. Direct and indirect ranging. Selection of stations. Instruments used for setting out right angles. Cross staff survey, calculation of its area. Obstacles and erroneous length of chain.

Unit – II

Compass Surveying: Concept of bearings, systems of bearings. Use of prismatic compass, Magnetic dip, declination and local attraction.

Unit - III

Leveling: Concept of explanation of all terms connected with leveling work. Principle and constructional details of Dumpy level. Reduction of levels and maintenance of level field work. Error and precautions of leveling.

Unit – IV

Civil Engg. Materials: Properties and uses of bricks, stones, cement, limes and Mortars. Lime concrete and cement concrete. Timbers, Bitumen and Asphalt. Fire resistant materials. Anti-vibration and sound proofing materials.

Road Construction: Elements of road structure, Subgrade, subbase, base and surfacing; W. B. M. roads and surface dressing.

Unit – V

Building Construction: Selection of site to be used for the construction of a building; setting out works; various components of building (workshop, factories, power house) and its orientation, ventilation and distribution of water.

Elementary idea of Foundations with particular reference to Machine foundation: Damp proof course: General principle of brick and stone masonry; Floors and types of flooring with particular reference to industrial flooring; Roofs and Roof coverings, Trussed roofs for factories.

Electrical Engineering
DEE- 106

Unit 1 DC Circuit Analysis

Concept of electricity, basic terms – voltage, current, potential difference, power, energy and their units. Ohm's law, factors affecting resistance of metallic conductor, resistance in series and parallel, series and parallel grouping of cells, Kirchhoff's current law and Kirchhoff's voltage law, simple numerical problems.

Unit 2 AC fundamentals and AC Circuits

Important terminology related to AC fundamentals, representation of sinusoidal quantities by phasors, Phasor algebra, AC circuit containing pure resistance, pure inductance, pure capacitance, numerical problems.
RL, RC and RLC series and parallel circuits, series and parallel resonance, numerical problems.

Unit 3 Electromagnetic Induction

Faraday's law of electromagnetic induction, Lenz's law, Fleming's right hand rule and Fleming's left hand rule, principle of self and mutual induction, self and mutually induced EMF, dynamically induced EMF, self inductance, mutual inductance, coefficient of coupling, numerical problems.

Unit 4 Poly phase Circuits

Concept of generation of three phase voltage, advantage of three phase over single phase, Star and Delta connection (relationship between phase and line values current and voltage), expression for power measurement by two wattmeter, numerical problems.

Unit 5 Domestic Installation & Safety Measures

Distribution between light & fan circuits, single phase circuits, Sub circuits, Various accessories & part of installations, Types of Earthing, Functions of earthing, IE rules for electric installation & wiring, Common Safety

Reference book:

- Fundamental of Electrical Engineering by Ashfaq Husain
- Elements of Electrical Engineering by C R Dargan

(For Diploma in Mechanical Engineering Ist Year, Self Finance Course)

ENGINEERING DRAWING

DME-108

Unit – I

Basic Concepts : Introduction to Engg. Drawing, dimensions, lettering, use of drawing instruments, Drawing conventions as per IS: 696-1972 (revised). Scales-simple & diagonal symbols –Electrical, Electronics, Civil and Mechanical.

Unit - II

Plane Geometry : Construction of plane geometrical figures, parabola, ellipse, hyperbola, cycloid, epi-cycloid, hypocycloid, involute of base circle.

UNIT – III

Principle of projection. Orthographic projection of solids. Normal position and Inclined position. Development of surfaces of the simple solids conversion of isometric/pictorial projection to orthographic projection of simple objects. Isometric projection of solids and simple objects.

UNIT – IV

Building Drawing: Plan and elevation of a simple building.

Machine Drawing: Drawing and free hand sketches of machine components such as screwed fastening (nut & bolts) keys, knucle, cotter and riveted joint. Some practice in blue print reading of assembly drawing.

WORKSHOP TECHNOLOGY

DME-109

Unit – I

Carpentry: Timber, Classification of timber, Structure and defects, conversion and selection of timber, Seasoning and protection, plywood and its advantages, tools: Marking and measuring tools, Holding and supporting tools, Cutting tools, Planning tools, Striking tools, Boring tools and miscellaneous tools.

Unit – II

Fitting: Material for tools, Vices, V Block, Surface plate, Try square, Combination set, Files, Scrapers, Chisels, Hacksaw, Surface gauge, Universal surface gauge, Punches, Hammers, Callipers and Dividers.

Unit – III

Smithy: Tools and equipments, Hammers, Sewage block, Anvil, Tongs, Chisels, Hardie, Gauges, Fullers, Flatters, Set Hammer, open fire and stock fire, Fuel and blowers.

Processes forging, Upsetting, Welding, Defects in forging.

Unit – IV

Welding: 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: Various metal cutting machine and operations (sawing sharing, plain turning, drilling, grinding and milling).

THERMAL ENGINEERING – I

DME-201

Formatted

Unit – I

Basic Concepts : Definition of thermodynamics, State of a system, Path, Process, Cycle and medium, Concept of a system, Types of thermodynamic systems and properties of a system, Definition of thermodynamic property, Extensive and Intensive properties, Types of thermodynamic processes, Flow and nonflow process, Isothermal, Isochoric, Isobaric and Adiabatic process, Quasistatic process, Work done during a quasistatic process, Zeroth law of thermodynamics, First and second 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 on the above topics.

Unit – II

Properties of Gases : Concept of a perfect gas, Laws of perfect gases, Properties of gas mixtures, Expansion and compression of gases, First law of thermodynamics applied to nonflow processes, Isothermal, Isobaric, Isochoric, Isentropic (reversible adiabatic), Polytropic processes, First law applied to flow processes, Deriavtion of steady flow energy equation and its application to boiler, Turbine, Compressor, Nozzle and throttle valve, Concept of entropy, T-s diagram, Change of entropy of a perfect gas, Representation of reversible processes on T-s diagram, Simple numerical problems on the above topics.

Unit – III

Properties of Steam and Boilers : Formation of steam, Conditions of steam, Wet steam, Saturated, 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, use of Mollier charts, throttling process. Details of boiler for low and high pressure generation of steam, Both fire tube and water tube boilers, Comparison of fire tube and water tube boilers, Simple Vertical boiler, Cochron boiler, Lancashire boiler, Cornish boiler, Nestler boiler, Babcock and wilccx boiler, Critical temperature and pressure, Benson boiler, La-mont boiler, Loeffler 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, Weight of 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 for moving blades for 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 of steam turbine turbines, Throttle 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, basic equation of convection, Convection coefficient, Over all efficiency of heat transfer, Radiation, Absorption, reflection and transmission of radiation, Concept of black, white and opaque bodies, Emissive power, emissivity, Weien's law, Kirchoff's law Stefan-Boltzman law, Heat transfer between parallel black planes. Simple numerical problems based on the above topics.

APPLIED MATHEMATICS - II

DMA-202

Unit-I

Matrices and Determinants: Determinants (up to 3rd order only), minor, cofactor, properties of determinants. Solution of linear simultaneous equations (up to 3 equations) by Cramer's rule. Matrix addition, subtraction and multiplication. Inverse of a matrix. Solution of linear simultaneous equations (up to 3 equations) using matrix method.

Unit-II

Differential Equations and Statistics: Solution of linear differential equations of 1st order. Solution of linear differential equations of 2nd order with constant coefficients including particular integrals of forms e^{ax}, sin ax, cost ax, x^n, e^{ax}sin bx, e^{ax}cos bx, e^{ax} x^n.

Mean, Median, Mode and Standard Deviation.

Unit-III

Fourier Analysis: Periodical functions. Mathematical equations of square, sawtooth, triangular, half and full rectified waves, super position of sinusoidal waves.

Fourier Series : Even and odd functions. Fourier cosine and sine series.

Unit-IV

Laplace Transform: Definition of Laplace Transform, General Laplace Transforms of Algebraic, Trigonometric and other functions. Inverse Laplace Transform.

Applications of Laplace Transform in solving differential equations of 2nd order.

Unit-V

Complex Numbers: Complex number, representation (Argand diagram), Complex number in rectangular, polar form and conversion from one form to other. DeMovire's Theorem. Roots of a complex number.

FLUID MECHANICS AND FLUID MACHINES

DME - 203

Unit-I

Introduction : Concept of fluid, mechanics and hydraulics. Properties of fluid (viscosity, specific weight, specific volume, specific gravity and their units). Static Pressure: Pascal's law (with proof), static pressure, intensity of pressure and pressure head, total pressure and center of pressure on vertical and inclined plane surfaces, walls and gates. Measurement of Pressure: Atmospheric pressure, gauge pressure, vacuum pressure, absolute pressure and differential pressure. Piezometer tube, manometers (simple and differential type), Bourden's pressure gauge.

Unit-II

Flow of liquids: Types of flow (laminar and turbulent, steady and unsteady, uniform and non-uniform). Concept of Reynolds's number. Rate of discharge, continuity equation. Berroulli's theorem (without proof), its limitations and practical applications. Discharge through venturimeter and Pitot tube.

Flow through Orifice: Types, coefficients of orifice (C_d, C_v C_c), discharge through a small orifice, through a large rectangular orifice under submerged, partially submerged and free conditions, Time of emptying a tank of uniform area through an orifice at the bottom.

Unit-III

Flow through Pipes: Loss of energy due to friction, 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 syphon pipe. Water hammer concept. Impact of jet: on a fixed and moving vertical, inclined, hinged flat plate. On a series of flat plates. Work done and efficiency.

Unit-IV

Hydraulic Turbines: Types of turbines-impulse and reaction type (Concept only). Construction and working of Pelton Wheel, Francis and Kaplan turbines. Performance of water turbines. Unit power, unit discharge, unit speed and specific speed. Hydraulic Pumps: Construction, working and application of single acting reciprocating and single stage centrifugal pumps. Power requirements for these pumps, their common defects and remedial measures.

Unit-V

Construction, working and applications of hydraulic coupling, hydraulic press, hydraulic ram, Intensifier, hydraulic accumulator and hydraulic Jack.

Manufacturing Processes-I

DME-204

Unit – I

Pattern Making : Introduction to patterns, different types of patterns, pattern materials relative advantages, pattern allowances, introduction to cores and core boxes, colouring codes for patterns preservation and storage of patterns.

Unit – II

Foundry : Introduction to moulding, types of moulding Sand for synthetic sand moulds, core materials, core making, positioning of cores, types of core prints, types of moulds, Gating system, moulding processes; bench moulding, floor moulding, pit moulding, machine moulding, melting furnaces and pit furnace, cupola electrical furnaces. Defects in casting, and causes remedies, fettling of castings.

Unit – III

Forging : Introduction to forging, its applications, tools and equipment Forging Processes bending, upsetting, drawing swaging straightening fillering, caulking, punching and drifting, power hammer, Introduction to Drop Forging.

Unit – IV

Metal Forming : Forming, rolling wire drawing.

Sheet Metal Working : Sheet Metal joints, Why and where needed and types, General principle of sheet metal press working, deep drawing of sheets, sheet metal spinning.

Unit – V

Welding (Gas and Electric) : General characteristics of welded joints. Principle of welding. Types of welding processes and their brief description e.g. gas welding and arc welding, High pressure gas welding and low pressure gas welding, DC welding and AC welding. Brief description of resistance welding, spot welding, butt welding, seam welding submerge arc welding, thermit welding, insert gas welding, tungsten inert gas welding, MIG, atomic hydrogen welding.

ELECTRICAL TECHNOLOGY

DEE-205

Unit-I

Principle of Alternating Current And Ac Circuit, Principle of generation of alternating currents, comparison between AC and DC, concept of frequency and wave forms, Instantaneous r.m.s. value and their relationship, simple Numerical problems. Concept of phase difference, Representation of alternating quantities by phases. Concept of resistance, inductance and capacitance in simple AC circuits, R-L-C series circuits and power factor, Simple problems. Need for improving the power factor. Improvement of power factor by use of capacitor. Concept of 3-phase system, star and delta connection voltage and current relationship, power in 3-phase system, Simple problems.

Unit-II

(A) Transformer : Principle of working & construction of a single phase transformer, e.m.f. equation, transformation Ratio, Simple problems. Industrial applications of transformer, short circuit and open circuit tests, efficiency and regulation of transformer, simple problems on efficiency and regulation. Cooling of transformers, isolation transformer, CVT, Auto transformer (brief idea).

(B) DC Machines : Principle of working and salient constructional features of DC motors, performance characteristics of different types of DC motors, different types of motors and their practical applications, Simple Numerical problems.

Unit-III

(A) Synchronous Machines : Alternator: Working principle, type and constructional details. Synchronous Motor: Working principle and its applications.

(B) Induction Machines : Working principle and construction of 3-phase induction motors.

Types of induction motors, slip ring & squirrel cage. Slip & torque speed characteristics of induction motor, operation of induction machines as induction generator. Application of 3-phase induction machines. Concept of single phase induction motor & its applications.

Unit-IV

(A) Electric Heating : Advantages of electric heating, various methods of heating including dielectric heating, resistance oven. Simple description of electric furnace, direct arc furnace, Indirect induction furnace, Direct resistance furnace.

(B) Measuring Instruments : Principle and construction of instruments used for measuring current, voltage, power and Energy. Extension of range of Ammeter and voltmeter, simple Numerical problems.

Unit-V

(A) Batteries : Construction of lead acid battery, methods of rating, care & maintenance (simple problems).

(B) Basic Electronics : Basic idea of semiconductor, P and N type Diode, Zener diode & their applications, Transistors PNP & NPN their characteristics & uses. Characteristics & application of thyrister, characteristics and application of servo motors.

Engineering Drawing – II

DME-206

Unit – I

Sectional views of simple brackets : Pipe joints (i) flanged (ii) Spigot and socket (iii) Hydraulic (iv)Expansion joints. Knuckle joint, universal joint.

Transmission :

(i) Pulleys : (a) speed cone (b) Grooved pulleys for V-belt and ropes (c) Split pulley (d) Fast and loose pulley.

(ii) Gears conventional sections

(iii) Chain and sprockets – conventional sections.

Unit – II

Study & Preparation working drawing of the parts showing, Limits, fits and tolerance (b) Surface finish symbols, Couplings and clutches, Flexible and rigid couplings. Friction clutch (conical), Disc or plate clutch

Bearings : Bush bearing with ring lubricating device. Ball bearing with limits fits and tolerance and finish marks.

Detailed assembly drawing of the following :

Engine Parts : Piston (i) I.C. Engine and steam engine (ii) Grosshead (iii)Connecting rods (iv)Eccentric (v) Stuffing box (vi) Crank shaft and fly wheel (vii) Piston pin (viii)Oil scraper ring (with limits fits and tolerances and finish marks shown).

Valves : Stop valve stop cock, safety valve and blow off cock.

Materials and Metallurgy

DME – 207

Unit-I

Introduction to Engineering Materials : Introduction to properties of materials physical, Mechanical, Electrical, Thermal and corrosion resistance, structure of metals, type of solid solution, bonds, solidification of metals and alloys phase rule and phase diagrams.

Unit-II

Ferrous Metals and Alloys : Brief description of manufacture of Pig Iron, Cast Iron and steel. Introduction to structure space lattices, phases diagrams, Iron carbon diagram. Composition and uses of cast iron, and plain carbon steel. Effects of elements (in brief) such as sulphur, phosphorous nickel, aluminium chromium, nickel, cobalt, molybdenum, tungston, vanadium, copper, composition, properties and uses of alloy steels (High speed steel, stainless steel, silicon steel, spring steel heat-resistant steel).

Unit-III

Heat Treatment of Steel : Definition and object of heat treatment. Principal processes – Annealing, Normalising, Hardening and Tempering. Case hardening (carburising, Nitriding and Cyaniding, flame hardening and induction hardening) Effects of these process of structure and resulting properties.

Unit-IV

Non-Ferrous Metal and Alloys : Physical and chemical properties of aluminium and aluminium alloys (duralumin, Y-alloy) their applications. Physical and chemical properties of copper and copper alloys (brasses, bronzes). Bearing metals – requisite quality, composition, properties and uses of white metal, copper base bearing metals and aluminium alloys for bearing. Composition and uses of Zinc base alloys, Nickel base alloys and cobalt base alloys in Engineering applications.

Unit-V

Powder metallurgy Processes : Brief description, applications, advantages and disadvantages.

Refractory Materials : Description and uses of common types of high temperature metals and alloys, common ceramics and heat resistant materials.

Miscellaneous Materials : Compositions and applications of following Engineering Materials glass, fiber glass, rubber, asbestos, thermocole, glass wool, cork, nylon, teflon.

COMPUTER APPLICATION

DCA-209

Unit – I

Introduction: Digital computer, Brief History, Computer Generations, Types of computers & their classification, PC family, Application of computer in office automation, Science & Engineering, Hardware & Software system, Basic computer organization, Basic concept of data & information. Number systems, Decimal & Binary number systems, Data representation –Fixed point & floating point number representation. Introduction to networking, various types of network, software & Hardware, Internet.

Unit – II

Operating System & PC Softwares : Basic concepts & functions of an operating system, Disk operating systems, MSDOS, Directories & Files, Commands & Utilities, Batch file programming, Management of computer resources like Memory, CPU, I/O, Storage Computer Virus and protection, Familiarization with Windows structure & use. Working knowledge of PC Software Word processor, Spreadsheet, Database.

Unit – III

Numerical Analysis & Programming Techniques : Numerical Analysis – Iteration methods, Newton - Raphson method, Bisection method, Algorithm, Pseudo-codes, Flow charting – rules & symbols, Structured programming concept, Computer Language – Low level, High level & 4 Gls, Compilers, Interpreters, Object oriented programming, Need & Characteristics, Inheritance, Reusablity, Polymorphism, Overloading.

Unit – IV

C/C++ Programming : C/C++ - preliminaries Data types, operators, Expressions, Input/Output, Functions and program structure, Program control flow, looping, Arrays, String, Pointers, Structures, Unions, File handling, Functions & Pre-processor commands, Graphics functions, Common programming errors, Classes.

Unit – V

Computer Graphics : Introduction to Computer graphics, Graphics premitives, Computer aided drafting & design (CADD), Various CADD packages, Auto-CAD, Simple engineering drawing using auto-CADD, Graphic Function in C.

STRENGTH OF MATERIALS
DME-210

Unit-I

Stresses and Strains : Types of load, Types of stresses and strains. Tensile, Compressive and Shear Stresses and Strains. Concept of elasticity, elastic limit, limit of proportionality, Hooke's law, Young's modulus of elasticity, Nominal stress, Yield Point, Plastic stage, strain hardening, ultimate strength and breaking stress, Percentage elongation, Proof stress, working stress, Factor of safety, shear modulus. Poission's ratio, lateral strain, relation between e, ν & K. Composite sections; Temperature stresses in bars of uniform section (composite sections to be excluded), Strain energy due to direct stresses, proof resilience and modulus of resilience, stress due to a gradual, sudden and falling load. Compound stress, Principle stress & maximum shearing stress. Mohr's circle. Longitudinal and circumferential stresses in seamless thin walled tubes.

Unit-II

Bending Moment and Shearing Force : Types of loading, Concentrated, UDL and varying load, types of end supports, Roller, Hinged and Fixed. Concept of bending moment and shearing force; B. M. and S. F. diagrams; B. M. and S. F. diagrams for cantilevers and simply supported beams with and without overhangs subject to concentrated and UDL.

Bending Stresses : Bending stresses, theory of simple bending, bending equation, moment of resistance, bending stress distributions; calculation of maximum bending stress in beams of rectangular, circular, I and T sections, permissible bending stress. Section modulus for rectangular, circular and symmetrical I section. Comparison between I, rectangular and circular sections with regard to their strength.

Unit-III

Deflection : Simple cases of deflection in simply supported beams with UDL on whole of the length and a point load at the centre, cantilever with UDL on whole of the length and a point load at the end. Simple problems. Laminated Springs (Semi Elliptical type only), Determination of number of plates, Maximum bending stress and deflection.

Unit-IV

Columns : Concept of column, modes of failure, types of column, buckling load; crushing load; Slenderness ratio, Factors affecting strength of a column, End restraints, effective length. Strength of column by Euler's formula, Rankine Gordon formula. Combined Direct and Bending Stresses. Simple cases of short columns of uniform sections subjected to eccentric loading with stress diagrams.

Unit-V

Torsion : Concept of torsion. Derivation of Torsion equation. Shear stress diagram for solid and hollow circular shafts, comparison between solid and hollow shafts with regard to their strength and weight. Power transmitted by shafts. Concept of mean and maximum torque.

Springs : Close coiled helical springs subjected to axial load and twisting moment, stress, deformation, stiffness, Angle of twist and strain energy, Proof resilience.

THEORY OF MACHINES

DME-301

Unit-I

Simple Mechanisms : Definition of link, Kinematics pair, Higher and lower pairs, Kinematics chain, Mechanism, its inversions, machines. Simple Examples of mechanisms with lower pair, four-bar chain, slider-crank chain. Degree of freedom. Higher pairs-Cams and gears, etc.

Cams and Followers – Terminology and classification only.

Unit-II

(A) Fly Wheel : Principle and application of fly wheel, Turning moment diagrams of Fly wheels for different engines (simple problems), Fluctuation of speed and fluctuation of energy.

(B) Governor : Principle of a governor, Simple description and working of Watt, Porter and Hartnel governors. (No numerical)

(C) Balancing : Concept of balancing, Static & dynamic balancing, Introduction to balancing of rotating masses. (Simple Problems)

Unit-III

Friction, Bearing and Lubrication : Friction in nuts, screws, collars and pivots, Screw Jack (Simple numerical only), Concept and types of Clutches (single plate, multi plate and cone clutch) Friction in Journal bearings, Boundary and Film lubrication.

Unit-IV

Transmission of Power :

Transmission Screw : Power transmitted and efficiency.

Flat and V belt drive : ratio of tensions. H.P. transmitted, Centrifugal and initial tension. Condition for maximum horse power. Belt dynamometer. Gear terminology, types of gears and their applications, profile of gear teeth, Simple, Compound and epicyclic gear trains (Simple numerical problems).

Unit-V

Vibrations : Introduction to various types of vibrations Free, Forced, Longitudinal, Transverse and Torsional vibrations. Causes of vibrations in machines their harmful effects and remedies.

MANUFACTURING PROCESS-II

DME –302

Unit - I

Introduction to machine tools and metal cutting. Common features of machine tools, system of control for 1p-Drilling tools, Geometry of single point cutting tools, drills and milling cutters, types of chips, wear of tools and tool life, concept of machinability, use of cutting fluids and their types.

Unit - II

Lathe: Working principle of lathe, classification of lathe, Description of various parts of lathe. Flow of power from motor to spindle. Direction reversing mechanism of lead screw. Lathe accessories and attachment: Centers, face plate and driving plate, chucks (three-jaw, four-jaw, collet & magnetic). Taper attachments, Grinding attachment, Gear cutting attachment.

Lathe Operations: Centering, Plain turning, facing, taper turning, thread cutting, knurling, chamfering, Grooving or Necking. Forming, drilling, boring, reaming. Safety guide lines for working on lathe.

Unit - III

Shaper, Plainer and Slotter: Working principle and description, classification and their specifications, study of various parts and working mechanism.

Unit - IV

Milling and Grinding: Study of the principle of milling machine, various types of milling machines with regards to their construction features, Indexing, differential attachments, Milling operations (plain milling, face milling, angular milling). Different types of gears and gear cutting, Rack cutting, cutting speed and speed for different tools. Feed and depth of cut for different materials.

(b) Introduction to grinding machine, common abrasive tools, grinding wheel materials (abrasive and Bonds, Grit) Grade and Structure of wheels, Dressing of wheels, various speed and feeds, use of coolants, methods of grinding, different types of grinding machines such as surface grinder, cylindrical grinder and tool and cutter grinder.

Unit - V

Non Conventional Machining Process: Introduction and working principles only of these machining. Abrasive Jet Machining (AJM). Ultrasonic Machining (USM). Electrochemical Machining (ECM). Electron Beam Machining (EBM). Laser Beam Machining (LBM). Plasma Arc Machining (PAM). Electro-discharge Machining (EDM). Introduction to NC & CNC machines: Introduction, working of NC Machine Tools, Classification of NC machine tools. Programming for NC machines. Application of NC machines. Advantages and disadvantages of NC machines: CNC and DNC; Transfer Machines and their types.

ESTIMATING, COSTING AND DRAWING
DME –303

Unit-I

Definition and importance of Estimating and Costing, Estimating Procedure.

Elements of Cost: Direct material, direct labor, direct expenses, Overhead expenses.

Ladder of Cost: Prime cost, production cost, factory cost, ultimate cost, selling price.

Fixed 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 the hourly cost of running and maintenance of machines/machine 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 or changing, checking and allied operations). Machining time calculation for all lathe operations, drilling, shaping, planning, milling and grinding. Numerical problems.

Welding (Electric and gas): Electrodes consumed, power consumed, gas consumed, calculation of welding charges.

Forging and Hot Metal Forming: Forging operations and losses. Costing of any simple product.

Unit-III

To draw detained dimensioned/views (full and sectional) for common mechanical devices such as machine vice, screw jack, gearing devices (spur gears), cams, engine parts (injector, fuel pump, simple jet carburetor), production machine parts (tail stock, tool post, etc.). Specification of materials for these parts.

Unit-IV

Design and Drawing of Jigs and Fixtures. Different locating and clamping devices. Simple drilling jig (Post jig, Turn over jig, etc.) to drill holes on a given component. Fixture for machining operations of a given part on a milling Machine.

Unit-V

Design and Drawing of Dies and Punches. Blanking and Piercing dies.

(a) Progressive die (b) Compound die

Deep draw "combination die".

To prepare working drawings of one of the self-designed machine parts with the help of computer using Auto-CAD.

THERMAL ENGINEERING - II

DME –304

Unit – I

I. C. Engines: Classification of I. C. Engines, S.I. engines, C.I. engines, Value timings, Basic differences between S.I. and C.I. engines, comparison of petrol and diesel engines, comparison of 4-stroke and 2-stroke engines. Derivation of Air Standard efficiencies of carnot cycle, Otto cycle and Diesel cycle. (Simple numerical problems). Various components of I. C. engines, their function and composition.

Unit – II

System In I. C. Engines:

Carbonation: Definition of carburetor, its function and classification. A/F mixture requirements under different loads, Simple Carburetor, its limitations, Compensation in carburetors, Solex, Zenith and Amal Carburetors.

Ignition: Principle of mutual induction, Battery ignition system of 4-stroke cylinder engine, Magneto ignition system, Spark plug, Ignition timings, Automatic ignition timing devices.

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

S. I. Engines: General Combustion Theory, Normal combustion and flame front propagation, factors, effecting flame speed, Rate of pressure rise, Abnormal combustion, Engine operating variables effecting detonation. C.I. Engines: Combustion C.I. engines, Ignition delay, Combustion, Knock in C.I engines, Variables effecting ignition delay, Fuel supply and injection system.

Unit- IV

Air Compressors: Uses of compressed air, Classification of compressors, Reciprocating compressors, Single stage acting Single stage double acting, Multi stage, Best value for index of compression, Isothermal efficiency, Effect of clearance volume, volumetric efficiency, Work input in multistage 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, System of operation, Advantages of gas turbine over other prime movers, types of gas turbines, Constant pressure turbines, Constant volume turbines their comparison, Application of turbines, Gas turbine cycles, Open cycle and closed cycle gas turbines, Thermodynamics of constant pressure gas turbine cycle. (Brytone cycle), Advantage of closed cycle gas turbine, combustion chamber, jet Propulsion, Turbo jet unit, Advantages and disadvantages of jet propulsion, Thrust augmentation for turbo jet engines, Ram jet Rocket propulsion, Classification of rockets, Rocket propellants, Simple numerical problems.

MACHINE DESIGN

DME –305

Unit – I

Introduction To Design : Basic requirements for machine elements, general design process, mechanical properties. General design considerations like fatigue, creep, factory of safety, stress concentration, material selection, etc. Designing for strength, Design equations, Failure Criteria, Fatigue Loading.

Unit – II

Temporary Fasteners :

Design of knuckle and Cotter Joints.

Screwed Joints: Introduction to screw and various types of screw threads, advantages and disadvantages of screwed joints over other joints, common types of screw fastenings (through bolt, tap bolt, stud, cap screw, machine screw and set screws). Design of screw threads, stresses in screw fastenings. Design of bolts for cylinder cover.

Unit – III

Permanent Fasteners :

Types of riveted joints, possible failures of riveted joints, Design of lap and butt type riveted joints (simple cases), strength and efficiency of riveted joints. Welded Joints: Advantages/disadvantages of welded joints. Common types, design of transverse and parallel fillet welded joints.

Unit – IV

Keysand Coupling: Various types of keys and their applications, splines, forces acting on sunk keys. Shaft coupling and their various types. Design of Flange Coupling.

Shafts: Various types of shafts, stresses in shafts, Design of shafts (solid and hollow) subjected to Torque and Bending Moment.

Unit – V

Design of Eccentrically Loaded Riveted, Bolted and Welded Joints (Simple types) and related numerical problems.

AUTOMOBILE ENGG.

DME –306

Unit-I

Introduction : Classification of vehicles on the basis of load, drive, fuel used, position of engine, axles, steering transmission, suspension, body and load. 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 axles, 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, variables affecting performance characteristics, method of improving engine performance.

Multi-cylinder Engine: Engine balancing & firing order, power balance charts.

Emissions: Sources of vehicular emission, emission control methods. Faults & Rectification: Reasons for excessive oil consumption and high fuel consumption, engine overheating and loss of power. Elementary idea of reconditioning of engines.

Unit-II

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

Final drive: Function and working of universal joints, propeller shaft and differential, rear axle: fully floating, semi-floating and three-quarter floating axle.

Unit-III

Electrical System: Complete 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, alternators and their regulators.

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. Brief introduction to vacuum, air & power brakes. Bleeding and adjustment of hydraulic brake.

Unit-IV

Steering System: Introduction, layout of steering system, steering gear box and linkages, fundamental equation for correct steering. 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. Centrifugal & cornering force, slip angle and its affect on steering. Under steering & over-steering.

Unit-V

Frame & Suspension: Frame and frame-less construction, description of suspension system such 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 lamoine stub axle. Tyres - Types, specification, and causes of wear and their remedies.

REFRIGERATION AND AIR-CONDITIONING
DME-307

Unit-I

Principles of Refrigeration : Meaning of refrigeration. Refrigeration methods. Units of Refrigeration. Reversed Carnot cycle. Heat pump. Coefficient of performance. Rating of Refrigeration machines. Refrigeration systems. Air Refrigeration cycle, applications and its limitations. Vapor compression cycle: P-H chart, effect of sub cooling and super heating, deviations from the theoretical cycle, effect of varying condensing and suction temperature on coefficient of performance, simple mathematical calculations with pressure–enthalpy charts. Vapour absorption cycle and its applications.

Unit-II

Refrigerants : Important properties of a refrigerant. Properties and applications of commonly used refrigerants such as R_{11}, R_{12}, R_{22}, NH_3 and Brine. Newer Refrigerants.

Refrigeration Components And Controls : Function, types, specifications and constructional details of components such as Compressor, Condenser, Throttling device, evaporator, oil separator, accumulator, header, spray ponds, cooling towers.

Controls: solenoid valve, thermostat, low pressure and high pressure cut out, oil switch.

Unit-III

Psychrometry: Dry and Wet bulb temperature. Dalton's law of partial pressures. Saturation, dew point, adiabatic saturation temperature. Relative humidity, absolute humidity, humidity ratio, Enthalpy of moist air.

Psychrometric charts and its uses: Psychrometric processes: Sensible heating, sensible cooling, humidification, and de-humidification, cooling and de-humidification, heating and humidification. Mixing of air. Representations on psychrometric chart. Working of simple problems.

Air-Conditioning: Introduction to air-conditioning (Summer and Winter). Metabolism in human body. Human comfort, comfort chart, physiological requirements of human body, Effective temperature. Application of air-conditioning.

Unit-IV

Heat Loads: Description of various types of loads. Sensible and latent heat loads. Sensible heat factor (SHF), by pass factor (BPF), apparatus dew point (ADP), Supply air and recirculated air. Simple problems on sensible heat factor and by pass factor.

Air-Conditioning Systems: Description of room air-conditioner, packaged air conditioner. Central air–conditioning system, round the year air-conditioning system. Air – distribution system: simple description of filters, dampers, fans, blowers, air ducts, air splitters, air registers (grills) and diffusers, strip heaters.

Unit-V

Miscellaneous: Principle of evaporative cooling. Desert air cooler. Layout and working of ice plant and cold storage plant. Domestic Refrigerator, water cooler, Deep freezer, Bottel Cooler. Thermal insulating materials. Effect of moisture in a refrigeration system. Different methods of defrosting.

ENERGY SOURCES

DME - 308

Unit-I

Introduction to the Sources of Energy: Conventional and non-conventional sources of energy. Renewable Energy Sources: Solar Energy, Solar Collectors and its types, Applications of Solar Energy,

Wind Energy: Site selection Wind Mills and its types.

Tidal Energy : Bio-mass, Bio-gas, Geothermal and O TEC.

Vapour Power cycle–Rankine cycle, Reheat, simple Regenerative and Reheat Regenerative cycle, Binary Vapour cycle, Topping cycle (Simple Numerical).

Unit-II

Thermal Power Plants : Steam Power Plant General lay out, flow chart, Pulveriser, Pulvirised fuel firing, Ash handling system – Pneumatic conveyer and hydraulic systems, Dust handling system – ESP.

Steam-Condenser: Type of condenser, Jet Condenser, Set and Surface condensers and its advantages and disadvantages over other types of condensers, selection of condensers (simple numerical).

Gas Turbine Power Plants: Introduction, application, main components, combined cycle plants.

Unit-III

Nuclear Energy: Applications compared with coal. Nuclear reactions. Energy mass relationship. Mass defect and Binding energy (simple numerical).

Nuclear Power Plants: Parts of a nuclear reactor, Classifications, BWR, FBR and CANDU type reactor, Uranium Enrichment, Safety precautions, Review of Indian nuclear power plants, Nuclear Waster Disposal.

Unit-IV

Hydro-Energy Power Plants: General Layout, Introduction, Merits and Demerits over thermal power plants. Classification and essential components of hydro power plants, hydro-steam inter connected system. Safety measures.

Unit-V

Plant Economy: Cost analysis factors affecting economics of generation and distribution of power. Economy in plant selection.

Terms and Definitions: Maximum demand, connected load, demand factor, diversity factor, load curve, load factor, capacity factor, utilization factor, base and peak load plants (simple numerical).

Environmental Aspects: Air pollution by thermal power plants. Nuclear Radiation Hazards, Environmental aspects concerned with hydro-power. Environmental Control Technique.

ENTREPRENEURSHIP DEVELOPMENT AND INDUSTRIAL MANAGEMENT

DME –309

Unit – I

Management, Industrial Management, Different Functions of Management: Planning, Organizing, Co-ordination and Control. Structure of an Industrial organization, Function of different departments, Relationship between individual departments. Human relations & performance in organization, Understanding self and others for effective behaviour, Behavior modification techniques, Industrial relations and disputes, Relations with subordinates, peers and superiors. Interpersonal relationship. Characteristics of group behavior and Trade unionism, Mob Psychology, Grievances, Handling of grievances, agitation's strikes, Lockouts, Picketing and Gherao, Labour welfare, worker's participation in management. Introduction to Human Resource Development / Personnel Management, Staff development and career development, Training strategies and methods. Introduction of wages, Classification of wage payment scheme.

Unit – II

Importance and necessity of industrial legislation, Types of labour laws and disputes, Brief description of the following Acts; The factory Act 1948, Payment of wages Act 1936, Minimum Wages Act 1948, Workmen's compensation Act 1923, Industrial Dispute Act 1947, Employees state insurance Act 1948, Provident Fund Act. Classification of accidents : According to the nature of injuries, fatal, temporary, According to event according to place. Causes of accidents – psychological, physiological, and other industrial hazards. Safety consciousness, safety measures during the execution of engineering works. Ecology, factor causing pollution, effect of pollution on human health, Air pollution and Control Act, Water pollution and Control Act, List of pollution control equipment, Solid waste management, Noise pollution.

Unit – III

Concept of ethics, Concept of professionalism, Need for professional ethics, Code of professional ethics, Typical problems of professional engineers. Factors determining motivation, Characteristics of motivation, Methods for improving motivation, Incentives, Pay, Promotion, Rewards, Job satisfaction and Job enrichment. Need of leadership, Function of a leader, Factors to be considered for accomplishing effective leadership, Manager as a leader. Types of production, Job, Batch and mass production, E.O.Q. (Economic order quantity).Concept of quality production, Philosophies of different groups, Concept of total quality management, JIT (Just in time), ISO-9000 & ISO-14000, Concepts of intellectual property rights & patents.

Unit – IV

Concept of Entrepreneurship, Importance and need of entrepreneurship in context of prevailing employment conditions in the country, Qualities of successful entrepreneurs, Career options, Scanning of business environment, Small scale sector, Types and forms of entrepreneurs and enterprises, Government assistance, Steps in setting up enterprises, Social responsibility of an entrepreneur. Project identification techniques, Selection of a project, Conducting a market survey, Preparation of project report and project appraisal.

Unit – V

Working capital assessment, Estimating costs, Production cost, Working capital requirement and profit estimation, break even analysis, Book keeping and accounts. Marketing management including export nature and scope of marketing, Identification of products/country, Price analysis, Documentation and procedures. Role of financial institutions like SIDBI, SFC, NGOs, Banks etc. and their support for enterprise building, Role of non-financial institutions like DIC, KVIC, SISI, NSIC etc. Legal requirements in setting up and running an enterprise. Commercial, labour and tax laws.