

SWAMI VIVEKANAND UNIVERSITY, SIRONJA, SAGAR (M.P.)



SYLLABUS

For
DIPLOMA IN ENGINEERING (3 YEAR)
MECHANICAL ENGINEERING

Course Code : DME

Department of Mechanical Engineering
Faculty of Engineering

Duration of Course : 3 Year
Examination Mode : Semester
Examination System : Grading

Swami Vivekanand University, Sironja Sagar (M.P.)
2016-2017



Communication Skills (DME-0101)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min				
DME-0101	Communicati on Skills	3	1	-	4	70	22	10	20	100	-	-	-	-	100	3 Hrs

UNIT – I

Marks :14

COMMUNICATION PROCESS AND ITS NEEDS

How to make communication effective, Barriers in communication, Removal of barriers. Grammar and vocabulary for correct English usage. Determiners, Prepositions, Auxiliary verbs and subject- Verb agreement, Rewrite as directed (change voice, correct form of verbs/ tenses), Vocabulary – Oneword substitution, words often misused and wrongly spelt.

UNIT – II

Marks :14

PASSAGES OF COMPREHENSION

Prescribed passages (six from existing syllabus), Language of Science, Desalination or Desalting Process, Safety Practices, Non-conventional Sources of Energy, Our Environment, Entrepreneurship, Writing summary, moral and characterization of any one story from the book prescribed.

UNIT – III

Marks :14

BUSINESS COMMUNICATION

Principles of effective business correspondence Its parts, mechanics, styles and forms., Application for job, Bio-Data and C.V., Letter of Enquiry, Placing order, Complaint

UNIT – IV

Marks :14

COMPOSITION & TRANSLATION

Writing paragraphs of 150 words on topics of general interest i.e. pollution, ragging college, importance of computers, importance of communication skill, importance of science and technology etc., Translation (Hindi to English and vice- versa).

UNIT – V

Marks :14

UNSEEN PASSAGES & PRECIS WRITING

Answer the questions based on the passage. Give suitable title, Writing Précis.

Reference Books

1. English Conversation Practice, Grant Taylor.
2. Practical English Grammar, - Thomson & Martinet.
3. Communication Skills for Technical Students Book– I, Book – II, M/S Somaiya Publication, Bombay.
4. Living English Structure, S. Allen.
5. English Grammar, Usage, and Composition, Tickoo & Subramanian, S. Chand & Co. Standard Allen Longman.
6. Essentials of Business Communication, Dr. Rajendra Pal & J.S. Korlahalli S.Chand & Sons, New Delhi.
7. Effective Business Communication, M.V. Rodriques, Concept Pub. Co. New Delhi.
8. Communication for Business, Shirely Taylor, Longman, England.
9. Communication for Engineers and Professors, P. Prasad, S.K.Kataria and sons publications, New Delhi.
10. Technical English Book-II, Somaya Publications, New Delhi.



Physics (DME-0102)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min				
DME-0102	Physics	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs

UNIT – I

Marks :14

UNITS & MEASUREMENT: Fundamental and derived units, Scalar and vector, Basic requirements to represent vector, Symbols, abbreviation, and proculation, Linear measurement by vernier calipers, screw gauge and spherometer Angular measurement by angular vernier, **MOTION:** Motion and its type, Linear motion (laws and equation), Circular motion, Angular velocity and relation with linear velocity, Centripetal acceleration, Centripetal and Centrifugal forces Rotatory motion, Axis of rotation, Moment of Inertia, Radius of gyration, Kinetic energy of rotation, Numerical Problems and solution on the topic.

UNIT – II

Marks :14

MOLECULAR PHENOMENON OF SOLIDS, LIQUIDS AND GASES: Postulates Of Molecular Kinetic Theory of Structure of Matter, Brownian motion, Kinetic and Potential energy of molecules, Kinetic theory of gases, Postulates, Calculation of pressure by Kinetic theory, Prove of different gases law by Kinetic theory. **PROPERTIES OF MATTER:** Elasticity: Meaning, definition, stress, strain, Hook's law and elastic limit, Surface Tension : Meaning, definition, molecular forces, cohesive and adhesive forces, surface energy, capillary rise and capillary rise method. Viscosity : Meaning, definition, stream line and turbulent flow, critical velocity, Stock's law. Numerical problems and solution on the topic.

UNIT – III

Marks :14

HEAT: Heat and temperature, concept of heat as molecular motion, Transmission of heat, study state and variable state. Concept of heat capacity, specific heat and latent heat. Calorimeter and its uses, Thermodynamics , Relation between heat and work, Mechanical equivalent of heat, First law of thermodynamics and its application, Second law of thermodynamics and its application. Carnot cycle, Numerical problems and solution on the topic. Heating effect of current and thermoelectricity: Heating effect of electric current: Joule's law, work energy and power in electric circuit, calculation of electric energy. Thermo electricity, See back effect and thermoelectric power. Neutral temperature, emperature of inversion and relation between them, Thermo electric thermometer and thermo couples. Numerical problems and solution on the topic.

UNIT – IV

Marks :14

SOUND: Production of sound waves(Longitudinal and transverse waves), Progressive and stationary waves, Basic knowledge of refraction , reflection, interference and diffraction. Ultrasonic, Audible range, Production of ultrasonic, properties and uses, **OPTICS AND OPTICAL INSTRUMENTS:** Refraction, critical angle and total internal reflection, refraction, through lenses and problems, Power of lenses, Spherical and chromatic aberrations, Simple and compound microscope, telescope and derivation for their magnifying power, Numerical problems and solution on the topic.

UNIT – V

Marks :14

ELECTROSTATICS AND ELECTROMAGNETIC INDUCTION: Coulomb's law, Electric field intensity, potential. Capacity, principle of capacitor, types of capacitor, combination of capacitors, Electromagnetic Induction: Faraday's law, Lenz's law, Self and mutual inductance, Transformer and electric motor, Induction coil. **MODERN PHYSICS, BASIC ELECTRONICS:** Photoelectric effect, threshold frequency, Einstein- equation, Photo electric cells, Radioactivity : decay constant, Half life,

mean life, Properties of nucleus, nuclear mass, mass defect, Production of x-rays, properties and its uses, Thermal emission, semiconductors, Types of semiconductors, Explanation of conductor, semiconductor and insulators on the basis of band theory, P-N junction, diode as rectifier.

Reference Books

1. Applied Physics Vol. 1 & 2, Saxena and Prabhakar.
2. Physics, - Ttti Publication.
3. Physics Vol. 1 &2, Halliday and Resnic R.
4. Engineering Physics, - Gaur and Gupta.
5. Principle of Physics, Brij Lal & Subramanyan.
6. Physics for Technical Education, LS Zednov.

List of Experiments

1. Refractive index of prism (I-d) curve
2. Refractive index of prism (spectrometer)
3. Focal length of a convex lens by u-v method
4. Focal length of a convex lens by displacement method
5. Verification of Ohm's law
6. To find out unknown resistance by meter bridge
7. To find out internal radius of hollow tube by vernier calipers.
8. To find out volume of given cylinder by screw gauge.
9. Surface tension by Capillary rise method.
10. Coefficient of viscosity
11. Coefficient of Thermal conductivity by searl's method.
12. Verification of Newton's cooling law.



Chemistry (DME-0103)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min	LW (F)			
DME-0103	Chemistry	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs

UNIT – I

Marks :14

ATOMIC STRUCTURE AND RADIOACTIVITY : Discovery of electron, proton, neutron and nucleus. Rutherford's and Bohr's model of atom. Bohr-Bury scheme of filling the electrons in various orbits. Idea of s, p, d, f orbital. Alpha, Gamma and Beta rays, theory of radio activity, Group displacement law, half life period, numerical problems on half life period, fission and fusion.

SURFACE CHEMISTRY AND ITS APPLICATION: True solution, colloidal solution and suspension, lyophobic and lyophilic colloids, optical and electrical properties of colloids, coagulation, coagulants, idea about gels and emulsions.

ELECTROCHEMISTRY: Electrolysis, Faraday's laws of electrolysis, Numerical problems on Faraday's Law, electroplating of copper and nickel.

COLLIGATIVE PROPERTIES: Osmosis & osmotic pressure, Relative vapour pressure and Raoult's law. Internal energy (enthalpy) Entropy, Entropy function free energy, Effect of change in temperature catalysis.

UNIT – II

Marks :14

CHEMICAL BONDING AND CATALYSIS: Bonding: Nature of bonds- Electrovalent, Co-valent, coordinate and hydrogen bond. Catalysis : Types, theory characteristic, positive, negative, auto and induced catalyst. Catalytic Promoter, and catalytic inhibitors. Industrial Application of catalysis.

WATER: Sources of water, types of water, hardness of water, its causes, types and removal, Boiler feed water, harmful - effects of hard water in boiler. Municipal water supply. Numerical on soda lime process. Determination of hardness of water by O. Hender's, EDTA and soap solution method.

UNIT – III

Marks :14

METALS AND ALLOYS : Physical and chemical properties of metals, copper, iron, aluminum, tin, nickel. General principle of metallurgy, minerals/ ores, ore dressing, roasting, smelting, blast-furnace, fluxes, purification. Explanation of alloying purposes, methods of alloying, composition and uses of alloy like brass, bronze, duralium, German silver, gun metal, solder, stainless steel, casting and bearing alloy. Ionization, pH value corrosion and protection: Arrhenius theory of ionization, factors affecting ionization. pH meaning (numerical), Buffer solutions and Buffer actions, choice of indication (acidimetry and alkalimetry). Explanation of corrosion, types of corrosion, factors affecting corrosion, corrosion control (protection against corrosion), metal and organic coating for corrosion control.

UNIT – IV

Marks :14

GLASS, CEMENT AND REFRACTORY: Glass: Basic raw materials for glass, composition and manufacture of glass, varieties of glass and annealing of glass, Cement : Constituting compounds in cement, Composition of Portland Cement, its manufacture, setting and hardening of cement. Refractories : Meaning, characteristics, use of common refractory materials.

HIGH POLYMERS, RUBBER AND INSULATORS: Polymerization and condensation, classification of plastics, Compounding and Moulding constituents of plastics. Preparation Properties and uses of PVC, polyethylene, polystyrene, polyamides, polyesters, Bakelite. Synthetic fibers - nylon, rayon, decron, and polyesters. Definition characteristics, classification and properties of insulators. Glass, wool and thermocol. Idea about rubber and vulcanization.

UNIT – V

Marks :14

LUBRICANTS, PAINTS AND VARNISHES: Lubricants: Meaning , type and theory of lubricants, properties of a good lubricants, Flash, and fire point and cloud point, emulsification number, viscosity. Paints and Varnishes : Meaning, ingredients and characteristics of good paints and varnishes, their engineering applications.

FUELS, FIRE EXTINGUISHERS AND EXPLOSIVES : Classification of fuel, gross and net calorific value, Determination of a solid fuel by bomb calorimeter , octane and octane number. Proximate analysis of fuel, its utility, crude petroleum, products of fractional distillation . Fire extinguishers - Description and use. Explosives - Meaning, types, characteristic and use of explosives. Name Dynamite, lead azide, T.N.T., Picric acid, R.D.X. Pollution and control: Introduction and chemical toxicology, air and water pollution, control of air and water pollution. Harmful effect of different gases like carbon mono-oxide, carbon dioxide, sulphur dioxide, nitric oxide, nitrous and lead.

Reference Books

1. Physical Chemistry, Bahl and Tuli
2. Inorganic Chemistry, Satyaprakash
3. Modern Text Book of Applied Chemistry, Dr. G. C. Saxena, Jain Prakashan, Indore
4. Applied Chemistry, Dr. G. C. Saxena, Deepak Prakashan, Gwalior
5. Applied Chemistry, Shrivastava & Singhal, Pbs Publication, Bhopal
6. Engineering Chemistry, Uppal
7. Engineering Chemistry, – Rao And Agarwal
8. Engineering Chemistry, P.C. Jain
9. Polymer Chemistry, O.P. Mishra
10. Applied Chemistry, H.N. Sahni, Deepak Prakash

List of Experiments

1. To identify one Anion and Cation in a given sample.
2. Determination of flash point and fire point of a given sample of oil by Abel's apparatus.
3. Determination of viscosity by Red Wood Viscometer no. 1 and no.2.
4. Redoximetry Titration :
 - a. Percentage of Iron in given sample of alloy.
 - b. Determination of strength of ferrous ammonium sulphate.
 - c. Determination of strength of anhydrous ferrous sulphate and ferrous sulphate.
5. Determination of hardness of water by :
 - a. EDTA Method and Soap Solution Method
6. Determination of solid content in the given sample of water.
7. Determination of percentage of moisture in the given sample of coal by proximate analysis.



Mathematics (DME-0104)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min				
DME-0104	Mathematics	3	1	-	4	70	22	10	20	100	-	-	-	-	100	3 Hrs

UNIT – I

Marks :14

ALGEBRA: Permutation- Meaning of factorial n, Permutation of 'n' dissimilar thing taken 'r' at a time. Combination Combination of n dissimilar things taken 'r' at a time, Binomial Theorem, Statement of the theorem for positive integer General Term, Middle term, Constant term, Partial Fractions, Define a proper-improper fraction, Break a fraction into partial fraction whose denominator contains Linear, Repeated linear and Non repeated quadratic factors. Determinant, Concept & principles of determinants, Properties of determinant, Simple examples. Complex Numbers, Algebra of Complex

UNIT – II

Marks :14

TRIGONOMETRY : Allied angles. Trigonometrical ratios of sum and difference of angles, (Only statement), Sum and difference of trigonometric ratios (C-D formula), Multiple angles (Only double angle and half angle), Properties of triangle (without proof).

MATRIX : Definition of Matrix. Types of Matrix. Row, Column, Square, Unit, Upper and lower triangular, Symmetric & Skew Symmetric, Singular and non Singular Matrices. Adjoint of a Matrix. Inverse of a Matrix.

UNIT – III

Marks :14

CO-ORDINATE GEOMETRY : Co-ordinate System : Cartesian and Polar. Distance, Division, Area of a triangle. Locus of a point and its equation. Slope of St. Line, Angle between two St. lines. Parallel and perpendicular St. lines. Standard and general equation of St. line. Point of intersection of two st lines.

STATISTICS : Measures of Central tendency (Mean, Mode, Median), Measures of Dispersion (Mean deviation, standard deviation).

UNIT – IV

Marks :14

DIFFERENTIAL CALCULUS : Define constant, variable, function. Value of the function. Concept of limit of a function. Definition and concept of differential coefficient as a limit. Standard results. Derivatives of sum, difference, product, quotient of two functions. Diff coeff. of function of a function. Diff. coeff. of implicit function. Logarithmic Differentiation. Differential coeff. of Parametric function.

UNIT – V

Marks :14

INTEGRAL CALCULUS : Definition as a inverse process of differentiation, Standard Results (including inverse function), Methods of Integration, Substitution, Integration by parts, Breaking up into partial fraction, Concept of Definite Integral.

VECTOR ALGEBRA : Concept of Vector and Scalar Quantities. Different types of vectors. Addition and subtraction of vectors. Components of a vector, Multiplication of two vectors: Scalar Product, Vector Product, Applications (Work done, power & reactive power).

Reference Books

1. Differential Calculus, Gorakh Prasad.
2. Integral Calculus, Gorakh Prasad.
3. Co-ordinate Geometry, S.L. Loni.
4. Engineering Mathematics, Dr. S.K. Chouksey & Manoj Singh.
5. Mathematical Statistics, Ray and Sharma.
6. Higher Engineering Mathematics, B.S. Grewal.



Professional Activities (DME-0105)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min				
DME-0105	Professional Activities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Professional Activities is not a descriptive course, as per conventional norms; therefore specific content for this course cannot be prescribed. It is a group of open-ended activities; where in variety of tasks are to be performed, to achieve objectives. However general guidelines for achieving the target and procedure for its assessment are given under the course content.

OBJECTIVES:

To allow for professional development of students as per the demand of engineering profession.

To provide time for organization of student chapter activities of professional bodies) i.e. Institute of engineers, ISTE or Computer Society of India etc.)

To allow for development of abilities in students for leadership and public speaking through organization of student's seminar etc.

To provide time for organization of guest lectures by expert engineers/eminant professionals of industry.

To provide time for organization of technical quiz or group discussion or any other group activity.

To provide time for visiting library or using Internet.

To provide time for group discussion or solving case studies.

To provide time for personality development of students.

To provide time for working for social cause like awareness for environmental and ecology etc.



Applied Mechanics (DME-0201)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min	LW (F)			
DME-0201	Applied Mechanics	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs

UNIT – I

Marks :14

COMPOSITION AND RESOLUTION OF FORCES

Definition , Effect, characteristics of force, System of Forces, Principle of Transmissibility of Forces, Concept of Resultant Force, Law of –Parallelogram of Forces, Triangle of Forces, Polygon of Forces, Determination of Resultant of two or more concurrent forces (analytically and graphically)

PARALLEL FORCES AND COUPLES

Classification of Parallel Forces, Methods of finding resultant Force of parallel forces- analytically & graphically, Position of resultant force of parallel forces- Definition, Classification and characteristics of a force Couple, moment of couple

UNIT – II

Marks :14

MOMENTS AND THEIR APPLICATIONS

Definition, Types and law of moment-Varignon's Principle of moment and its applications Lever and its Applications. Types of supports and determination of support reactions of a simply supported beam subjected to point load and uniformly distributed load (UDL).

EQUILIBRIUM OF FORCES

Equilibrium of a system of concurrent forces, Conditions and types of Equilibrium Lami's Theorem and its applications.

UNIT – III

Marks :14

CENTRE OF GRAVITY

Difference between Centroid and Center of Gravity (CG), Centroid of standard plane figures and CG of simple solid bodies, Method of finding out Centroid of composite plane laminae and cut sections, Method of finding out CG of Composite solid bodies.

FRICTION

Concept and types of friction, Limiting Friction, coefficient of friction, angle of friction, angle of repose, Laws of friction (Static and Kinetic), Analysis of equilibrium of Bodies resting on Horizontal and inclined Plane, Utility / Nuisance value of friction.

UNIT – IV

Marks :14

SIMPLE LIFTING MACHINES

Concept of lifting Machines, Definition of Mechanical Advantage, Velocity Ratio and Efficiency of Machines and their relation Reversibility of Machines and condition for self locking machine, Law of Machines, Maximum mechanical advantage and maximum efficiency of machine, Friction in machine (In terms of Load and effort), Calculation of M.A., V.R. and efficiency of following machines, Simple wheel and axle Differential wheel and axle Single purchase crab Double purchase crab Simple screw jack, Different System of simple pulley blocks.

MOTION OF A PARTICLE

Definition of speed, velocity, acceleration, uniform velocity, uniform acceleration and variable acceleration, Motion under constant acceleration/ retardation (equations of motion) Motion under force of gravity, Concept of relative velocity, Definition of projectile, velocity of projection , angle of projection,

time of light, maximum height, horizontal range and their determination, Definition of angular velocity, angular acceleration and angular displacement, Relation between linear and angular velocity of a particle moving in a circular path, Motion of rotation under constant angular acceleration.

UNIT – V

Marks :14

LAWS OF MOTION

Newton's Laws of motion and their applications.

WORK, POWER AND ENERGY

Definition unit and graphical representation of work, Definition and unit of power and types of engine power and efficiency of an engine. Definition and concept of Impulse, Definition, unit and types of energies, Total energy of a body falling under gravity.

Reference Books

1. A text book of Applied Mechanics – R.S. Khurmi , S.C. Chand & Co. , New Delhi
2. Applied Mechanics – I.B. Prasad, Khanna Publishers, New Delhi
3. Applied Mechanics (Hindi) – R.S. Jog, Anand Publishers, Gwalior Applied

List of Experiments

1. Verification of laws of parallelogram of forces.
2. Verification of laws of polygon of forces
3. Verification of laws of moments
4. Determination of forces in the members of Jib Crane
5. Determination of Centroid of plane lamina by graphical method
6. Determination of coefficient of friction for surfaces of different materials on horizontal plane
7. Determination of coefficient of friction for surfaces of different materials on an inclined plane
Determination of mechanical advantage, velocity ratio and efficiency of the following lifting machines.
8. Simple wheel and axle Differential wheel axle Single purchase crab Double purchase crab Simple pulley block Simple screw jack
9. Measurement of B.H.P. of an engine using rope break dynamometer



Environmental Engineering and Safety (DME-0202)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
						Theory					Practical					
		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)						
		Max (A)	Min	TW (B)			MST (C)	Max (E)	Min		LW (F)					
DME-0202	Environment Engineering and Safety	3	1	-	4	70	22	10	20	100	30	-	20	-	150	3 Hrs

UNIT – I

Marks :14

INTRODUCTION TO ENVIRONMENT.

The Biosphere, biotic and abiotic, An aquatic ecosystem, Types of pollution, Impact of human being on environment, Impact of environment on human being, Basic approach to improve environmental qualities, Roll of an environmental engineer.

AIR POLLUTION SOURCES AND EFFECTS.

Standard definition of air pollution, Composition of natural air, Names of air pollutants, Classification of air pollutants, primary and secondary pollutants, Classification of source of air pollutants on different bases, Definition of different types of aerosols, Effect of air pollution on: human health, material properties, vegetation, Major toxic metals and their effects, Major environmental phenomenon e.g., acid rain, global warming, green house effect, ozone layer depletion, Air quality standards, Brief description of air pollution laws.

UNIT – II

Marks :14

METEOROLOGICAL ASPECTS OF AIR POLLUTANT DISPERSION.

Meteorological parameters influencing air pollution, Environmental lapse rate, temperature inversion, atmospheric stability and adiabatic loss rate, Turbulence, topographical effects, Plume behavior, looping, coning, fanning fumigation, lofting, trapping.

AIR POLLUTION CONTROL METHODS AND EQUIPMENTS.

Natural purification processes of air, Artificial purification methods of air, Brief description of following control equipments along with sketch e.g., gravitation settling chamber, cyclone, scrubber, bag house filter, electrostatic precipitator, Brief description of following processes for the control of gaseous pollutants e.g., absorption, adsorption, condensation, combustion etc.

UNIT – III

Marks :14

WATER POLLUTION SOURCES AND CLASSIFICATION.

Water resources, Uses of water, Classification of water, Origin, composition and characteristics of domestic waste water as well as industrial waste water, Biochemical oxygen demand, Water pollution laws and standards, Uses of waste water, Classification of waste water, Chemical oxygen demand.

WASTE WATER TREATMENT METHOD.

basic processes of water treatment. Meaning of primary, secondary and tertiary treatment. Flow chart of a simple effluent treatment plant, Theory of industrial waste treatment, Volume reduction, neutralization and proportioning.

UNIT – IV

Marks :14

SOLID WASTE MANAGEMENT.

Sources and classification of solid waste, Public health aspects, Disposal methods – open dumping, sanitary, land fill. Incineration, composting, Potential methods of disposal, Recovery and recycling of paper, glass, metal and plastic.

NOISE POLLUTION AND CONTROL.

Sources of noise pollution, Units of Noise pollution measurement, Allowable limits for different areas, Problems of noise pollution and measures to control it, Noise pollution control devices brief discussion.

UNIT – V**Marks :14****SAFETY PRACTICES**

Responsibility of employees and employers regarding health and safety, Fire hazards ,prevention and precautions, Industrial hazards prevention and protection, Protection from air and noise pollution.

Reference Books

1. Environmental pollution control Engineering by C.S. Rao.
2. Air pollution and control by Seth.
3. Air pollution by M.N Rao.



Introduction to Computers (DME-0203)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min				
DME-0203	Introductation to Computers	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs

UNIT – I

Marks :14

INTRODUCTION TO COMPUTERS

Basic Concepts-Generations of Computers Overview of computer Systems Classifications of Computers Characteristics of Computers Applications of Computers. Numbers System & Codes-Decimal, Binary, Octal, Hexadecimal Conversions from one system to other Binary Coded Decimal & ASCII Code. Computer Hardware: Input Devices-Keyboards, Mouse, Trackball, Joystick, Scanner, OMR OCR Bar-Code Reader, MICR, Digitizer, Card Reader, Voice Recognition, Web Cam, Video Cameras, Etc. Output Devices-Monitors, Printers : Dot matrix, Inkjet & Laser, Plotters, Commuter, Output Micro Film (COM), Multimedia Projector, Speech Synthesizer, Dumb, Smart & Intelligent Terminal. Storage Devices

UNIT – II

Marks :14

Primary and Secondary Storage- Characteristics and Limitation, Floppy, Hard disk, CD ROM DVD, Disk Cartridge. Microprocessor-Registers, Arithmetic Unit, Control Unit, Buses, Instruction Set, Processor Speed, Memory Concepts. Concept of Memory-Unit of Memory, Types of Memory, RAM, ROM, PROM, EPROM, EEPROM, Cache Memory. Computer Software-System Software Vs Application Software, Operating System Programs, Language Processor, Assembler, Compiler & Interpreter, Application Software, Types of Application Software and their examples., High Level Language, Low Level Language, Assembly Language. Multimedia-Basics of Multimedia, Components- Text, Graphics, Animation, Audio, Images & Video. Multimedia Applications.

UNIT – III

Marks :14

OPERATING SYSTEM

Overview of DOS- Internal Commands, External Commands. Windows Operating System-Overview of different versions of Windows Characteristics and Facilities of Windows, Terminologies of Windows – Desktop, Icon, Menu etc. Components of Desktop. Working with Files and Folders. Windows Utilities and Accessories – Notepad, WordPad, Paintbrush, Windows Explorer, Calculator. Introduction to Linux- An overview of Linux, Basic Linux elements System, Features Software, Features File structure, Linux H/W & S/W requirements.

UNIT – IV

Marks :14

WORD PROCESSING

Saving, Closing, Opening of documents, Selecting text Editing text, Finding and replacing text\ Printing documents, Merge Documents. Character and paragraph Formatting, Page Design and layout. Spell Check, Creating Tables and Charts. Handling Graphics

SPREADSHEET PACKAGE

Spreadsheet concept – Need, advantage, Terminology like cell, row, column etc. Working with Spreadsheet– Creating, Saving, Editing and printing, Entering data – Entering number, text, date, time etc. Selecting cells – Cut, copy, paste date, Editing Worksheet data. Formatting – Text and Cells, Applying border shading, background patterns, conditional formats, positioning cells, formatting numbers, text, Date, time. Creating formulas- Entering, Editing, Using Functions, Controlling calculations. Working with Charts- Creating charts, Adding & changing text, changing the view and display, types of charts. Presentation Software: Introduction Presentation design tools Presentation terminologies, Creating,

Opening and Saving Presentation. Working with different views Creating and Organizing slides, Adding and Formatting text in slides Formatting paragraphs Adding drawings and objects Creating special effects Working with table and charts Printing Presentation.

UNIT – V

Marks :14

DATABASE

Introduction – need, Characteristics and terminologies of database, Types of database – relational, Hierarchical and Network. Basic entities – Tables, records, Data types, Data, Validation and constraints, keys relation between tables. Query – Select, Insert, Update, Delete. Forms – Creating forms, Forms controls Report Designer- Customize formats, grouping reports. Computer Communication & Networks: Information Networks- The Technology of Workgroup Computing, Types of network, Network topology. Network components. Data Communication-Introduction to Data Communication, Types of Data, Transmission media. Internet and E-mail- Internet Basics, Websites- Applications, terminologies, naming conventions., Web Browsers- Types, Navigation and tools, E-mail – concept, terminologies, mailing services provider, advantages comparison with Conventional mailing. Search engine – concept, search engine websites, searching methods.

Text Books

1. S . Jaiswal, A First Course in Computers, Golgotha Publication
2. Slotnick, Butterfield, Colantonio and Kopetzky, Computers & Application, C.C. Health & Company
3. Ron Mansfield, The Complete Guide to Microsoft Office Professional, Sybex /BPB Asian Edition
4. Hardware Bible, BPB Publication
5. Learning Windows in 24 Hours, Sam Techmedia

Reference Books

1. Suresh K. Basandra, Computers Today, Galgotia Publication
2. Norton Peter, Inside IBM PC
3. Computer Hardware, Osborne Series
4. Hardware Bible, BPB Publication
5. Learning Windows in 24 Hours, Sam Techmedia
6. Chapman, Understanding windows, BPB Publication

List of Experiments

1. Study of various components of computer like CPU, keyboard, mouse, monitor, printer, CVT and storage devices.
2. Internal and external commands of DOS.
3. Using Windows operating system, study of desktop, control panel, accessories and settings.
4. File management in windows explorer, Study of WordPad, NotePad, PaintBrush, Calculator etc. Study of Linux operating system.
5. Study of MS-word – opening and saving of documents, formatting, editing and spell check, find and replace, printing, merging. Creating Table, Charts and Graphics.
6. Study of Spreadsheet – creating, saving, editing and printing. Entering data, selecting cells, formatting text, applying border shades and backgrounds, creating formulas, creating charts.
7. Study of Power Point – creating, opening, editing and saving of slides. Adding and formatting text, creating, animations, working with images and special effects. Printing presentation.
8. Study of MSAccess– creating, saving, editing and printing of tables. Managing relationships, writing queries e.g. SELECT, UPDATE, DELETE, INSERT. Forms designing and report printing.
9. Study of Web Browser and mailing programs.



Engineering Drawing (DME-0204)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min				
DME-0204	Engineering Drawing	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs

UNIT – I

Marks :14

INTRODUCTION TO DRAWING INSTRUMENTS:

Introduction of drawing instruments, materials and their uses, Applications of minidrafter Applications of compass and divider Applications of French curves and spline Pencils grades and their uses, Designation and sizes of drawing sheet and drawing board.

PLANNING AND LAYOUT OF DRAWING SHEET:

Planning of drawing sheet as per I.S.: 696-1972 (SP 46: 1988). This should include- Margin, Title Block, Zoning, Revision panel, Folding marks, Numbering of sheet.

CONVENTIONAL REPRESENTATION:

Conventional representation of the following as per BIS practice. Common Engineering materials

Electrical installations and fittings – Main switches, (lighting and power), socket outlets (3 pin 5AMP, 3pin15AMP), bell, buzzer, loud speaker, Aerial, ceiling fan, exhaust fan, Bracket fan, fan regulator, battery and earth point.

Electronics components- Diode: Zener, varactor, Scotty, step recovery, light emitting diode (LED), PNP and NPN transistors, resistance, capacitor, Inductors (fixed and variable both), IC (8pin and 14pin), SCR, TRIAC, DIAC, UJT, FET, MOSFET, LOGIC GATES.

Sanitary fittings- showerhead, wall lavatory basin, corner Lavatory basin, urinal stall, kitchen sink, Indian type WC, Water closets (Asian pan, urissapan, Anglo-Indian, European)

Building -single and double swing doors and windows.

Mechanical components- Internal and external threads, slotted head, Square end and flat, radial arms and ribs, serrated shaft, splined shaft, Chain wheel, bearing, straight and diamond knurling, Compression and tension spring, leaf spring (with and without eye), Spur and helical gear.

LINES, LETTERING AND DIMENSIONING:

Introduction of type of lines and their applications, Single stroke vertical, inclined letters (capital and lowercase) And numerals. Dimensioning: Elements of dimensioning- dimension line, extension line, arrowhead And leader line. Dimensioning system – Aligned and unidirectional. Dimensioning of Arcs and Circles. Angular Dimensioning. Dimension of counter sunk and counter bore.

UNIT – II

Marks :14

GEOMETRICAL CONSTRUCTIONS AND ENGINEERING CURVES

Divide a line into any number of equal parts by parallel line method, Bisecting of line and angle. Construction of triangles and polygons Introduction of conic sections (curves), Construction of Ellipse by Eccentricity and Concentric circles methods, Construction of Parabola by Eccentricity and Rectangle methods, Construction of Hyperbola by Eccentricity method, Construction of Cycloid, Construction of Involute of circle and polygon, Construction of Archimedian Spiral of any number of convolutions.

SCALES:

Introduction of scales and their applications, Concept of reducing, enlarging and full size scale Classification of scales – plain, diagonal, vernier, Scale of chord and comparative scales Definition of R.F. Construction of plain and diagonal scales.

UNIT – III

Marks :14

THEORY OF PROJECTION AND PROJECTION OF POINTS, LINES AND PLANES

Definition of various term associated with theory of projection- Planes of projection, Quadrants, first & third angle projection method, Projection of points in all the four quadrants. Projection of lines parallel to HP and VP both, perpendicular to one plane and parallel to other, Inclined to one plane and parallel to other, knowledge of projection of line inclined to both the plane, (No practice required).

Projection of planes – Perpendicular to HP and VP both, Perpendicular to one plane and parallel to other, Inclined to one plane and perpendicular to other, Knowledge of projection of plane inclined to both the planes.

UNIT – IV

Marks :14

PROJECTIONS OF SOLIDS:

Projection of cylinder, cone, prism and pyramid. Under the conditions :- Axis parallel to HP and VP, Axis perpendicular to HP and parallel to VP, Axis perpendicular to VP and parallel to HP, Axis inclined to HP and parallel to VP, Axis inclined to VP and parallel to HP, Axis inclined to both HP and VP.

SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES:

Section of cone, cylinder, prism and pyramid (Solid resting on its base in the HP i.e. the Axis perpendicular to HP and parallel to VP) in the cases:- Section plane parallel to HP and perpendicular to VP, Section plane parallel to VP and perpendicular to HP, Section plane inclined to HP and perpendicular to VP, Section plane inclined to VP and perpendicular to HP. Drawing True shape of section.

Introduction to development of lateral surface of solids- Cone, Cylinder, Prism and Pyramids (Simple and truncated). Under the condition – solid resting on its base in the HP and axis Perpendicular to HP and parallel to VP. Development of funnel and elbow.

INTERSECTION OF SURFACES

Intersection of following cases – Cylinder to cylinder and Prism to prism (With their axis intersecting and perpendicular to each other.)

UNIT – V

Marks :14

ORTHOGRAPHIC PROJECTIONS & FREE HAND SKETCHING:

Principles of orthographic projections- Identification of necessary views and superfluous view Selection of front view. Preparation of necessary orthographic views of simple objects From given pictorial views. Dimensioning of orthographic views as per standard practice. Free hand sketches of simple objects (Using Pencil, Eraser & Paper only)

ISOMETRIC VIEWS

Concept of isometric projection and isometric view (Isometric Drawing), Construction of isometric scale, Construction of isometric view of polygon and circle, Construction of isometric view of cone, cylinder, prism and pyramids, Construction of isometric view of simple objects from given orthographic views.

List of Practical:

Sketching and drawing of geometries and projections based on above syllabus

Text Books

1. ENGINEERING DRAWING – N.D. Bhatt
2. ENGINEERING DRAWING – R.K. Dhawan
3. ENGINEERING DRAWING – P.S.Gill

Reference Books

1. ENGINEERING DRAWING – P.S.Gill
2. SP: 46-1988 Bureau of Indian standard
3. PRINCIPLES OF ELECTRONICS - Malvino



Workshop Practics (DME-0205)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min	LW (F)			
DME-0205	Workshop Practice	-	-	4	4	-	-	-	-	-	60	18	40	100	100	-

PURPOSE

To provide the students with hands on experience on different trades of engineering like fitting, carpentry, smithy, welding and sheet metal.

INSTRUCTIONAL OBJECTIVES

To familiarize with

1. The basics of tools and equipments used in fitting, carpentry, sheet metal, welding and smithy.
2. The production of simple models in the above trades.

Text Books

1. Gopal, T.V., Kumar, T., and Murali, G., A first course on workshop practice – Theory, practice and work book, Suma Publications, 2005.

Reference Books

1. Kannaiah, P. & Narayanan, K.C. Manual on Workshop Practice, Scitech Publications, Chennai, 1999.
2. Venkatachalapathy, V.S. , First year Engineering Workshop Practice, Ramalinga Publications, Madurai, 1999.

List of Experiments

1. EMPHASIS TO BE LAID ON REAL LIFE APPLICATIONS WHEN FRAMING THE EXERCISES.
2. FITTING Tools & Equipments – Practice in Filing and Drilling. Making Vee Joints, Square, dovetail joints, Key Making.
3. CARPENTRY Tools and Equipments- Planning practice. Making Half Lap, dovetail, Mortise & Tenon joints, a mini model of a single door window frame.
4. SHEET METAL Tools and equipments - Fabrication of a small cabinet, Rectangular Hopper, etc.
5. WELDING Tools and equipments - Arc welding of butt joint, Lap Joint, Tee Fillet. Demonstration of Gas welding, TIG & MIG.
6. SMITHY Tools and Equipments – Making simple parts like hexagonal headed bolt, chisel.



Professional Activities (DME-0206)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min				
DME-0206	Professional Activities	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Professional Activities is not a descriptive course, as per conventional norms; therefore specific content for this course cannot be prescribed. It is a group of open-ended activities; where in variety of tasks are to be performed, to achieve objectives. However general guidelines for achieving the target and procedure for its assessment are given under the course content.

OBJECTIVES:

To allow for professional development of students as per the demand of engineering profession.

To provide time for organization of student chapter activities of professional bodies) i.e. Institute of engineers, ISTE or Computer Society of India etc.)

TO allow for development of abilities in students for leadership and public speaking through organization of student's seminar etc.

To provide time for organization of guest lectures by expert engineers/eminent professionals of industry.

To provide time for organization of technical quiz or group discussion or any other group activity.

To provide time for visiting library or using Internet.

To provide time for group discussion or solving case studies.

To provide time for personality development of students.

To provide time for working for social cause like awareness for environmental and ecology etc.



Material Technology (DME-0301)

Paper / Subjec t Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		Theory					Practical					Grand Total (H= D+G)				
		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)						
		Max (A)	Min	TW (B)			MST (C)	Max (E)	Min		LW (F)					
DME -0301	Material Technology	3	1	-	4	70	22	10	20	100	-	-	-	-	100	3 Hrs

UNIT- I

Marks : 14

Requirement of Engineering materials, mechanical properties and their testing Introduction to engineering materials classification of engineering materials and their properties. Mechanical properties of materials, destructive including Tensile test, compression test, hardness test, impact test fatigue test, endurance limit, bending test, shear test and non- destructive testing methods. **Structure of Solid materials:** Classification amorphous and crystalline states, unit cells and crystal structure (B.C.C., F.C.C. and H.C.P) allotropy. Crystal imperfection and their effects on properties **Solidification of Metal and ingot structure:** Process of nucleation and grain growth, ingot solidification, dendritic and columnar structure, segregation of impurities, grain and grain boundaries

UNIT- II

Marks : 14

Equilibrium Phase Diagrams and Phase Transformation :Equilibrium of phase Diagrams : Plotting of equilibrium diagrams, interpretation, phase rule and lever rule and its application Phase transformations – Eutectic Eutectoid, Peritectic and Peritectoid

Practical Metallography Preparation of specimen, selecting the specimen, mounting the specimen, grinding , polishing, etching and etching reagents. The metallurgical microscope. Use and care of microscope.

Iron- Carbon Equilibrium System : The complete iron carbon diagram and its interpretation. The solidification and cooling of various carbon steels, structures produced, correlation of mechanical properties with carbon content

UNIT- III

Marks : 14

Heat Treatment of Steels: Objective of heat treatment, thermal processes- annealing, normalizing, hardening and tempering. Hardening process : Surface hardening, flame hardening, case hardening methods, their scope, limitations and advantages, Hardening defects due to improper quenching, hardenability, T.T.T. curves interpretation and use, Isothermal heat treatment processes -martempering, austempering, spheroidising and patenting

UNIT- IV

Marks : 14

Ferrous Metals and Alloys : Classification, types of cast irons their Properties and uses, alloy cast-irons, various alloying elements used, their effects on properties and uses. Classification, composition and uses of plain carbon steels, effect of impurities, their effects on properties and uses. Alloy steel classification. Tool Steel: Typical compositions, requirements of tool steels, high speed steel, high carbon steel. Standardization of steels. Designation of steels as per B.I.S. codes.

Non- Ferrous Metals and Alloys : Copper : Its Properties and uses Copper Bases Alloys: Brasses, their classification, composition ,properties and uses, designation of copper alloys as per B.I.S. aluminum its properties and uses. Aluminum Alloys: Their composition, Classification, properties and uses. Designation of Al- alloys as per B.I.S, Zinc, and Nickel and lead their alloys properties and uses Bearing alloys - their composition and field of application.

UNIT- V

Marks : 14

Non- Metallic Materials : introduction to Ceramic Refractory, Rubbers Insulators and Lubricants

Plastics: characteristics, classification, commonly used thermosetting and thermoplastic - their properties and uses. Ingredients for processing plastics. Plastic processing methods different methods.

Powder Metallurgy:-Introduction and application. Description of process, manufacture and blending of metal powder compacting and sintering.

Metal Preservation: Corrosion meaning various mechanism effect of corrosion, methods of minimizing corrosion

Modern Trends in Materials Engineering : New materials like FRP, Composites, synthetic fibers, synthetic wood. Super conductors

REFERENCES

1. Engineering physical Metallurgy-By Prof. Y Lakhtin MIR Publishers Moscow
2. A Text Book of Material Science And Metallurgy by O.P. Khanna.
3. Material Science And Process. by S. K. Hazia Choudhry
4. Mechanical Metallurgy by Dieter (Tata McGrawhill)
5. Materials For Engineers by M.H.A. Kempster
6. Introduction to Material Science And Engineering by K.M. Ralls, T.H. Courtney, John Wuff (Wiley Eastern New Delhi)
7. Physical Metallurgy Principles by Read Hill (Affiliated East- West Press Pvt. Ltd. New Delhi.)
8. Engineering Metallurgy by R. Higgins (ENS).
9. Materials Science by B.S. Narang (Pub. CBS pub. & Distributions New Delhi)
10. Padarth Prodyogiki (Hindi) by P.N. Vijayvergiya (Deepak Prakashan, Gwalior)



Manufacturing Processes (DME-0302)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min	LW (F)			
DME-0302	Manufacturin g Processes	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs

UNIT- I

Marks : 14

Introduction to Manufacturing Processes : Definition, classification of basic manufacturing processes i.e, mechanical working, casting, metal joining processes, metal cutting process ,press working . Examples of each of the above listed manufacturing processes, factors which influence selection of manufacturing process for a particular application.

UNIT- II

Marks : 14

Metal Casting : Introduction , advantages and limitations of casting as production process.

Pattern Making : Definition of pattern, types of patterns and their details, materials, allowances, tools required, colour code for patterns.

Moulding : Definition, moulding methods and types of moulds ,moulding materials, moulding sand and its composition, sand properties, testing parameters of sand, and their effects, sand preparations, sand conditioning, characteristics and defects of moulds. Function of runners, risers and gate. Cores and core making, core boxes. Cleaning of casting, Special casting methods, need for special casting methods, die casting, centrifugal casting, investment (lost wax) casting, Casting defects, causes and analysis, area of application of casting process. Furnaces: Cupola, crucible, pit and electric arc furnaces, induction furnace , their salient features, safety aspects.

UNIT- III

Marks : 14

Press Working : Introduction of press working of metals, principle of press working , description of a simple press working unit, press **working operations** : punching, shearing, drawing, bending, slitting, knurling, notching, trimming, piercing etc. Double action press, description and its field of application, die and punch types of dies, specifications of a press, safety precautions to be observed while working on a press.

UNIT- IV

Marks : 14

Mechanical Working : Introduction - hot and cold working Principle of recrystallization. **Metal Rolling:** Principle of metal rolling, basic components of a simple rolling process equipment. Types of deformation during rolling. Roller material, selection and desirable properties, principles of thread rolling- description with sketches, manufacture of seamless tubes by rolling. types of rolling mill. Rolling defects

Metal Drawing: Basic Principle of drawing of metals, differentiate between the drawing and deep drawing of metals, principle of wire drawing and example.

Extrusion: Definition, Classify the methods of extrusion, their limitations, advantage and disadvantage. Tube extrusion, impact extrusion, application of extrusion processes. Extrusion defects.

Forging: Types of forging, Die forging, differentiate between the cold die and hot die forging , advantage of forming by forging, common defects and their reasons. Limitations of forging, press forging, drop forging, upset forging, die material, applications of forging processes in engineering.

UNIT- V

Marks : 14

Metal Joining : Introduction, Classification of metal joining processes

Welding :-classification, Plastic, fusion and forge welding, Weldability of metals, metallurgy of welding

Resistance welding: Spot, seam, butt, projection, percussion techniques.

Gas welding and gas cutting : Principle of operation and technique, gas cutting.

Arc Welding : Carbon arc, TIG, MIG, Submerged arc , Atomic hydrogen, Eletro-slag, Plasma arc welding processes, Electrodes- types and selection , flux and their uses. Special welding techniques- Welding of different metals. Defects in welds, testing and inspection. Accident prevention in gas and arc welding Equipments & tools used in metal

arc welding, specification and functions. Soldering, Brazing and Adhesive bonding

Recommended Books

1. Process And Materials of Manufacture by Lindberg.
2. Workshop Technology by Hazara & Choudhary.
3. Materials And Manufacturing process by Dalela.
4. Manufacturing Processes by Yankee.
5. Manufacturing Process by S.E. Rusinof
6. Welding Engineering by B.E. Rossi.
7. Production Engineering – P.C. Sharma
8. Manufacturing Technology- P.N. Rao
9. Production Technology- R.K. Jain
10. Foundry Engineering by P.L. jain.
11. Nirman Prakram (Hindi) by P.N. Vijayvargiya. (Deepak Prakashan, Morar, Gwalior)

List of Experiment

1. Practice of making gas flames with nozzles and making simple joints
2. Practice of joining wires and rods of different size on spot welding machine
3. Practice of Welding of corner, edge and Tee joint
4. Practice of edge preparation for welding.
5. Practice of piercing, notching and circle cutting with the help of Metal master machine
6. Practice of making of washer of any size on a flypress
7. Practice of upsetting of a round on power hammer
8. Demonstration of metal melting in pit furnace& casting process
9. Practice of core making and baking
10. Tempering of sand, practice of green and dry sand making



Basic Electrical & Electronics (DME-0303)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
						Theory					Practical					
		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)						
		L	T	P			Max (A)	Min	TW (B)		MST (C)	Max (E)	Min	LW (F)		
DME-0303	Basic Electrical & Electronics	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs

UNIT- I

Marks : 14

FUNDAMENTALS OF ELECTRICAL ENGINEERING Concept of electric current, potential and potential difference (Voltage). Sources of D.C. and A.C. Electric energy. Method of voltage generation and standard voltages used in generation transmission and distribution. Electrical Power, energy and their units.

UNIT- II

Marks : 14

A.C. CIRCUITS Generation of single phase and three phase sinusoidal voltage. Vector representation. Concept of Cycle, Frequency, time period, amplitude, phase and phase difference. Define instantaneous value, average value, RMS value and peak value of sinusoidal electrical quantities. Derive relationship between them. Form factor and peak factor (Definition only). Current voltage and power in pure resistive, inductive and capacitive circuit. Concept of Reactance, impedance and power factor in R.L., R. C. and RLC Series circuit. (Simple Numericals). Causes and effect of poor power factor. Methods of improving power factor. phase AC supply- three phase three wire and three phase four wire system. Relationship between VL and VPH, IL and IPH and three phase power in star and delta connected load. (Simple Numerical)

UNIT- III

Marks : 14

D.C. MACHINES Review of concept of Electromagnetism and related laws (Faraday's Law, Lenz's Law, Cork Screw Rule, Fleming's Left Hand & Right Hand Rule). Construction of D.C. Machines, its main parts and their functions. Classification of D.C. Machines. D.C. Generator : Principle EMF equation (Derivation and simple numerical), Types of D.C. Generator (No Numerical), Applications of DC generator. D.C. Motor : Working Principle of DC motor, Types of DC motor, significance of back emf, Torque equation (No Numerical). Characteristics of D.C. Series and Shunt Motor. Applications of D.C. Motor. D.C. Motor starter - 3 point starter. Efficiency (No numerical)

UNIT- IV

Marks : 14

A.C. MACHINES Single Phase Transformer : Construction, working principle. EMF Equation (Derivation with simple numerical), Turn ratio, Step up and step down transformers and their application. Losses, efficiency and regulation (No derivation). Three Phase Induction Motor : Construction, types, principle of operation. Concept of Slip (Simple Numerical), Applications, Starters: DOL and Star Delta. Single Phase Induction Motor : Methods of making a single phase motor self start. Types of single phase induction motor- capacitor start, capacitor run and shaded pole and their applications. Synchronous Machines : Synchronous motor- construction, principle of operation, comparison with three phase induction motor. Synchronous generator (alternator) – Construction, principle of operation, speed and frequency, synchronous speed.

UNIT- V

Marks : 14

MEASURING INSTRUMENTS AND TRANSDUCERS Classification of Measuring Instruments, absolute and secondary instruments. Indicating, Integrating and Recording instruments, their examples.

Elementary idea about working principles and construction of MI and MC type Ammeter and voltmeter. Electrodynamicometer type watt meter. Induction type energy meter , electronic energy meter. Application of Megger and earth tester. Multimeter, CRO, its block diagram and applications. Transducers – Definition, primary and secondary transducers, active and passive transducers, variable parameter R,L,C type transducers. General idea about strain gauge, LVDT, Thermocouple, Piezo Electric and Photoelectric Transducers.

Recommended Books

1. Basic electrical engineering- V K Mahta
2. Basic electrical engineering- V N Mittle
3. fundamental of electrical engineering and electronics- B L Thareja

List of Experiment

1. Verification of Kirchhoff's Law
2. To Measure Voltage Current and power in single phase AC circuit.
3. To calculate Impedance, power and power factor by measuring voltage across each element and current to the circuit for a given RLC series circuit.
4. Study of different parts of DC machine .
5. Study of three point starter for DC motor.
6. To determine transformation ratio of a given single phase transformer.
7. Study and operation of DOL and Star Delta Starter.
8. To measure slip for a given three phase induction motor.
9. To measure insulation resistance by Megger.
10. To measure earth resistance by earth tester.
11. To measure linear displacement by LVDT.
12. To make connection for stair case wiring.
13. To make connection for fluorescent tube light circuit.
14. Testing of various electronic components using multimeter and CRO.
15. To draw V-I characteristics of Zener diode.
16. To observe input and output wave form of full wave / half wave rectifier on CRO.
17. To observe amplified output of a given amplifier



Mechanical Drafting & AutoCAD (DME-0304)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		Theory					Practical					Grand Total (H= D+G)				
		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)						
		Max (A)	Min	TW (B)			MST (C)	Max (E)	Min		LW (F)					
DME-0304	Mechanical Drafting & Auto CAD	3	1	2	6	70	22	10	20	100					100	3 Hrs

UNIT- I

Marks : 14

Projection and multi view Representation: Projection orthographic projection. First and third angle projection, superfluous view, choice of views, auxillary views- views -full and partial, conversion of pictorial views in to orthographic views, conventional representation as per IS: 696.

Sectional Views : Full section, half section, partial or broken section, revolved section, removed section, offset section. Sectioning conventions, section lines. Hatching procedure for different materials as per IS code 6861972. Sectional views of assembled parts. Choosing from IC engine parts, couplings, clutches, brackets, bearing etc. (Use 1st and 3rd angle projections both)

UNIT- II

Marks : 14

Dimensioning Tolerance, Machining And Welding Symbols :Types of dimensions (size and location) dimensioning terms and notations.(use of I.S.Code 696 &2709) general rules for dimensioning and practical hints on dimensioning systems of dimensioning. Dimension of cylinder holes arcs of circle narrow space, angles, counter sunk hole, screw threads taper etc. Application of tolerances. (Use I.S. Code 696) Machining marks, finish marks, countersinking, counter boring spot facing, figure sand notes for same. Representation of characteristics machining(circularity, Angularity etc .) (Ref IS 969) Representation of welded joints, welding symbols, tolerance of forms and positions. Procedure of drawing fits, limits, size, tolerance, clearance etc.

Production Drawing: Detailed drawing, assembly drawing, scale, finish tolerances, notes etc. Title block, tool list, gauge list. Preparation of production drawing for pattern shop. Forging shop, machine shop, preparation of assembly drawing from detailed drawing. Exploded views, sectional pictorial views, assembly drawing of nut and bolt, Plummer block, flange coupling, stepped pulleys, foot-step bearing, Universal coupling, connecting rod, piston of I.C. engines, cotter joint, Knuckle joint. Preparation of detailed drawing from assembly drawings and assembled pictorial views, Interpretation of production drawing.

UNIT- III

Marks : 14

Introduction to Auto CAD: Coordinate system. Draw command line ,arc, circle rectangle, polygon, point, ellipse, hatch, table. Modify commands-erase, copy, offset, array, trim, extend, break, join, chamfer, fillet, move, rotate, scale, stretch, lengthen. Dimensioning Tray settings: snap, grid ,ortho ,polar, osnap Format commands: line type,point style, units, layers, drawing limit, dimension style

UNIT- IV

Marks : 14

Application of Auto CAD: Practice of assembly drawings using Auto cad **Presentation:** Block, creating layout, insert layout , plotting / printing

Pipe Drafting : Various symbols used in pipe line work as per ISO code of Practice, C.I. flanged joint, socket and spigot joint, gland and stuffing box, expansion joint, pipe fitting typical pipe bends, pipe supports and accessories.

UNIT- V

Marks : 14

Gear Drawing : Gear terminology such as pitch, pitch circle diameter module, addendum, root circle diameter, hole depth, blank diameter etc. construction of cycloidal, involute teeth profiles, pinion and rack meshing, spur gear meshing.

Graph and Charts : Introduction, Classification of chart, graphs and diagrams, quantitative and qualitative charts and graphs, Drawing and curve titles, legends notes etc. procedure for making a graphical representation in ink. Logarithmic graphs, semi logarithmic graphs, bar charts area (Percentage) charts, pie chart, alignment charts (Nomo graphs) Forms and construction, construction of functional scale, parallel scale charts for equations of the form $f(t) + f(u) + f(v)$, $f(t) f(u) = f(v)$ three scale alignment chart, graphical construction of a Z- chart, four variable relationship parallel scale alignment chart.

Recommended Books

1. Mechanical drawing by N. D. Bhatt
2. Mechanical drawing by P S Gill
3. Mechanical drawing by R K Dhawan

List of Experiment

1. design of clutch
2. design of joint
3. design of gear
4. design of auto cad



Strength of Material (DME-0305)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam	
		L	T	P		Theory					Practical				Grand Total (H= D+G)		
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal				Total (G= E+F)
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min	LW (F)				
DME-0305	Strength of Material	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs	

UNIT- I

Marks : 14

Simple Stress and Strains : Introduction types of loads and deformation, types of stresses and strain. Hooke's law, stress strain diagram for ferrous and non ferrous materials modulus of elasticity .rigidity and bulk modulus of materials Stress in bars of varying cross sections, composite sections and compound sections Thermal stresses and strains, thermal stresses in composite sections. Poisson's ratio, volumetric strain, relation between different modulus, strain Energy, resilience, proof resilience, modulus of resilience suddenly applied loads and impact loads.

UNIT- II

Marks : 14

Mechanical properties and their testing : Mechanical properties of materials, destructive including Tensile test, compression test, hardness test, torsion test, impact test fatigue test, endurance limit, bending test, shear test and non- destructive testing methods. S.F. and B.M. Diagrams : Definition, types of loading types of beams, shear force and bending moment sign conventions S.F. and B.M. diagrams for cantilever simply supported and overhanging beams with point or concentrated loads uniformly distributed load sand combination of point and U.D.L. Point of contra flexure, numerical problems.

UNIT- III

Marks : 14

Principal Planes and Principal Stresses : Stresses on inclined plane subjected to direct shear or combination of stresses in two mutually perpendicular planes. Principal planes and principal stresses, analytical and graphical methods. Bending Stresses in Beams : Theory of simple bending as assumptions made in simple bending theory position of neutral axis, surface moment or resistance. Modules of section of symmetrical sections such as rectangular, circular and I sections, bending stresses in symmetrical sections. Simple problems. Reinforced concrete beams, beam of uniform strength.

UNIT- IV

Marks : 14

Shear Stresses in Beams.: Introduction shear stress equation, assumptions made, distribution of shear stresses over various sections, such as rectangular, circular and I L & T sections, Simple numerical problems. Deflection of Beams : Introduction Strength and stiffness of beam Curvature of bent beam, Derivation of equation for slope and deflection of beam in case of cantilever and simply supported beam loaded with point loads U.D.L. and combination. Simple numerical problems. Importance of deflection and practical applications. Torsion of Shaft : Definition of torsion relation between stress, strain and angle of twist assumptions made strength of solid and hollow circular shaft, polar moment of inertia. Calculation of shaft diameter on the basis of strength and stiffness for the given horsepower transmitted torsional rigidity. Maximum torque comparison of solid and hollow shaft size of a shaft for a given torque.

UNIT- V

Marks : 14

Spring : Definition types and use of springs, leaf spring, helical and spiral springs, Stiffness of a spring and maximum shear stress, defection of spring . Spring Classification based on size shape and load. **Columns and**

struts :Definitions crippling load different end conditions, slenderness ratio, equivalent length, Euler's theory Rankine's formulae, radius of gyration, Rankine constant for different materials Limitations of Rankine formula simple problem B.I.S. code for columns. **Stresses in Frames** : Definition of frame, perfect, deficient and redundant frame. Assumptions made in finding stress in method of sections and graphical method Bows notation, solution of problem using three methods. Thin Cylinders and Spheres : Hoop stress longitudinal stress on inclined plane subjected to direct, shell, volume strain change in value, cylindrical vessels subjected to internal pressure, simple numerical problems.

Recommended Books

1. Strength of Materials. by B.C. Punmia.
2. Strength of Materials . by R.S. Khurmi.
3. Strenght of Materials by Sadhu Singh.
4. Strength of Materials by K.D. Sexena.
5. Strength of Materials by S. Ramamuruthan.
6. Strength of Materials by I.B. Prasad.
7. Strength of Materials by Ryder.
8. Strength of Materials by Timo shanko & young
9. Laboratory Experiments In Strength of Materials by B.D. Sharma.
10. Dravya Samarthya (Hindi) by K. D. Saxena (Deepak Prakashan, Morar Gwalior)

List of Experiment

1. Study and demonstration of Universal Testing Machine & its attachments
2. Tension Test on mild steel, Aluminium & compression test on cast iron on Universal Testing Machine
3. Direct Shear Test of mild steel on Universal Testing Machine
4. Brinell Hardness Test on Mild Steel
5. Rockwell hardness Test on Hardened Steel
6. Izod & Charpy - Impact tests of a standard specimen
7. Drawing sheet on shear force & bending Moment diagrams for a given loading (At least four problems)
8. Estimation of principal stresses and maximum shear strain for a given combined loading by analytical & Mohr's circle method. (At least two problems.).



FLUID MECHANICS AND HYDRAULIC MACHINE. (DME-0401)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Duration of Theory Exam
						Theory					Practical					
		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)						
							Max (A)	Min			TW (B)	MST (C)	Max (E)	Min	LW (F)	
DME -0401	FLUID MECHANICS AND HYDRAULIC MACHINE	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs

UNIT- I

Marks : 14

Fundamentals of Fluid Flow : Definition of fluid, ideal and practical, compressible and incompressible fluids, fluid properties- density, specific weight, specific gravity, dynamic and kinetic viscosity, types of flow- laminar and turbulent, steady and unsteady, uniform and non-uniform. Continuity equation, Simple numerical problems on continuity equation.

Pressure and Its Measurement: Concept of pressure, intensity of pressure, Pascal's law, pressure head, gauge pressure, vacuum pressure, absolute pressure, manometers- Piezometer, U-tubemanometer inclined manometer, differential manometer ,inverted U-tube manometer Pressure gauges, Bourdon tube pressure gauge. Simple numerical problems on differential manometers.

UNIT- II

Marks : 14

Equation of Fluid Flow: Various form of energies applicable to fluid flow, potential energy, kinetic energy, pressure energy, total energy of fluid flow, Concept of datum pressure, velocity and total head of a fluid particle in motion. General steady flow energy equation, Bernaulli's theorem, assumptions made in deriving Bernaulli's theorem and derivation of Bernaulli's theorem, practical applications of Bernaulli's equation: venturimeter, orifice- meter, pitot tube, flow nozzle- Their construction, working and limitation. Simple problems on venturimeter, orifice meter, pitot tube.

Flow Through Orifices and Mouth Pieces and flow measurement: Definition and types of orifices, Vena contracta, coefficient of contraction., velocity, discharge and resistance . Torricell's theorem experimental determination of Cc, Cv and Cd. Head loss due to sudden enlargement, contraction and obstruction in pipe. Mouth pieces, Time of emptying vessel by orifice (cylindrical, conical) Flow from one vessel to another large orifices. Flow measurement by Rota meter, Volume flow meter

UNIT- III

Marks : 14

Flow Through Notches and Weirs : Weirs and notches definition, Classification, flow over rectangular weir with and without velocity of approach, calibration of rectangular weir, different formula for large rectangular weir. Time required to empty a reservoir with rectangular weir, V notch. Advantages of triangular notch over rectangular notch. Trapezoidal notch. Broad crested and submerged weirs. Practical application of weirs. Spillway and Siphon spillway, guage weir.

UNIT- IV

Marks : 14

Flow Through Pipes : Laminar and turbulent flow, Raynold's number, differentiation of laminar and turbulent flow on the basis of Reynold's number, loss of head due to friction in pipes, Darcy's formula and Chezy's equation. Hydraulic gradient and total energy line. Flow through long pipes, pipes in series and parallel simple problems based on above formulae water hammer and its effect surge tank.

UNIT- V

Marks : 14

Water Turbines : Meaning Classification Impulse and reaction turbine, Comparison description and working of Pelton, Francis and Kaplan turbines, Fan laws specific speed & Selection of turbines.

Water Pumps : Centrifugal and reciprocating- principle construction, working classification and layout. Comparison of centrifugal and reciprocating pumps. Specific speed, selection of pumps. Use of air vessels in reciprocating pump, indicator diagram, horse power calculation in case of reciprocating pump. Horse power calculation in case of centrifugal pump. Operating characteristics.

Hydel Power Station : Schematic diagram, function of various elements, advantage over other power stations.

Recommended Books

- 1 A text Book of Hydraulics, Fluid Mechanics and Hydraulic Machines. by Khurmi (S. Chand & Co.)
- 2 Fluid Machines by M. Manohar
- 3 Hydraulics & Hydraulic Machines by Dr. Jagdish lal (Metropolitan)
- 4 Hydraulics & Hydraulic Machines by Priyani.
- 5 Fluid Machines With Engineering Applications by R.L. Draught lery & A.C. Jugersoll. (McGraw Hills)
- 6 Journal of experiments in Hydraulic Laboratory by V. N. Rao & Husan New Heights.
- 7 Fluid Mechanics by Dr. M.L. Mathur (Std. Publications).
- 8 Taral Yantriki Avum Machinery (Hindi) by G.B. Bamanker. (Deepak Prakashan, Gwalior).

List of Experiment

1. To measure the pressure of water in pipe by (a) Piezometer (b) different types of monometers
- 2.To verify Bernaulli's equation
- 3.To determine discharge through a given venturimeter
- 4.To determine discharge through a given orifice meter
- 5.To determine discharge through a Pitot tube
- 6.To determine Cc, Cv and Cd for different types of orifices and mouth pieces
- 7.To determine loss of head due to : (a) Sudden enlargement.
(b) Friction in pipes
- 8.To determine discharge through different types of notches
- 9.Study of Pelton wheel, Francis turbine, and Kaplan turbines
- 10.Study of centrifugal pump



THERMAL ENGINEERING (DME-0402)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Duration of Theory Exam
						Theory					Practical					
		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)						
		Max (A)	Min	TW (B)			MST (C)	Max (E)	Min		LW (F)					
DME-0402	THERMAL ENGINEERING	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs

UNIT- I

Marks : 14

Dimensions and systems of units: Basic and Derived units for common engineering variables and properties like mass, length, time, temperature, area, volume, velocity, acceleration, force, pressure, work, heat, energy, power etc.

Sources of energy: Brief description of energy sources Classification of energy sources, Renewable, Non-Renewable, Fossil fuels, including CNG, LPG; Solar Energy- Its nature, merits and demerits ,potential; Flat plate and concentrating collectors & their application. Solar Water Heater, Solar Air Heater, Photovoltaic Cell, Solar Distillation; Wind, Tidal, Geothermal, Biogas, Biomass, Bio-diesel, Hydraulic, Nuclear, Fuel cell – list of fuel cells

UNIT- II

Marks : 14

Basic Concepts of thermodynamics: Definition and importance of thermodynamics, thermodynamic system open, closed and Isolated system, boundary and surrounding forms of energy .Point and path functions, properties of system intensive and extensive properties thermodynamicstate, thermodynamic process, cycles thermodynamic definition of work, heat and thermodynamic equilibrium, Zeroth law of thermodynamics, Quasi-static process, work done during Quasi Static process

First Law of Thermodynamics: Concept of heat reservoir, heat source and heat sink, Statement of first law, Mathematical representation, applications of first law to open and closed system. Concept of internal energy and its calculation, relationship between heat transfer, work transfer and change in internal energy. Differentiation between shaft work, flow work and displacement work; Steady flow energy equation and its application to various units such as boiler, nozzle, turbine compressor enthalpy.

UNIT- III

Marks : 14

Second Law of Thermodynamics: Limitation of first law. Statements of second law Kelvin, Planck and Clausius statements, Concept of heat pump, refrigerator and heat engine thermal efficiency. Parameters affecting thermal efficiency, means of increasing efficiency, COP. Equivalence and irreversible processes. Factors which make a process irreversible. Reversible cycle. Carnot cycle its efficiency and limitation ; Carnot theorem Clausius Inequality, concept of entropy, Principle of increase of entropy, determination of increase of entropy, principle of increase of entropy, determination of increase of entropy, Statement of third law of thermodynamics **Ideal Gases and Gas Processes:** Definition of an ideal gas, gas law, characteristics gas equation, specific and universal gas constants specific heat constant pressure and specific heat, constant volume. Ideal gas processes- isobaric isothermal, isentropic, polytropic and throttling process as applied to open and closed systems. Representation of these processes on P-V, T-S and H-S diagrams. Computation of change in enthalpy, entropy and internal energy. Net heat transfer and work done

UNIT- IV

Marks : 14

Thermodynamic Cycles: Air Standard cycles- definition and purpose standard efficiency, Carnot, Otto Diesel dual and Brayton cycles, their representation on P.V. & T.S. Diagrams. Derivation of airStandard efficiency and their comparison and limitation of each cycle. Vapour power cycle - Carnotcycle its limitation, Rankine cycle

modified Rankine cycle- their representation on P.V.T.S. and H.S. Planes, derivation of expression for thermal efficiency. **Two Phase System:** Pure substance phase, phase changes steam as a two phase system steam. formation and its representation on temp- enthalpy plane. Properties changes, representation of wet dry and saturated and superheated steam on P.V., T.S. and H.S. planes. Dryness fraction of steam, methods of determination of dryness fraction separation and throttling calorimeter. Use of steam tables and Mollier's diagram. Determination of change in properties such as entropy enthalpy internal energy and work and heat transfer in the following processes- isobaric, isochoric, isothermal, isentropic, polytropic, throttling, and representation of various processes on P.V. and H.S. planes

UNIT- V

Marks : 14

Internal Combustion Engines: Introduction, classification I.C. Engine Components and their function, working of two stroke and four- stroke cycle engines and their comparison. Indicator diagram, Calculation of IHP, BHP thermal efficiency, Mechanical efficiency and relative efficiency, Governing, Cooling and lubrication of I.C.

Recommended Books

- 1 Engineering Thermodynamics by P. K. Nag, Tata McGraw Hill Ltd.
- 2 Engineering Thermodynamics, C. P. Gupta, Rajendra Prakash
- 3 Thermal Engineering by P.L. Ballani. (Khanna Publisher's N. Delhi)
- 4 A Course in thermodynamics And Heat Engines by Kothanandran, Khajuria and Arora (Dhanpat Rai & Sons Delhi)
- 5 Treatise On Heat Engineering by Vasandani & Kumar (Metropocitan Book Co. Ltd, New Delhi)
- 6 Thermodynamics by G.T. Van Wylen (John Wiley & Sons)
- 7 Thermodynamic And Heat Engines Vol . I & II by R. Yadav. (Central Book Depot, Allahabad)
- 8 Heat Power by Kashitish Chandra Pal (Orient Longman Hyderabad)
- 9 I.S. 2986- 1966.
- 10 Tapiya Abhiyantriki (Hindi) by G.B. Bamankar (Deepak Prakashan, Morar

List of Experiment

1. TwStudy of flow of heat in natural environment at least 10 cases and relation to second law of thermodynamics
- 2.two phase systems equilibrium diagram on p-v , T-s, h-s plane
3. Numerical on vapour processes and ideal gas processes (minimum two problems)
- 4.Study and compare various heat exchangers such as radiators, evaporators, condensers, plate heat exchangers et
- 5.Study of
 - (a) Fuel pump
 - (b) Fuel injector
 - (c) Carburetor
- 6.Study of various systems of I.C. engines.
 - (a) Fuel supply system
 - (b) Cooling system
 - (c) Ignition system
 - (d) Government system.
 - (e) Lubrication system
- 7.Study of different types of I.C. engines (four stroke and two stroke C.I. and S.I.)
- 8.Trace the flue gas path and water-steam circuit with the help of boiler model and write a report
- 9.Report on visit to wind power generation plant / biogas plant / hydraulic power plant



THEORY OF MACHINE (DME-0403)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min	LW (F)			
DME-0403	THEORY OF MACHINE	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs

UNIT- I

Marks : 14

Simple Mechanism: Introduction of theory of machines, definitions- statics, dynamics, kinematics, kinetics, kinematic pair, kinematic chain, mechanism, machine inversions, relation between number of links, number of joints and number of pairs, Four bar chain and its inversion, Slider crank chain and its inversions. **Velocity and Acceleration of Points and Links :** Angular and linear velocity, relative and absolute velocity, velocity in links. Instantaneous centre, locating instantaneous centre of rotation, velocity determination of four bar mechanism by relative velocity method, Acceleration of link centripetal and tangential, total relative and absolute acceleration. Velocity and acceleration diagrams for four bar and other mechanisms. Klein's construction for single slider crank mechanism. Analytical method of calculating the velocity and acceleration of piston in a reciprocating engine mechanism.

UNIT- II

Marks : 14

Dynamic force analysis, Crank Effort Diagrams and Flywheel : Dynamics of reciprocating engine mechanism. Inertia force due to reciprocating mass, piston effort crank effort, turning moment on crank shaft, Analytical and graphical methods of construction of turning moment diagrams for steam and I.C. engines. Fluctuation of energy and speed. Coefficient of fluctuation of energy and speed. Flywheel and its function . Calculation of moment of inertia. weight of flywheel for steam and I.C. engines.

Brakes and Dynamometers: Brakes - need, types, braking force, braking torque. band brakes, block brakes, internally expanded brakes, dynamometer- meaning, need and types . Simple numerical calculation on above items

UNIT- III

Marks : 14

Power Transmission : Drives : meaning, Classification, belt, chain, rope and gear drives. Flat and ' V ' belt, ratio of tensions . Slip length of belt calculation for open and cross belt drive. H.P. transmitted. Effect of centrifugal force, centrifugal tension, total tension maximum stress in belt. Maximum Power transmitted. Velocity for maximum H.P. condition. V-Belt drives, advantages and disadvantages of V-Belt drives. Rope Drives : Types, ratio of tensions, Designation of ropes as per B.I.S. **Chain Drive :** Classification, design a **Governors :** Functional difference with flywheel. Classification : Watt, porter, proell and hartnell- their construction and working. Sensitivity, stability, power and effort, hunting phenomenon and isochorism of governor of chain drives as per

UNIT- IV

Marks : 14

Cams and Followers : Need, Classification. motion of follower Displacement, velocity and acceleration diagrams uniform velocity, uniform acceleration and retardation. Simple harmonic motion. Cam profile for radial. offset knife edged follower. **Balancing of Machine Parts:** Concept Static and dynamic balancing of rotating parts. Simple numerical problems on static balancing of several masses in single plane graphical and analytical method.

UNIT- V

Marks : 14

Gear and Gear Train: Introduction , classification of gears , gear terminology , law of gearing velocity of sliding , forms of teeth –cycloid profile teeth , involutes profile teeth, path of contact, arc of contact. Interference

in involutes gear , minimum no of teeth in gear and pinion classification of gear train . Function of idler. Calculation of velocity ratio, train value of gear train- simple, compound epicyclic and reverted gear train, motor car gear box

Recommended Books

- 1** Theory of Machines by J.M. Shah & H.M. Jadhvani.
- 2** Theory of Machines by Abdulla Shariff
- 3** Theory of Machines by M.R. Malhotra & H.C. Gupta. (Technical India Pub.)
- 4** Theory of machines by P.L. Ballani .
- 5** Theory of Machines by Thomas Bevan .
- 6** Theory of Machines by S. S. Ratan.
- 7** Theory of Machines By R.S.Khurmi
- 8** Theory of Mechanism and Machine By Jagdish La

List of Experiment

1. Study of inversions of four bar chain mechanism
2. Study of inversions of single slider crank chain mechanism (a) crank slotted lever mechanism (b) Whitworth quick return motion mechanism
3. Dynamic force analysis of single cylinder four stroke engine
4. Study of flywheel
5. Study of governor
6. Study of different cam and follower
7. Study of different gear trains
8. Study of power transmission methods
9. Study of different types of break and dynamometer
10. Study of types of vibration and their measurement methods



INDUSTRIAL MANAGEMENT (DME-0404)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		Theory					Practical					Grand Total (H= D+G)				
		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal		Total (G= E+F)					
		L	T	P			Max (A)	Min	TW (B)	MST (C)			Max (E)	Min	LW (F)	
DME-0404	INDUSTRIAL MANAGEMENT	3	1	-	4	70	22	10	20	100	-	-	-	-	100	3 Hrs

UNIT- I

Marks : 14

INTRODUCTION :Definition and functions of management. Management theories - Decision, Quantitative ,Mathematical and Behavioral Science **MATERIALS MANAGEMENT** : Introduction, function, purchase systems, stock turn-over, ordered quantity. Inventory, need of inventory control, EOQ and simple numerical problems on EOQ. Safety stock, different techniques of inventory control, ABC analysis (simple treatment only). Stores management - storing procedure and store records.

UNIT- II

Marks : 14

PRODUCTION PLANNING AND CONTROL : Production systems, characteristics of each type, production and consumption rate. PPC functions, Gantt chart, advantages and preparation of Gantt chart (simple cases only), Critical ratio scheduling

VALUE ANALYSIS : Concept of cost and value, types of value, objectives and procedure of value analysis, VA test, DARSIRI method of VA.

UNIT- III

Marks : 14

PROJECT PLANNING BY NETWORK :Network definition, objectives. CPM and PERT, activity, event, network formation, Fulkerson's rule, dependency of activities, dummy activity, duration, EST, EFT, LST, LFT, EPO, LPO, Total float and Free float. Network analysis in tabular form

UNIT- IV

Marks : 14

INDUSTRIAL RELATIONS :Need, objectives and functions of personnel management, job analysis and job description, recruitment procedure, selection, difference between recruitment and selection, training and its advantages. Communication in industry - its need and importance, techniques and barriers of communication. Grievances - its meaning and factors responsible for grievances, procedure for handling grievances. Strikes and Lock-out. Motivation - meaning and its benefits, techniques of motivation. Morale - definition and importance, factors responsible for high morale. Job satisfaction - factors influencing job satisfaction.

UNIT- V

Marks : 14

SUPERVISION AND LEADERSHIP : Meaning and role of Supervisor in an industry. Older workers and their supervision. Concept of Leadership, qualities of good leader,

Recommended Books

1. Learning Package on Industrial Management
Publisher : TTTI, Bhopal.
2. CPM and PERT - Principles and Applications
By L.S.Shrinath
3. Industrial Engg. and Management
By O.P.Khanna.
Khanna Publisher.
4. Industrial Organisation and Management
By K.K.Ahuja
5. Modern Production Operation Management
By BuffaWilley Eastern Ltd. (latest edition)
6. Production Operation Management
By Goel B.S. Pragati Prakashan.



ELECTIVE – I (A) ENTREPRENEURSHIP(DME-0405)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
						Theory					Practical					
		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal		Total (G= E+F)					
		Max (A)	Min	TW (B)			MST (C)	Max (E)	Min	LW (F)						
DME-0405	Elective-I (A) ENTREPRE NURSHIP	3	1	-	4	70	22	10	20	100	-	-	-	-	100	3 Hrs

UNIT- I

Marks : 14

INTRODUCTION TO ENTERPRENEURSHIP Definition of Entrepreneur / Entrepreneur. Difference between Entrepreneurship / Entrepreneurship. Need for Entrepreneurship qualities of successful entrepreneur. Myths about Entrepreneurship .Classification of entrepreneurs on the basis of different criteria. Reasons for the failure of entrepreneurs.

UNIT- II

Marks : 14

INDUSTRIES AND BUSINESS ORGANIZATIONS Concept of Industry or Enterprise. Classification of Industries.(a) On the basis of capital investment. Tiny (Micro) Industry. Small Scale .Medium Scale .Large Scale.(b) Others. Rural Industry. Cottage Industry.(c) Forms of Business Organization. Proprietorship .Board & Co-operative .Partnership. Public Ltd..

INCENTIVES / CONCESSION / FACILITIES AVAILABLE Seed money .Incentive subsidies. Others (Phones, Lands etc).

UNIT- III

Marks : 14

PLANNING OF AN INDUSTRIAL UNIT (SSI)Pre- Planning Stage. Scanning the environment.

Market survey.Seeking information. product project selection.Implementation Stage.PPR Preparation.DIC registration. Arrangement of Land.Arrangement of Power. Obtaining NOC / Licenses from various departments. DPR Preparation .Seeking financial assistance.Commercial Production.Post Implementation stage.Permanent registration from D.I.C.Avaling Subsidies. Diversification / Modification.Setting up of marketing channel / Distribution. Private Ltd. IT Sector.

Government Co-operative / Undertakings.(d) Tiny small scale Industry. DefinitionIts significance in National Development.Govt. policies for SSI promotions

UNIT- IV

Marks : 14

ACHIEVEMENT MOTIVATION Historical perspective. Concept of achievement motivation.Significance of achievement motivation.Development of achievement motivation

UNIT- V

Marks : 14

FINANCIAL MANAGEMENT OF AN INDUSTRIAL UNIT (SSI)Tools of financial analysis.

Ratio analysis.Fund Flow / Cash flow analysis. Working capital and concepts. Financial accounting.

REFERENCES

1. Entrepreneurial Development Vol. I, II, III

By Vasant Desai Himalaya Publication

2. CEDMAP (Center of Entrepreneurial development Madhya Pradesh)

3. Udyamita Vikas

By Anand Prakashan



ELECTIVE – I (B) Marketing Management (DME-0405)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min	LW (F)			
DME-0405	Elective-I (B) Marketing Management	3	1	-	4	70	22	10	20	100	-	-	-	-	100	3 Hrs

UNIT- I

Marks : 14

MARKETING & CONCEPT

Evolution of marketing-a historical background Selected definitions of marketing .Different concept of marketing Benefits & significance of marketing Benefits & significance of marketing

Marketing environment

Internal & external factor . Demographic environment .Economic environment .Political environment Physical environment .Technological environment .Social & cultural environment .Micro & macro environment. Marketing planning & organization

UNIT- II

Marks : 14

Price management

The meaning & importance of pricing .Objectives of pricing .Factors affecting pricing –Internal & external .Pricing methods . Cost based pricing Break even pricing Demand based pricing Competition based pricing Product line pricing Tender pricing Affordability pricing Differentiated pricing .Pricing policies & setting the price

UNIT- III

Marks : 14

Understanding consumer

Factor influencing buyer behavior Information from variety of sources Socio-cultural environment of buyer Group influence Religion & language Concern about status Buying motives –Product & patronage motive Buying habits – Convenience, shopping and spatiality goods

UNIT- IV

Marks : 14

Marketing research & sales forecasting

Definition & importance of marketing research Steps in marketing research Defining problem Problem analysis Developing research design Developing research procedure Data collection –Primary & secondary Analyzing & interpretation Summarizing & preparing the research report Method of market research Necessity & purpose of sales forecasting Methods of sales forecasting

UNIT- V

Marks : 14

Sales management Designing the sales force Managing the sales force Recruitment & selection Training, compensation, control Supervision & direction Motivation of salesman Fixing sales quota Duties & responsibilities of sales manager

REFERENCES

1. Marketing management - Analysis, Planning & Control - Philip Kotler
2. Principles & practice of Marketing in India - C.B.Memoria & R.L.Joshi
3. Contemporary Marketing – Louis & Bone & David L. Kurtz
4. Essential of Management –Koontz
5. Marketing management- S.A. Sherlekar



Professional Activity (DME-0406)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam	
							Theory				Practical				Grand Total (H= D+G)		
		L	T	P		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)			
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min	LW (F)				
DME- 0406	Professional Activity / seminor			2	2	-	-	-	-	-	-	-				3 Hrs	

1. Industrial Visits

Structured industrial visits be arranged and report of the same shall be submitted by the individual student, to form a part of the term work. **(2 visits)**

Following are the suggested types of Industries/ Fields -

- Automobile manufacturing / auto component manufacturing units to observe the working of SPM
- Refrigeration and air conditioning manufacturing / servicing units / industries / workshops
- Automobile service stations for four wheelers
- Co-ordinate measuring machine to observe its construction working specifications and applications.
- Auto Engine Testing unit to gather details regarding the testing procedures/parameters etc.
- Wheel Balancing unit for light and/or heavy motor vehicles.
- Food processing unit.
- Textile industry machinery manufacturing / servicing units.
- Hydro electric and Thermal power plants.
- Engine testing, exhaust gas analysis and vehicle testing
- PWD workshop.

2. Group Discussion :

The students should discuss in group of six to eight students and write a brief report on the same, as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are (any one)-

- CNG versus LPG as a fuel.
- Petrol versus Diesel as a fuel for cars.
- Trends in automobile market.
- Load shading and remedial measures.
- Rain water harvesting.
- Trends in refrigeration Technology.
- Disaster management.
- Safety in day to day life.

ix) Energy Saving in Institute.

x) Nano technology

3 Seminar : (any 2 topics)

Seminar topic should be related to the subjects of fifth semester / topics from guest lectures. Students shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes for a group of 2 students

4.. **Individual Assignments :**

Any two from the list suggested

- a) Process sequence of any two machine components.
- b) Write material specifications for any two composite jobs.
- c) Collection of samples of different plastic material or cutting tools with properties , specifications and applications.
- d) Preparing models using development of surfaces.
- e) Assignments on bending moment , shear forces , deflection of beams and torsion chapters of strength of material.
- f) Select different materials with specifications for at least 10 different machine components and list the important material properties desirable.
- g) Select 5 different carbon steels and alloy steels used in mechanical engineering applications and specify heat treatment processes employed for improving the properties. Also give brief description of the heat treatment processes.
- h) List the various properties and applications of following materials – a.Ceramics, b. fiber reinforcement plastics,c. thermo plastic plastics d. thermo setting plastics,e. rubbers.

OR

Conduct **ANY ONE** of the following activities through active participation of students and write report

- i) Rally for energy conservation / tree plantation.
 - ii) Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc.
 - iii) Conduct aptitude , general knowledge test , IQ test
 - iv) Arrange **any one** training in the following areas :
 - a) Yoga. B) Use of fire fighting equipment and First aid
- Maintenance of Domestic appliances.



PROCESS PLANNING ESTIMATING AND COSTING (DME-0501)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min				
DME-0501	PROCESS PLANNING ESTIMATING AND COSTING	3	1	-	4	70	22	10	20	100	-	-	-	-	100	3 Hrs

UNIT- I

Marks : 14

Introduction to Planning: Process engineering, its scope and relation with product engineering and manufacturing, production system, types and characteristics.

Selecting and Planning the Process of Manufacture: Function, fundamental rules for the manufacturing process, basic design of product, influence of process engineering on product design, rechecking specifications, how materials selected affect process cost, using materials more economically, material cost balance sheet, eliminating operations, combined operations, selecting the process tooling, availability of equipment, make or buy decisions

UNIT- II

Marks : 14

Determining the Manufacturing Sequence: Operation, classifications and the manufacturing sequence, purpose of major process sequence.

Operation Routing - Routing uses, routing descriptions

Elements of Costs and their Allocation : Definition and objective of Estimating & costing, desirable conditions for a costing system, advantages of costing, elements of cost, , direct material cost, direct labour cost, direct expenses, prime cost overheads, indirect materials, indirect labour, indirect expenses administrative and selling expenses, analysis of total cost fixed cost and variable cost. Break even analysis.

UNIT- III

Marks : 14

Depreciation: Definition & Concept, causes of depreciation methods of depreciation calculation

Profit: Profit methods of increasing profit, effects of the methods on production, market and sales.

Budget : Definition, departmental budget and purpose of budgetary control.

Overhead Allocation: Definition and classification of overheads, methods of overheads allocation viz direct material cost, direct labour cost, man hour rate and machine hour rate, selection of appropriate method limitation of various methods

Actual Cost Estimation: Process Materials and Manpower - Terminology associated with estimation, Calculation of volume, weight and cost of materials

UNIT- IV

Marks : 14

Machine Shop: Process, Materials and Man power - Terminology used in machine shop estimation, use of standard table to determine time elements for various machining processes, use of formulas to calculate actual machining time for different operations of machine tools, Calculation of production operation time per product per cycle, batch production time

UNIT- V

Marks : 14

Foundry Shop: Process, Materials and Man- power - Pattern cost, production time for casting, material cost

of casting, moulding cost, batch production time

Forging Shop: Process, Materials and Man power - Forging gross and net weight of forging, forging losses, materials cost, labour cost and batch production cost.

Welding shop- process, materials and Man-power Gas and Arc. Welding terminology, production operation time, labour cost, materials cost, cost elements, batch production cost.

REFERENCE BOOKS

- 1 Cost Control by G. R. Sharma. (National Productivity Council)
- 2 Engineer' s Guide to Costing (Institute of cost works Accounts)
- 3 Mechanical Estimating And Costing by T.R. Banga and & S. C. Sharma
(Khanna Pub.)
- 4 Mechanical Estimation and Costing by R.L. Shrivastava & P.C. Jain (Jain Pub. House)
- 5 Mechanical Estimation And Costing (Resource Persons of Hill Publishing Co. T.T.T.L, Madras Tata McGraw Hill)
- 6 Machine Shop Estimation by Nordoff .
- 7 Learning Packing In Costing And Estimating (T.T.T.L. Bhopal Publication)
- 8 Process Engineering For Manufacturing By Eary and Johnson (Prentice Hall)
- 9 Fundamentals of Process Engineering by Benjamin W. Nibbel, Alon & Ropy
- 10 Produce Design And Process Engineering (McGraw Hill)
- 11 Yantriki Abhiyantriki Abhikalpan (Hindi) by K. D. Saxena. (Deepak Prakashan, Morar, Gwalior) .

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MACHINE TOOL TECHNOLOGY (DME-0502)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam	
		L	T	P		Theory					Practical				Grand Total (H= D+G)		
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal				Total (G= E+F)
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min	LW (F)				
DME-0502	MACHINE TOOL TECHNOLOG Y	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs	

UNIT- I

Marks : 14

Introduction : Concept of machine tool technology, needs, area of use etc

Metal Cutting Theory : Stages in cutting, factors affecting cutting, types of chips, built up edge (BUE) formation conditions and effect upon surface finish, definition of cutting force, feed force, radial force with the help of merchant circle diagram. Power requirement for each type of force. Tool geometry and influence of tool angles, desirable properties of cutting tool materials and their influences on the choice of tool material. Primary and secondary function of cutting fluids and properties of cutting fluids commonly used, types of cutting fluids. Cutting variables, tool wear and tool life. Taylor's tool life equation and cutting speed calculation. Economy of metal cutting

UNIT- II

Marks : 14

Lathe: Basic difference between centre, turret and Capston lathes, constructional details and specification. working principles and features of mechanical hydraulic and electrical copying system, rate of production, skill requirement, accuracy and cost of production. Working principles and types of automatic lathes, work holding and tool holding and tooling used for Capston and turret lathes, operation planning and tool layout

Shaper, Drilling & Boring Machine. Shaper- Construction, operation. application, Types of Drilling Machines, construction, operation and application, Horizontal and vertical boring machines constructional features, Jig boring machine, its construction, operation and application

UNIT- III

Marks : 14

Milling Machines: Define milling, Classification of milling machines, Principles, parts and their functions, types of table movement in universal milling machine, specifications of milling M/C. Conventional and climb milling, different milling operations and their application, milling cutters and tool angles, specification and cutter materials, use of arbor, collets and adapters machine attachments, methods of mounting the cutter, work holding devices, dividing heads. Direct, simple and differential indexing, selection of cutters, speed feed, procedure for setting up operations and inspections, maintenance of milling.

UNIT- IV

Marks : 14

Grinding Machines and Finishing processes : Definition of grinding and cutting action in grinding, types of abrasive materials and their properties, binding materials, grinding wheel classification and standard marking system, conditions for selection of grinding wheels. Balancing of grinding wheels, glazing and loading, methods of dressing and tracing, Principles of working of grinding machines, types of grinding process, functions of tool and work holding devices, feed arrangement, table drive in surface and cylindrical grinders. Types of lubricants and coolants used in grinding, grinding defects, their remedy and safety practices. Definition of honing, lapping, super finishing methods, equipments involved, Materials used, tolerances obtained and limitations, applications of honing and lapping processes.

Special purpose Machines: Difference between forming and generation of gears, principle of gear shaping, hobbing and shaving, rate of production accuracy and limitations. Thread production : thread rolling and thread milling. Broaching Machines : Definition of Broaching, types of broaches, broaching machines, advantages and limitations.

UNIT- V

Marks : 14

Jigs and Fixtures : Functions of Jigs and fixtures, 3-2-1 principle of location, Design criteria for simple jigs and fixtures

Machine Tool Drives : Requirements of machine tools, elements of machine tools and their purpose

Drive Systems : Stepped and step less drives, advantages and limitations of the gear box drives, function of feed box, types of feed gear boxes, working and advantages. Principle of straight line motion, multihandle, single lever and pre-selective control system

REFERENCE BOOKS

1. Workshop Technology Vol. I & II by Hajra Chaudhary, (Media Promoters & Publishers Pvt. Ltd. Mumbai)
2. Workshop Technology Vol. I, II and III by W.A.J. Chapman, (ELBS)
3. Manufacturing Processes & Systems by Phillip F. Ostwald & Jairo Minoz (John Willey & Sons.)
4. Production Technology – HMT Handbook (HMT)
5. Production Technology by Jain Gupta, (Khanna Publishers, New Delhi)
6. Manufacturing Processes by Begeman Amstead, (Wiley.)
7. Manufacturing Processes by Rusinoff, (Tata McGraw Hill Publishing Co. Ltd.)
8. Advanced Manufacturing Technology by Kalpakjian (Addison Wesley)
9. Manufacturing Technology – Metal Cutting & Machine Tools by P. N. Rao (TMH).
10. Workshop Technology Vol. II by Bawa H. S. (TMH).
11. Manufacturing Science and Technology Vol. I & II. by Suresh Dalela (Umesh Publication).
12. Workshop Technology Vol. I and II by B. S. Raghuvanshi (Dhanpat Rai & Sons).
13. Production Technology by R. K. Jain (Khanna Publishers, Delhi).
14. Vijayvargiya P.N.”Machine Tool” Shilp Vigyan (Hindi)

List of Experiment

- 1.Demonstration of formation of chips on a lathe, continuous, discontinuous and fractured by changing variables like rake angle, speed feed and depth of cut
- 2.Demonstration of built up edge on the finished tool point by changing speed and depth of cut while machining on a mild steel bar
- 3.Measuring of angles of a single point tool with reference to main plane with the aid of tin templates
- 4.Demonstration of preparing soluble oil cutting fluid and its use for improving the surface
- 5.Practice of drilling, boring and reaming on a lathe.
- 6.Practice of mounting cutters on the milling m/c and setting of m/s.
- 7.Practice of up milling and down milling operation



ENGINEERING MEASUREMENT AND MAINTENANCE PRACTICES (DME-0503)

Paper / Subject Code	Title of the Paper / Subject	Cred it Allot ted				Total Credit	Distribution of Marks										Durati on of Theory Exam
							Theory					Practical				Grand Total (H= D+G)	
		L	T	P		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)			
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min					LW (F)
DME-0503	ENGINEERING MEASURMENT AND MAINTENANCE PRACTICES	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3 Hrs	

UNIT- I

Marks : 14

Inspection: Meaning and application of inspection, daily life examples of inspection, concept of inspection as applied in industries. Effect of absence of inspection in an industry. Classification of inspection, function, meaning and advantages of each concept of inspection applied to metrology. Definition & meaning of precision. accuracy and error, need of precision measurement in industry, relationship between cost and accuracy, Interchangeability and selective assembly.

General Measurement Concept: Limits, fits and tolerances, selection of fit, calculation of fundamental deviation, tolerance and limits, selection of limits, tolerances and allowances.

Linear Measurement: Standards of length, classification and use of slip gauges, wringing process , precautions to be observed while using slip gauges, classification of linear measuring instrument, direct and indirect, construction and working of vernier callipers, micrometers, vernier height gauge, dial vernier and dial height gauge, finding least count, precautions. Dial gauge-types, construction, principle, accuracy and precautions, comparators - principle, types, working and field of application of Mechanical, electrical, optical and pneumatic comparators.

Angular Measurement: Need of angular measurement , various instruments used. Methods of measurement and field of application of protractor, angle gauges, Sine bars, spirit levels, clinometers and angle dekkor.

UNIT- II

Marks : 14

Straightness, Flatness, Squareness and Roundness Testing: General concept straight edge method, light gap and feeler gauge method, wedge method, use of V- Block and dial indicator for checking roundness.

Surface Roughness: Definition of primary and secondary texture , CLA value, R.M.S value, Types of surface measuring instrument, Working principle of Tomlinson mechanical surface finish recorder .

Screw Thread Measurement: Types of screw threads, threads nomenclatures, errors in screw thread, equipment required for measuring pitch, effective diameter and angle- procedure, advantages, limitation and precautions of each method

Limit Gauges: Definition of gauge and gauging, necessity of gauging in industrial practice, types according to use (shop inspection and reference gauge), limit gauges for specific use - screw pitch gauge, template feeler gauge, working tolerance of gauges, maximum and minimum metal conditions to tolerance. Selection and specification as per IS 2251, 3455, 3484 Wear allowances and its selection for design, Taylor's principle for design of ' Go ' and ' No Go ' gauges.

Transducers: Meaning, function, primary and secondary transducers . Classification- mechanical electrical, active, passive . Comparison of electrical and mechanical transducers, Working principle and application of resistance type, inductance type, capacitance type and piezo electric type.

UNIT- III

Marks : 14

Temperature measurement: Principle on which temperature measuring devices work- example of each type. Comparison of resistance thermometer and thermister. Thermocouple- Principle, material, and working. Working principle of optical and radiation pyrometers.

Introduction to Plant Maintenance: Introduction to maintenance, its need and scope, functions of the maintenance department. Different maintenance practices, procedure of corrective or break down maintenance, scheduled maintenance, preventive maintenance and predictive maintenance, methods of keeping records for condition of equipment, maintenance and replacement of parts, standard data for maintenance form, time standards (time to complete the maintenance job).

UNIT- IV

Marks : 14

Fault Tracing:- Trouble Shooting and Remedies, Sequence of activities in fault finding, methods and procedures of repair, various measures to prevent repetition of similar faults. Various remedial actions. **Maintenance Cost:** Definition, classification, Kelvin graph, procedures for obtaining cost data, maintenance cost control.

UNIT- V

Marks : 14

Wear and its effect: Definition of wear and types of wear, causes of wear, effects of wear on performance, wear reduction and component replacement.

Lubrication and Lubricating Systems: Need, properties of lubricant, selection criteria, principle of lubrication, centralized and decentralized lubrication systems, boundary, layer and hydrodynamic lubrication, use of greases and oil. Methods of preserving lubricants, handling of lubricants.

REFERENCE BOOKS

1. Engineering Metrology. by R.K. Jain (Khanna Pub. Delhi)
2. Engineering Metrology. by I.C. Gupta (DANPAT RAI & SONS)
3. Inspection & Gauging by Kennedy (The Industrial Press, 93, Wortinstreet, New york)
4. Engineering Metrology by K.J. Hume. (Macdonald & Co. Ltd. London)
5. Practical Metrology by K.J. Hume . (Macdonald & Co. Ltd. London)
6. Hand book of Industrial Metrology by R.S.T.M.E. (Prentice Hall of India)
- a. .Metrology & Gauging S.A.J. Parsons. . (Macdonald & Erass . Ltd. London) .
7. Industrial Instrumentation by D.P. Eckman (Wiley Easter Ltd. New Delhi)
8. Measurement Techniques in Mechanical Engineering by R.J. Sweeny

List of Experiment

1. Study of different type of fits with their practical application
2. Demonstration of concept of interchangeability using different objects
3. Measurement of various parameters of different objects using vernier caliper & Micro-meter
4. Measurement of various parameters of different objects using combination set.
5. Measure different angles using vernier protractor .
6. Measure different angles using angle gauges
7. Check for flatness, and parallelism of an object using a dial indicator and surface plate
8. Use of plug and ring gauges for checking holes and shafts.
9. Lubrication practices on different machine tools.
10. Maintenance practice on lathe and shaper m/c.



MORDERN PRACTICES IN MANUFACTURING AND MANAGEMENT (DME-0504)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Duration of Theory Exam
		Theory					Practical					Grand Total (H= D+G)				
		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal		Total (G= E+F)					
		Max (A)	Min	TW (B)			MST (C)	Max (E)	Min	LW (F)						
DME - 0504	MORDERN PRACTICES IN MANUFACTURING AND MANAGEMENT	3	1	-	4	70	22	10	20	100	30	9	20	50	150	3 Hrs

UNIT- I

Marks : 14

Unconventional Machining Methods: Limitations of conventional machining. Working Principle, operating parameters and application of unconventional machining. Electro Chemical Machining, Chemical Machining, Electric Discharge Machining, Electron beam Machining, Ultra Sonic Machining, Abrasive Jet Machining, LASER Beam Machining, Plasma Arc Machining.

UNIT- II

Marks : 14

Coating & Deposition processes: plating & related processes, physical vapor deposition, chemical vapor deposition, Organic Coating,

Rapid Prototyping: Need, Fundamentals, Technologies and applications

UNIT- III

Marks : 14

Manufacturing Automation: Introduction to Numerical control, Computer Numerical control, Direct Numerical Control, CNC Millings M/c, CNC Turning M/c, Turn mill centers, flexible manufacturing system, Preliminary idea of robotics. Introduction to G and M code as used in part programming. Use of Canned cycles. Simulation of parts, drawing generated through CAD, its modeling and transfer

UNIT- IV

Marks : 14

Flexible Manufacturing systems: Elements, Limitations, Feature & Characteristics, New development.

Robotics: Introduction to robotics, concept, and application, A4 level automation

Total Quality Management (TQM)-Evolution, definition, preparation stages in TQM implementation, Integrated TQM model, customer satisfaction, Employee involvement. Continuous Process Improvement, 5s, Kaizen, and KANBAN, Supplier Partnership, Performance Measures.

UNIT- V

Marks : 14

Just in Time systems (JIT) – Introduction, application and advantages

Total Productive Maintenance (TPM)- Introduction, Plan, New Philosophy Improvement needs, Six Major losses Life cycle costing, work groups.

Six Sigma systems: Basics of Six Sigma, competitive advantage of implementing six sigma systems. Briefs of what, why and how six sigma works to initiate and sustain greater productivity, profitability and customer satisfaction rates. **Lean manufacturing** : System design for Lean manufacturing adopting.

REFERENCE BOOKS

1. Fundamentals of Manufacturing processes , G. K. Lal & S. K. Choudhary, Narosa Publishing House.
2. A Text book of production Technology (Manufacturing Processes) by P.C. Sharma, S. Chand & Co.
3. Manufacturing Technology Vol. II By P.N. Rao, Tata McGraw Hill Publishing Co.
4. Fundamentals of Modern Manufacturing By Mikell P. Groover, Wiley Student Edition.
5. Quality Management By Donna C.S. Summers Pearson Prentice Hall
6. Total Quality Management By L. Sugandhi & Anand A. Samuel Prentice Hall of India Pvt. Ltd.

List of Experiment

1. Visit to a nearby installation / Study and practice at least two of the following:
 - a. NC
 - b. CNC
 - c. DNC
 - d. CNC Milling
 - e. CNC Turning
2. Manual part programming (for simple jobs) on a CNC Milling or Turning machine
3. Visit to a nearby factory and estimation of six major losses on the critical machine
4. Prepare a plan for getting ISO 9001 Certification for an Industry
5. Seminar on TQM Philosophy, TPM.
6. Seminar on Six Sigma practice



INDUSTRIAL ENGINEERING (DME-0505)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min				
DME-0505	INDUSTRIAL ENGINEERING	3	1	-	4	70	22	10	20	100	30	-	20	50	150	3 Hrs

UNIT- I

Marks : 14

Introduction: Definition of industry and industrial engineering, scope and role of industrial engineering fields of applications. **Productivity:** Production and productivity, production systems and their impact on productivity, its significance and benefits of higher productivity. Long term and short term factors affecting productivity, productivity cycle. **Work Study:** Introduction, its relation with productivity aims, objectives and application of work study, basic procedure and techniques of work study . Human factors in work study. Role of manager, supervisor and workers. Working conditions, environment of industry affecting work study.

UNIT- II

Marks : 14

Method Study: Definition objectives, basic procedures of methods study. Recording techniques, operation process chart, flow process chart, machine chart, flow diagrams, string diagrams, two hand process charts, questioning technique procedure to develop, install and maintain new methods.

Principles of Motion Economy: Meaning, basic rules design of efficient work place- layout, classification of human body movements and their preferred order.

Material Handling and Plant Layout : Importance and its effects on productivity, requirements of good material handling system, classification and selection of material handling equipment. Requirements of good layout. Effect of bad layout, Factors affecting plant layout, types of layout, advantages and limitations of each type of layout selection of layout, factors affecting the plant location.

UNIT- III

Marks : 14

Micro Motion Study: Definition and objectives, techniques of micromotion study, therbligs and their symbols, use of therbligs, SIMO chart and its application.

Work Measurement: Definition, Basic procedure and technique to work measurement. Stop watch time study, types of stop watch study, factors considered in selecting a job for time study, qualified and representative workers, procedure of stop watch time study, job element and their need of identification, general rules for break down of job into elements, work cycle, methods of time measurement, performance rating, its meaning, standard rating , rating of operators, conditions for operators variation at work place rating scales, rating factors, calculation of basic time. Allowances purpose ,types. Calculation of standard time synthesis method- meaning, data, complication, advantages and limitations.

UNIT- IV

Marks : 14

PMTS- Definition principle and use, calculation of standard time.

MIM - Meaning, tables and use. Application of MIM analysis for LH-RH charts, calculation of standard time. **Work/ Activity Sampling:** Definition, statistical basics, determination of number of observation for given accuracy, sources of error, application and calculation of standard time.

MOST Technique for work measurement: Definition of terms, concept of the MOST, Basic MOST sequence models, Time Units, Parameter Indexing, Method Accuracy and Sensitivity, Levels of Work Measurement, Compatibility of MOST systems, Application of MOST.

UNIT- V

Marks : 14

Job Evaluation, Wages and Incentives: Definition, need and scope of job evaluation. Job evaluation systems and their comparative merits and demerits and limitations. **Wage:** Definition, wage components, wage fixation, real, minimum and fair wage. Financial and nonfinancial incentives and their examples. Wage plans- Halsey, Taylor, differential plan, Gantt task and bonus plan, 100 % premium plan.

REFERENCE BOOKS

- 1 Introduction To Industrial Engineering by Philip Hicks (McGraw Hills)
- 2 Productivity Means Property (Asian Productivity Organisation, Tokyo)
- 3 Introduction To Work Study (International Labour Office)
- 4 Work Study by M.D. Schmid & Subrammaniam
- 5 Motion and Time Study by Ralph M. Barnes John Willey New York
- 6 Work Study by Dalela.
- 7 Wage Administration by D.K. Roy. (N.P.C. Publication).
- 8 Quality Assurance Engineering by M.D. Schmid & Subramaniam.
- 9 S.Q.C. by E.L.Grant.
- 10 S.Q.C. by R.C. Gupta.
- 11 Industrial Engineering & Management by O. P. Khanna.
- 12 Industrial Engineering by Saxena.
- 13 MOST Work Measurement Systems, Kjell B. Zandin, Marcel Dekkar Inc. New York
- 14 Material Handling Equipment (N. Rudenki Place Pub)
- 15 Learning Package In Industrial Engineering by O.D.C. , T.T.T.I Bhopal .
- 16 Laboratory Manual Industrial Engineering by O.D.C. , T.T.T.I Bhopal .



Field Visit (DME-0506)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min	LW (F)			
DME-0506	Field Visit / seminor			2	2	-	-	-	-	-	-	-				3 Hrs

1. Industrial Visits

Structured industrial visits be arranged and report of the same shall be submitted by the individual student, to form a part of the term work. **(2 visits)**

Following are the suggested types of Industries/ Fields -

- Automobile manufacturing / auto component manufacturing units to observe the working of SPM
- Refrigeration and air conditioning manufacturing / servicing units / industries / workshops
- Automobile service stations for four wheelers
- Co-ordinate measuring machine to observe its construction working specifications and applications.
- Auto Engine Testing unit to gather details regarding the testing procedures/parameters etc.
- Wheel Balancing unit for light and/or heavy motor vehicles.
- Food processing unit.
- Textile industry machinery manufacturing / servicing units.
- Hydro electric and Thermal power plants.
- Engine testing, exhaust gas analysis and vehicle testing
- PWD workshop.

2. Group Discussion :

The students should discuss in group of six to eight students and write a brief report on the same, as a part of term work. The topic of group discussions may be selected by the faculty members. Some of the suggested topics are (any one)-

- CNG versus LPG as a fuel.
- Petrol versus Diesel as a fuel for cars.
- Trends in automobile market.
- Load shading and remedial measures.
- Rain water harvesting.
- Trends in refrigeration Technology.
- Disaster management.
- Safety in day to day life.
- Energy Saving in Institute.
- Nano technology

3 Seminar : (any 2 topics)

Seminar topic should be related to the subjects of fifth semester / topics from guest lectures. Students shall submit a report of at least 10 pages and deliver a seminar (Presentation time – 10 minutes for a group of 2 students)

4.. Individual Assignments :

Any two from the list suggested

- a) Process sequence of any two machine components.
- b) Write material specifications for any two composite jobs.
- c) Collection of samples of different plastic material or cutting tools with properties , specifications and applications.
- d) Preparing models using development of surfaces.
- e) Assignments on bending moment , sheer forces , deflection of beams and torsion chapters of strength of material.
- f) Select different materials with specifications for at least 10 different machine components and list the important material properties desirable.
- g) Select 5 different carbon steels and alloy steels used in mechanical engineering applications and specify heat treatment processes employed for improving the properties. Also give brief description of the heat treatment processes.
- h) List the various properties and applications of following materials – a.Ceramics, b. fiber reinforcement plastics,c. thermo plastic plastics d. thermo setting plastics,e. rubbers.

OR

Conduct **ANY ONE** of the following activities through active participation of students and write report

- i) Rally for energy conservation / tree plantation.
 - ii) Survey for local social problems such as mal nutrition, unemployment, cleanliness, illiteracy etc.
 - iii) Conduct aptitude , general knowledge test , IQ test
 - iv) Arrange **any one** training in the following areas :
 - a) Yoga. B) Use of fire fighting equipment and First aid
- Maintenance of Domestic appliances.



DESIGN OF MACHINE ELEMENTS (DME-0601)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
						Theory					Practical					
		L	T	P		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min			LW (F)	
DME- 0601	DESIGN OF MACHINE ELEMENTS	3	1	2	6	70	22	10	20	100					100	3hr

UNIT- I

Marks : 14

Introduction to Machine Design: Machine and machine elements, bolt, nut, axle, shaft, bearing, coupling, clutch, belt, rope, chain, gear etc. Specific purpose of piston connecting rod, crank shaft, turbine blade etc. Factors influencing design of machine elements - Strength stiffness, light weight, wear resistance minimum size, availability, processability, safety, compliance with standards. Basic design procedure. Selection of mechanism, material, shape and size. Preliminary design, applying checks, revision of design final design. Factors influencing selection of materials. Type of failures, types of forces. Types of loading. Safe design stress and factors of safety

UNIT- II

Marks : 14

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

UNIT- III

Marks : 14

Design of Riveted Joint: Type of fastening - temporary and permanent, types of riveted joint - lap and butt joint, definition of common terms like pitch, back pitch, efficiency, margin. Modes of failure of riveted joints. Design of Riveted Joint: Type of fastening - temporary and permanent, types of riveted joint - lap and butt joint, definition of common terms like pitch, back pitch, efficiency, margin. Modes of failure of riveted joints.

UNIT- IV

Marks : 14

Design of Simple Welded Joints: Definition of welding advantages of welding over riveted joints, types of welded joints, strength of the butt weld, types of fillet joints and strength of fillet joint problem solving. Design of Threaded Joints: Types of threads and their proportions, Types of bolts, proportion of nut and bolt dimensions, design of bolt, designation of threads as per I.S. codes

UNIT- V

Marks : 14

Design of Clutch: Pivots and Collars friction. Horse power lost assuming uniform pressure and uniform wear. Clutch- need, classification and construction and working of single and multi plate clutches, horse power transmitted by single and multi plate clutches

REFERENCE BOOKS

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

List of Experiment

- 1 Design of Riveted Joint
- 2.cotter and knuckle joints
3. Design of Simple Welded Joints
4. Design of Clutch



AUTOMOBILE ENGINEERING (DME-0602)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		L	T	P		Theory					Practical				Grand Total (H= D+G)	
						End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)		
						Max (A)	Min	TW (B)	MST (C)		Max (E)	Min				
DME-0602	AUTOMOBILE ENGINEERING	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3hr

UNIT- I

Marks : 14

Introduction: Meaning of automobile, elements of automobile, classification of automobile, layout of chassis, various operating systems used in automobile **Auto Engines:** Meaning of I.C. Engines, Classification on the basis of cycle, fuel used, ignition system, number of cylinders, number of strokes etc. Otto/ Diesel cycles. Two stroke and four stroke engines, merits and demerits, scavenging comparison of petrol and diesel engines. Cooling systems, firing order. Valve timing diagrams. Engine rating. Lubrication, factors affecting lubrication, Lubrication systems, Fuel Supply system, fuel pump - SPU electric pump. Carburettor, air fuel ratio, Solex and amal carburetor

UNIT- II

Marks : 14

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

UNIT- III

Marks : 14

Transmission System: Clutch : necessity, function of its components, Types –single & multi plate and centrifugal clutches, clutch actuating mechanism and fluid flywheel. Gear Boxes : necessity, Types of gear boxes and their working. Importance of gear shifting mechanism, gear box troubles, their causes and remedies. **Final Drives System:** Drive mechanism in cars, purpose and working of propeller shaft, construction of propeller shaft. Types of universal joints. Rear axle assembly : function of differential - constructional features and working. Arrangement of semi floating and fully floating rear axle, and their troubles.

UNIT- IV

Marks : 14

Braking system: Introduction, classification of brakes, construction & working of mechanical brake, hydraulic brake, Electric brake , advantages and disadvantages of each type of brakes, Servo brake system. **Front Axle and Steering:** Function of front axle, axle type, wheel alignment and its elements toe-in, toe -out. King pin inclination. Ackerman steering principle. Camber and castor angle . Elements of steering - types and working , Under and over steering, power steering and advanced steering systems

UNIT- V

Marks : 14

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

Reference Book

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

List of Experiment

1. Study of automobile chassis and function of various components
- 2 Study of various components used in auto vehicles.
 - (a) Engine (b) Transmission system
 - (c) Final Drive (d) Braking system
 - (e) Electrical system (f) Steering Mechanism
3. Study of various elements of scooter/ car/bus servicing
4. Engine tuning and adjustment for smooth, idle speed of a scooter/moped/ motor cycle/ car etc.
- 5 Starting troubles and their rectifications
6. Rectification procedure for :
 - (a) Air bleeding. (b) Brake adjustment.
 - (c) Problems in Carburettor. (d) Wheel alignment
7. Collect specifications for 2/3/4 Wheeler and prepare a comparison table and their manuals



REFRIGERATION & AIR CONDITIONING (DME-0603)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Duration of Theory Exam
		Theory					Practical					Grand Total (H= D+G)				
		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)						
		Max (A)	Min	TW (B)			MST (C)	Max (E)	Min		LW (F)					
DME-0603	REFRIGERATION & AIR CONDITIONING	3	1	2	6	70	22	10	20	100	30	09	20	50	150	3hrs

UNIT- I

Marks : 14

Introduction to Refrigeration: History of refrigeration, meaning and need of refrigeration, difference between refrigeration and Cryogenics, production of refrigeration by various methods. Refrigeration systems and their classification on the basis of use, size and application **Thermodynamics of Refrigeration:** Revision of I and II law of thermodynamics, comparison between heat engine, heat pump and refrigerator using heat reservoir, heat source, sinks & work. Unit of refrigeration, refrigeration effect, work input, coefficient of performance, Reversed carnot cycle with gas and vapour as working substance. P-V, T-S and schematic diagrams. Calculation of refrigeration effect, work C.O.P and Heat rejection. Practical difficulties with carnot cycle. with gas and vapour as working substance. Vapour compression refrigeration cycle its schematic diagram and representation on P-V,T-S and P-H diagrams. Wet, dry and superheated vapour compression. Use of tables and charts of common refrigeration for calculating work input, refrigeration effect and C.O.P deviation of actual vapour compression system form, theoretical cycle and reasons for deviation. Effect of sub-cooling and superheating on vapour compression system.

UNIT- II

Marks : 14

Basic Components of Vapour Compression Refrigeration Systems: Basic components of vapour compression refrigeration system and their function- compressor, condensor, expansion device and evaporator. Compressor : Classification, reciprocating- open and hermetically sealed rotary, and their field of application. Working of single and double acting reciprocating compressor. Working of hermetically sealed compressor. Condensor : Types (Water cooled, air- cooled evaporative) and their field of application and brief description. Expansion: Types of evaporators (Dry expansion and flooded type, and principle of their working and application **Vapour Absorption Refrigeration System:** Comparison between vapour compression and vapour absorption system, the theoretical and practical vapour absorption system, Lithium bromide- water absorption system. Three fluid system. (Electrolux syste).

UNIT- III

Marks : 14

Properties of Commonly Used Refrigerants: Definition, primary and secondary refrigerants, designation of refrigerant, examples of each type. Desirable properties of good refrigerant Azeotropic mixtures. Environmental problems related to halogenated hydrocarbons as refrigerants. New developments **Refrigeration Plants:** Layout and working of Ice plant, cold storage. Water cooler and household refrigerator **Refrigeration Fittings, Tools, Charging and Leak Detection:** Tubing, Materials heat treatment specifications. **Tools:** Use and types of cutter, spring and mechanical bender flaring and swaging tools pinch of tool, wrenches, Pliers etc. **Fittings:** Flared tube fittings, unions, elbows tee **Joints:** Making soldered and brazed joints. Installation and removal of servicing gauge and testing manifold: Working of suction and discharge compressor service values.

UNIT- IV

Marks : 14

Charging of Refrigerant: evacuating a refrigeration system, removing, refrigerant form a refrigeration system leak detection methods. **Introduction to Air Conditioning :** Meaning of air conditioning, application of Air conditioning in theatres, community halls, industry, restaurants, hospitals and windows air conditioner.

UNIT- V

Marks : 14

Psychometry: psychometric - definition, terminology, psychometric charts and tables, using psychometric charts for solving simple problems. **Air Conditioning Systems:** Central and unit air conditioning, residential and commercial air conditioning system. Types of fans and ducts - air distribution systems. Thermal insulator, methods and insulation cladding **Maintenance and Repairing of Refrigeration and Air Conditioning Units:** Fault location in vapour compression system and air conditions. Repair and maintenance of house hold refrigerators. Water coolers and air conditioners

Reference Books

- 1 Refrigeration and Air Conditioning by C.P. Arora (Tata Mc Graw Hill)
- 2 Ashrae Guide and Data Book by Ashrae (Ashrae)
- 3 Andels Refrigeration and Air Conditioning Guide. by E.P. Anderson (Tarapowala)
- 5 Refrigeration and Air Conditioning by A.S. Sarao & P.C. Gaabi (Satya Prakashan)
- 6 Modern Refrigeration Practice by G.P. King (McGraw Hill)
- 7 A Course in Refrigeration & Air Condition by S. Lomkkundwar & S.C. Arora (Dhanpat Rai & Sons)
- 8 Refrigeration and Air Conditioning by R.C. Jorden & S.B. Priester (Prentice Hall)
- 9 Basic Refrigeration and Air Conditioning by D. Hazre & D.N. Chakravarty (Dhanpat Rai & Sons)
- 10 Principles of Refrigeration by R. W. Marsh (Taraporwala)
- 11 Refrigeration and Air Conditioning by P.L . Ballancey. (Khanna Publisher

List of Experiment

1. Study of water cooler with respect to
 - (a) Refrigerant used and flow path.
 - (b) Electric circuit
 - (c) Water flow path
 - (d) Specification of main components used.
 - (e) Capacity of the unit
2. Study of packaged/ Window/ Air conditioner with respect to-
 - (a) Capacity.
 - (b) Electric circuit
 - (c) Air flow path.

(d) Specification of main components used.

(e) Refrigerant used

3. Study of Ice-plat/ refrigeration cold storage with respect to-

(a) Electric circuit

(b) Refrigerant used and its flow path.

(c) Capacity.

(d) Specification

4. Charging/Recharging the system refrigerator, water cooler, air Conditioner

5. Determination of refrigeration capacity.

Power input, C.O.P of the given unit available in the institution



PROJECT (DME-0604)

Paper / Subject Code	Title of the Paper / Subject	Credit Allotted			Total Credit	Distribution of Marks										Durati on of Theory Exam
		Theory								Practical				Grand Total (H= D+G)		
		End Sem.		Internal		Total (D= A +B+C)	End Sem.		Internal	Total (G= E+F)						
		Max (A)	Min	TW (B)			MST (C)	Max (E)	Min		LW (F)					
DME-0604	Project	-	-	12	12	-	-	-	-	-	200		100	300	300	3hrs

The examiners will look for the following points when assessing your project :

- The way in which you have applied existing knowledge to your project.
- Mental skill in manipulations of formulas etc.
- The quality of physical skills in the manufacture and assembly of apparatus and test pieces etc.
- Analysis of test results to produce a conclusion.
- The ability to produce a complete project from all the individual elements.
- Skill in evaluating between, for instance, various design alternatives.
- The way in which the initial specifications are interpreted and translated in to a finished project.
- The quality of the creative aspect of the design to meet the given specifications.
- The quality of the written content of the report.
- The quality to the graphical content of the report.

The assessment of your project will count towards your final diploma, and the accompanying marking grid shows how the marks are allotted in your particular case.

Remember that this is your project. The supervisor is there to give guidance if and when it is necessary. He will start you off on the right lines but will only intervene at the later stages, if asked.