

MVN University, Palwal
Scheme of Studies, Syllabus & Examinations
Integrated B.Tech(M.E) 2nd Year
Semester - III

Sr. no	Course title	Paper code	Teaching schedule			Total hours	Credit
			L	T	P		
1	Math-III	AHL033	4	1	0	5	5
2	Thermodynamics	MEL 033	3	1	0	4	4
3	Applied Mechanics	MEL 035	3	1	2	6	5
4	Manufacturing Technology –I	MEL 037	3	0	2	5	4
5	Machine Drawing	MEL 039	1	0	4	5	3
6	Language Communication - III	AHP 031	1	0	2	3	0
7	Electrical Machines	EEL 039	3	1	2	6	5
	Total		18	4	12	34	26

MATHEMATICS –III

AHL-033	MATHEMATICS -III	L	T	P	Cr
		4	1	0	5

SECTION A

UNIT – I

Multiple Integrals & Beta and Gamma functions: Beta and gamma functions and relationship between them. Dirichlet's integral , Double integral, change of order of integration, double integral in polar coordinates, triple integral , change of variables.

UNIT – II

Vector Calculus: Differentiation of vectors, Scalar and Vector point functions, Gradient, Divergence, Curl, Directional derivatives, Properties. Integration of vector functions and Line integrals

UNIT – III

Interpolation and Curve Fitting: Introduction to interpolation, Lagrange approximation, Newton polynomials, least squares lines, curve fitting.

SECTION B

UNIT – IV

Solution of Algebraic Equations: Bisection method, Regula-falsi method, Newton-Raphson method and secant methods.

UNIT – V

Solution of Linear Systems: Gauss elimination method, UV factorization, Iterative method- Gauss seidal and Jacobi's method.

UNIT – VI

Statistics: Concepts of discrete and continuous data -Presentation of data , Cumulative frequency Mean, Median, Mode, Standard Deviation, Variance, and Coefficient of Variation for raw and classified data.

Text Books:

1. Higher Engineering Mathematics by B.S. Grewal; Khanna Publishers, Delhi
2. Numerical Methods by B.S. Grewal; Khanna Publishers, Delhi

Reference Books:

1. Numerical Methods by Jain, Iyenger, Jain

THERMODYNAMICS

MEL 033	THERMODYNAMICS	L	T	P	Cr
		3	1	0	4

SECTION A

UNIT-I

Principal of Thermal Engineering: Introduction, Thermodynamics Properties – Intensive and Extensive, Property, Path, Process, System, Surroundings, Heat and Work, Enthalpy and Internal Energy, Problems.

Gas Laws: Boyle's Law, Charle's Law, Joule's Law, Characteristic Gas Equation, Gas Constant, Universal Gas Constant, Problems.

UNIT-II

Law of Thermodynamics: Zeroth Law of Thermodynamics, Irreversible Process, First Law of Thermodynamics (concept only), Limitations of First Law of Thermodynamics, Second Law of Thermodynamics (concept only), Thermal Efficiency and Heat Pump, Heat Engine and Heat Sink, Concept of Entropy, Constant Volume, Constant Pressure, Isothermal, Hyperbolic, Adiabatic, Polytropic, Throttling and Free Expansion Processes, Application of Steady Flow Energy Equation to Turbine, Pump, Compressors, Nozzle, and Evaporator, Problems.

UNIT-III

Air Cycles: Carnot Cycle, Otto Cycle, Diesel Cycle, Dual Combustion Cycle, Problems.

Fuels and Combustion: Types of Fuels, Properties of Fuel, Calorific Value of Fuels, Fuel Combustion, Air Requirement for Complete Combustion of Fuel, Fuel Gas Analysis, Alternative Fuels for Automobiles- CNG,LPG, Bio-Diesel Problems.

SECTION B

UNIT-IV

Air Compressors: Reciprocating air Compressor, Centrifugal Compressor, Working of Single Stage and Double Stage Compressor and Applications, Rotary Air Compressor, Working of Fan, Blower, Booster and Super Charger, Principles of Turbo Charger Problems

UNIT-V

IC Engine Testing: Testing of I.C. Engine and Determination of IHP, BHP and FHP. Mechanical, Efficiency and Thermal Efficiency, Specific Fuel Consumption, Heat Balance Sheet Problems

Heat Transfer:Modes of Heat Transfer, Fourier's Law, Steady State Conduction, Composite Structures, Natural and Forced Convection Problems.

UNIT-VI

Refrigeration and Air Conditioning:Refrigeration Methods, Unit of Refrigeration, Reversed Carnot Cycle, Heat Pump, Coefficient of Performance, Rating of Refrigeration Machines Principles of Air Conditioning, Concept of Human Comfort, Introduction to Air Conditioning System. Components of Air Conditioning System and Their Function..

Text Books:

1. Engineering Thermodynamics by PK Nag; Tata McGraw Hill, Delhi
2. Basic Engineering Thermodynamics by Roy Chaudhary; Tata McGraw Hill, Delhi
3. Basic Thermodynamics by PB Joshi and US Tumne; Pune VidyarthiGrahPrakashan

Reference Books:

1. Engineering Thermodynamics by CP Arora; Tata McGraw Hill, Delhi
2. A Treatise on Heat Engineering by VP Vasandani and DS Kumar; Metropolitan Book Company.

APPLIED MECHANICS

MEL 035	APPLIED MECHANICS	L	T	P	Cr
		3	1	2	5

SECTION-A

UNIT-I

Introduction: Concept of Engineering Mechanics, Definition of Mechanics, Statics, Dynamics, Application of Engineering Mechanics in practical fields. Definition of Applied Mechanics. Basic Quantities and derived Quantities of basic units and derived units Different Systems of units (FPS, CGS, MKS and SI) and their conversion from one to another for Density, Force, Pressure, Work, Power, Velocity, Acceleration .Concept of Rigid Body, Scalar and Vector quantities.

UNIT-II

Laws of Forces: Definition of Force, Measurement of Force in SI units, its representation, Types of Force: Point force/Concentrated Force & Uniformly distributed Force, Effects of Force, Characteristics of a Force Different Force systems (Coplanar and non-Coplanar), Principle of transmissibility of Forces, Law of Super-position Composition and resolution of coplanar Concurrent Forces, Resultant Force, Method of composition of Forces, Laws of Forces, Triangle law of Forces, Polygon law of Forces - Graphically, Analytically, Resolution of Forces, Resolving a Force into two Rectangular components Free body diagram Equilibrant force and its determination Lami's theorem (concept only) - Simple problems.

UNIT-III

Moment: Concept of Moment, Moment of a Force and units of Moment, Varignon's theorem (definition only) Principle of Moment and its applications (Levers – Simple and Compound, Steel yard, Safety valve, Reaction at support) Parallel Forces (like and unlike parallel force), Calculating their resultant Concept of couple, its properties and effects. General conditions of equilibrium of bodies under coplanar forces, Position of resultant force by moment, Simple problems.

SECTION-B

UNIT-IV

Friction: Definition and concept of friction, Types of friction, Force of friction Laws of static friction, Coefficient of friction, Angle of friction, Angle of repose, Cone of friction Equilibrium of a body lying on a horizontal plane, Equilibrium of a body lying on a rough inclined plane.

UNIT-V

Centre of Gravity: Concept, Definition of centroid of plain figures and centre of gravity of symmetrical solid bodies. Determination of centroid of plain and composite lamina using moment method only, Centroid of bodies with removed portion Determination of center of

gravity of solid bodies - Cone, Cylinder, Hemisphere and Sphere; composite bodies and bodies with portion removed. Simple problems.

UNIT-VI

Simple Machines: Definition of effort, Velocity ratio, Mechanical advantage and Efficiency of a machine and their relationship, Law of machines, Simple and compound machine (Examples) Definition of ideal machine, Reversible and self-locking machine. Effort lost in friction, Load lost in friction, Determination of maximum Mechanical Advantage and Maximum Efficiency System of pulleys (first, second, third system of pulleys), determination of Velocity ratio, Mechanical Advantage, Efficiency Working principle and application of Wheel and Axle, Weston's Differential Pulley Block, Simple screw jack, Worm and worm wheel, Single and Double purchase winch crab, Expression for their Velocity ratio and field of their application-Simple problems.

Text Books:

1. A Text Book of Applied Mechanics by S Ramamurtham, Dhanpat Rai Publishing Co. Ltd.
2. Applied Mechanics By, Col. Harbhajan Singh, TL Singha and Parmod Kumar Singla, Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
3. A Text Book of Engineering Mechanics (Applied Mechanics) by RK Khurmi; S Chand and Co. Ltd., New Delhi.

Reference Books:

1. A Text Book of Applied Mechanics by RK Rajput; Laxmi Publications, New Delhi..
2. Text Book of Applied Mechanics by Birinder Singh, Kaption Publishing House, New Delhi.

APPLIED MECHANICS-LAB

List of Practical:

1. Verification of the polygon law of forces using greaves and apparatus.
2. To verify the forces in different members of jib crane.
3. To verify the reaction at the supports of a simply supported beam.
4. To find the mechanical advantage, velocity ratio and efficiency in case of an Inclined plane.
5. To find the mechanical advantage, velocity ratio and efficiency of a screw jack.
6. To find the mechanical advantage, velocity ratio and efficiency of worm and worm wheel.
7. To find mechanical advantage, velocity ratio and efficiency of single purchase crab.
8. To find out center of gravity of regular lamina.
9. To find out center of gravity of irregular lamina.
10. To determine coefficient of friction between three pairs of given surface.

MANUFACTURING TECHNOLOGY-I

MEL 037	Manufacturing Technology-I	L	T	P	Cr
		3	0	2	4

SECTION A

UNIT I

Molding Process: Molding Sand: Various Types of Molding Sand, Properties of Molding Sand viz. Permeability, Refractoriness, Adhesiveness, Cohesiveness, Strength, Flowability and Collapsibility.

Mould Making: Types of Moulds, Step Involved In Making a Mould, Molding Processes- Bench Molding, Floor Molding, Pit Molding and Machine Molding

Pattern Making: Types of Pattern, Pattern Material, Pattern Allowances.

Introduction to Cores: Core Boxes and Core Materials, Core Making Procedure, Core Prints, Positioning of Cores.

UNIT II

Casting Process: Working and Application of Die Casting – Hot Chamber and Cold Chamber Casting, Centrifugal Casting.

Gating and Rising System: Elements of Gating System, Types of Risers, Directional Solidification.

Melting Furnace – Types of Melting Furnace, Construction and Working of Cupola Furnace

Casting Defects – Different Types of Casting Defects, Testing of Defects

UNIT III

Extrusion and Drawing: Type of Extrusion – Hot and Cold, Direct and Indirect, Tube Drawing, Wire Drawing.

Metal Forming Processes: Introduction, Metal Forming Operations – Shearing, Piercing, Trimming, Punching, Notching, Shaving, Embossing, Stamping, Coining. Die Forging, Press Forging, Upset Forging, Draw Down, Swaging

SECTION B

UNIT IV

Welding Process: Introduction, Principle of Welding, Classification of Welding Processes, Advantages and Limitations of Welding, Industrial Applications of Welding, Arc Welding Principle of Operation, Arc Welding Machines and equipments, A.C and D.C arc Welding, Effect of polarity, Electrode Classification, Function of Flux for Arc Welding.

UNIT V

Other Welding Process and Defects: Principle of Gas Welding Operation, Types of Gas Welding Flames and Their Applications, Gas Welding Equipments and Flexes.

Resistance Welding Principle, Advantages, Limitations, Working and Application Of Spot Welding, Seam Welding, Projection Welding, Percussion Welding, Welding Defects

UNIT VI

Modern Welding Methods: Principle of Operation, Advantages, Disadvantages and Application of Tungsten Inert Gas Welding, Submerged Arc Welding, Metal Inert Gas Welding, Shielded Metal Arc Welding, Thermite Welding, Electro Slag Welding and Electron Beam Welding.

Text Books:

1. Workshop Technology by BS Raghuvanshi : Dhanpat Rai and Sons, Delhi
2. Welding Technology by Dr. R.S Parmar, O.P Khanna.
3. Elements of Workshop Technology by SK Choudhry and Hajra : Asia Publishing House
4. Manufacturing Technology by M Adithan and A.B. Gupta; Wiley Eastern India Ltd. New Delhi.

Reference Books:

1. Welding Engineering by RL Aggarwal and T Manghnani; Khanna Publishers, Delhi
2. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi
3. Foundry Technology by KP Sinha and DB Goel; Roorkee Publishing House, Roorkee.
4. A Text Book of Manufacturing Science and Technology by A Manna, Prentice Hall of India, Delhi.

List of Practical

1. Exercise on Preparation of T Joint by Arc Welding.
2. Preparation of Solid/Single Piece Pattern.
3. Preparation of Two Piece/Split Pattern.
4. Preparation of a Pattern on Wooden Lathe.
5. Preparation of Drilling Jig.
6. Preparation of a Core Box.
7. Preparation of Floor Mould of Split Pattern in Cope and Drag of Moulding Box.
8. Molding and Casting of a Solid Pattern of Aluminum.
9. Preparing a Mould of Step Pulley and Also Preparing Core for the Same.
10. Preparation of Utility Item Out of G.I. Sheet.

MACHINE DRAWING

MEL 039	MACHINE DRAWING	L	T	P	Cr
		1	0	4	3

SECTION A

UNIT 1

Limits, Fits and Tolerances: Limit system – tolerance, limits, deviation, allowance, basic size, design size. Tolerances-fundamental tolerances, fundamental deviation, method of placing limit dimensions, Clearance fit, transition fit, interference fit, hole basis system, shaft basis system, tolerance grades. Calculation for values of clearance/interference, hole tolerance, shaft tolerance with given basic size for common assemblies like H7/g6, H7/m6, H8/u7.

UNIT 2

Surface Roughness: Introduction-actual profile, reference profile, datum profile, mean profile, peak to valley height, mean roughness index, surface roughness number, Use of machining symbols in production drawings, indication of surface roughness-indication of special surface roughness characteristics, indication of machining allowance, indication of surface roughness, symbols on drawings, method of indicating surface roughness on given components.

UNIT 3

Shaft Couplings, Oldham coupling, Universal coupling

SECTION B

UNIT 4

Bearings Bush bearing, Foot step bearing, Plummer block, Self-aligning bearing, Brackets

UNIT 5

Pipe Joints: Symbols for piping and layout plan of piping, Flanged joint, Socket and Spigot joint, Union joint, Expansion pipe joint

UNIT 6

I.C. Engine Parts: I.C. engine connecting rods, I.C. engine pistons, Screw Jack

Text Books:

1. Machine Drawing by P.S. Gill; S.K. Kataria and Sons, Delhi.
2. Machine Drawing by R.K. Dhawan; S. Chand and Company, Delhi.

Reference Books:

1. Machine Drawing by R.B. Gupta; SatyaParkashan, New Delhi.
2. Machine Drawing by N.D. Bhatt; Charotar Publishing House.

LANGUAGE COMMUNICATION-III

AHP031	LANGUAGE COMMUNICATION-III	L	T	P	Credits
		1	0	2	0

UNIT-1: Phonetics

- Revision of Speech Sounds
- Phonetic Transcription of Words-III
- Syllable Identification in polysyllabic words
- Words Commonly Mispronounced- III
- Word Stress-I

UNIT-2: Reading Practice

- Reading newspaper articles
- Reading magazine articles
- Reading short stories

UNIT-3: Oral Practice

- Extempore Speeches
- Role Plays and Simulations
- Debate
- Group Discussions
- Classroom Presentations
-

UNIT-4: Study Skills

- Commonly Misspell Words-III
- Dictation
- Looking up a dictionary
- Learning pronunciation from a dictionary (Practical implementation of IPA symbols)
- Learning meanings of words from the dictionary

Crosswords

BASIC OF ELECTRICAL MACHINES

EEL039	Basic of Electrical Machines	L	T	P	Cr
		3	1	2	5

SECTION A

UNIT-1

D.C Machine: Construction, Working Principle of a DC Generator, EMF Equation, Classification, Working Principle of a DC Motor, Back EMF and its importance, Classification and Characteristics of a DC Motor and Its application, brief introduction to Starter and Speed Control of DC motor.

UNIT-2

Transformer:

Definition, Need of a Transformer, Construction, Principle of operation, Working of a transformer at No load and its Phasor diagram & transformer at Full load, EMF Equation, Losses and Efficiency, Brief Introduction to Auto Transformer, Current Transformer and Potential Transformer.

UNIT-3

Induction Motor: Salient feature of Three Phase Induction Motor, Constructional features of a Squirrel Cage and Slip Ring three Phase induction motor, Advantages, Working Principle of a three Phase induction motor, Slip & its Significance, Power Flow Diagram, Speed Control methods, Applications.

SECTION B

UNIT-4

Synchronous Machines: Constructional features, Working Principle of a Synchronous Generator, Synchronous Motor, Working Principle, Starting Method, Synchronous Condenser, Applications of a Synchronous Motor.

UNIT-5

Special Purpose Machines: Single Phase Induction Motor, Classification of a Single Phase Motor, Construction and Working principle, Split Phase Induction Motor: Split Phase Resistance Start Single Phase Induction Motor, Split Phase Capacitor Start Single Phase Induction Motor, Construction and Working of Servo Motor and Stepper Motor and their Applications.

UNIT-6

Electrical Heating Appliances: Introduction, Classification of Methods of Electric heating, Requirement of a Good Heating Material, Design of heating element, Electric Arc Furnace, brief Introduction to Induction and Dielectric Heating.

Text Books

1. Electromechanical Energy Conversion: MukeshSaini: Vayu Publication, Delhi
2. Electrical Technology : B.L. Thareja: S.Chand, Vol-II

Reference Books

1. Electrical Machines by SK Bhattachariya, Tata McGraw Hill, New Delhi.
2. Electrical Machines by SK Sahdev, Unique International Publication, Jalandhar.
3. Electrical Machines by Nagrath& Kothari, Tata McGraw Hill New Delhi.
4. Electrical Machines by SB Gupta, SK Kataria& Sons, New Delhi.
5. Electrical Machines by PS Bhimbhra, Khanna

BASICS OF ELECTRICAL MACHINES LAB

List of Practical:

1. Introduction of tools, electrical materials,symbols & abbreviations.
2. To study Stair Case Wiring.
3. To Study house wiring i.e. batten,cleat, casing-caping and conduit wirings.
4. To Study fuses,relays,contactors,MCBs and circuit breakers,Fluorescent tube light.
5. To Study Earthing of Electrical Installation.
6. Study of Construction of a DC Machine.
7. To Perform direct load test of a DC motor.
8. Speed control of a DC motor by armature control & field control methods.
9. Star-Delta starting of a three phase induction motor.
10. To Perform direct load test on a transformer and plot efficiency Vs load characteristics.
11. DOL Starting of a three phase induction motor.
12. Study of ISI/BIS Code for a three phase induction motor.
13. To Study the effect of a capacitor on the starting & running of a Single phase induction motor by changing value of capacitor & also reverse the direction of rotation of a single phase induction motor.

NUMERICAL METHODS

AHL 208	NUMERICAL METHODS	L	T	P	Cr
		3	1	2	5

SECTION-A

UNIT-1

Errors In Numerical Calculations: Errors and their analysis, general error formula.

Interpolation And Curve Fitting: Taylor series and calculation of functions, Introduction to Interpolation, Lagrange interpolation, Newton interpolation, Chebyshev interpolation. Least square Line, curve fitting, interpolation by Spline functions.

UNIT-2

Solution of Non Linear Equations: Fixed –Point Method, Bisection Method, Secant Method, Newton- Raphson Method, and Muller’s Method.

UNIT-3

System Of Linear Equations: Direct Method, Gaussian Elimination Method and pivoting, Matrix inversion, UV factorization and Iterative methods for linear system.

SECTION-B

UNIT-4

Numerical Differentiation And Integration: Numerical Differentiation using Newton’s interpolation Formula and Cubic Spline Method. Numerical integration using Newton-cote’s interpolation formula, Trapezoidal rule, Simpson’s rule 1/3 and 3/8 Rules, Weddle’s Rule, Gauss- Hermite and Gauss-Legendre Formula.

UNIT-5

Numerical Solution Of Ordinary Differential Equations: Introduction to differential equation, Initial value problems. Euler’s Method, Heun’s Method, Runge-Kutta Method, Taylor’s series Method, System of differential equations, boundary value problems and Finite difference Method.

UNIT-6

Numerical Solution of Partial Differential Equation, Eigen Values and Eigen vector: Solution of hyperbolic, parabolic, and elliptic equations. The Eigen value problem .The power method, Jacobi’s method, Given Method and House Holder Method for Eigen value problems. Rutishauser method for general matrices.

Text Books:

1. Numerical Methods for Scientific and engineering computation by M.K.Jain, S.R.K.Iyengar and R.K.Jain (New Age International Publishers).
2. Introductory Methods of Numerical Analysis by S.S. Sastry (PHI Learning Pvt.Ltd.).

Reference Books:

1. Numerical Methods in Science and Engineering by B.S.Grewal.
2. Numerical Method by E.Balagurusamy.(TMH).
3. Numerical Methods for Mathematics, Science and Engineering by John H. Mathews(PHI).

MVN University, Palwal
Scheme of Studies, Syllabus & Examinations
Integrated B.Tech(M.E) 2nd Year
Semester – IV

Sr. no	Course title	Paper code	Teaching schedule			Total hours	Credit
			L	T	P		
1	Engineering Materials	MEL 032	3	0	2	5	4
2	Fluid Mechanics & Machines	MEL 034	3	0	2	5	4
3	Internal Combustion Engines	MEL 036	3	0	2	5	4
4	Manufacturing Technology II	MEL 038	3	0	2	5	4
5	Machine Design	MEL 040	3	2	0	5	5
6	CAD Lab	MEP 042	0	0	2	2	1
7	Language Communication - IV	AHP 032	1	0	2	3	0
8	Basics of EVS	AHL 034	2	0	0	2	2
	Total		18	2	12	32	24

ENGINEERING MATERIALS

MEL 032	ENGINEERING MATERIALS	L	T	P	Cr
		3	0	2	4

SECTION A

UNIT: 1

General: Introduction to engineering materials, Classification of materials: Thermal, chemical, electrical, mechanical properties of various materials, Selection criteria for use in industry.

UNIT: 2

Structure of Metals and their Deformation: Metal Structure: Relation of metal structure to its properties , Arrangement of atoms in metals (Basic idea) , Crystalline Structure of metals , Crystal Imperfections , Deformation of metal , Impact of cold and hot working on metal structure, Corrosion and its cause and prevention.

UNIT: 3

Ferrous Materials:Classification of iron and steel , Sources of iron ore and its availability , Manufacture of pig iron, wrought iron, Cast iron and steel (Flow Diagrams only), Types of Cast Iron: White, malleable, grey, mottled, modular and alloy and their usage. , Steels and alloy steel : Classification of steels , Different manufacturing methods of steel, open hearth, Bessemer, electric arc. Availability, Properties and usage of steels, Specification as per BIS and equivalent standards, Effect of various alloying element like Cr, Ni, Co, V, W, Mo, Si, Mn, S on mechanical properties of steel. Use of alloy steels (high speed steel stainless steel, spring steel, silicon steel).

SECTION B

UNIT: 4

Non Ferrous Materials :Important ores and properties of aluminum, copper, zinc, tin, lead, Properties and uses of Al alloys, Copper alloys, Bearing metals, solders.

Engineering Plastics and Fibers: Important sources of plastics , Classification: thermoplastic and thermo set, Various Trade names of engineering plastics, Plastic Coating , Fibers and their classification: Inorganic and Organic Fibers, Usage of fibers.

UNIT: 5

Insulating Materials:Various heat insulating materials and their usage like asbestos, glass wool, thermo Cole, cork, puf, china clay, various electrical insulating material and their use like China clay, leather, bakelite, ebonite, glass wool, rubber, felt.

Testing of Metals and Alloys: Identification tests: appearance, sound, spark, weight, magnetic, band microstructure, filing.

UNIT 6

Fundamentals of Heat Treatment:Purpose of heat treatment ,Theory of solid solution , Iron-Carbon Diagram , TTT Curve in steels and its importance, Basic idea about martensitic transformation, Various heat treatment processes-hardening, tempering, annealing, normalizing, case hardening (elementary idea) , Types of heat treatment furnaces.

Text Books:

1. Material Science by GBS Narang, Khanna Publishers, New Delhi.
2. Material Science and Metallurgy by RB Choudary, Khanna Publishers, New Delhi.

Reference Books:

1. Material Science by RK Rajput; SK Kataria and Sons, Delhi.
2. Materials and Matallurgy by D.S. Nutt. SK Kataria and Sons, Delhi.

ENGINEERING MATERIALS LAB**List of Practical**

1. Classification of about 25 specimens of materials/parts into i) Metals and non metals ii) Metals and alloys iii) Ferrous and non ferrous metals iv) Ferrous and non ferrous alloys
2. Given a set of specimen of metals and alloys (copper, brass, aluminum, cast iron, HSS, Gun metal); identify and indicate the various properties possessed by them.
3. Study of heat treatment furnace.
4. Study of a metallurgical microscope and a diamond polishing machine.
5. To prepare specimens of following materials for microscopic examination and to examine the microstructure of the specimens of following materials: i) Brass ii) Copper iii) Grey CI iv) Malleable CI v) Low carbon steel vi) High carbon steel vii) HSS
6. To anneal a given specimen and find out difference in hardness as a result of annealing.
7. To normalize a given specimen and to find out the difference in hardness as a result of normalizing
8. To temper a specimen and to find out the difference in hardness and tensile strength due to tempering
9. To study crystal structures of a given specimen
10. To study crystal imperfections in a given specimen

FLUID MECHANICS & MACHINES

MEL 034	FLUID MECHANICS & MACHINES	L	T	P	Cr
		3	0	2	4

SECTION- A

UNIT-I

Introduction: Concept of Fluid Mechanics and Hydraulics, Properties of Fluid (Viscosity, Specific Weight, Specific Volume, Specific Gravity, Pressure, Compressibility, Surface Tension), Problems.

UNIT-II

Fluid Statics: Pascal's Law, Concept of Static Pressure, Intensity of Pressure and Pressure Head, Total Pressure on Plane Surface and Centre of Pressure, Concept of Pressure (Atmospheric, Gauge, and Absolute Pressure), Pressure Measuring Devices (Piezometer Tube, Simple Manometer, U Tube Manometer, Differential Single Column Manometer, Bourdon Tube Pressure Gauge), Problems.

UNIT-III

Fluid Flow-I: Types of Flow (Laminar and Turbulent), Steady and Unsteady, Uniform and Non- Uniform, Concept of Reynolds Number, Rate of Discharge, Equation of Continuity, Head of Fluid (Datum, Pressure, Velocity and Total Head), Bernoulli's Theorem (Without Proof), and its Applications, Discharge Measurement by Venturimeter and Orifice meter, Pitot Tube, Problems.

Fluid Flow-II: Type of Orifices, Coefficients of Contraction, Velocity, and Discharge, Discharge through Orifice under Submerged, Partially and Free Conditions, Time Emptying a Tank of Uniform area through An Orifice at the Bottom, Problems.

SECTION- B

UNIT-IV

Flow Through Pipes: Concept of Flow through Pipes, Wetted Perimeter, Hydraulic Mean Depth, Hydraulic Gradient, Loss of Head due to Friction, Chezy's Equation and Darcy's Equation (Without Proof), Head loss due to Sudden Contraction, Enlargement, and Obstruction on Flow Path, Loss of Head due to Pipe Fittings, Flow through Siphon Pipe, Concept of Water Hammer, Problems.

UNIT-V

Fluid Machines-I: Classification of Turbines, Impulse and Reaction Turbines, Construction and working Principle of Pelton Wheel, Francis and Kaplan Turbines, Specific Speed of Turbines.

Fluid Machines-II:Construction and Working Principle of Single acting Reciprocating, Centrifugal Pumps, Vane, Screw and Gear Pumps (Brief Introduction), Performance, Efficiencies and Specifications of Centrifugal Pumps, Trouble Shooting and Problems in Centrifugal Pumps and Remedies, Pitting, Cavitations , and Priming.

UNIT-VI

Hydraulic And Pneumatic System:Construction and Working Principle of Hydraulic Press, Jack, Ram, Brake, and Accumulator, Construction and working Principle of Air Compressor, Air Hammer.

Text Books:

1. Hydraulics and Hydraulic Machines by RS Khurmi ;S.Chand& Co. Ltd., NewDelhi.
2. Hydraulics and Fluid Mechanics by JagdishLal; Metropolitan Book CompanyLtd., Delhi.

Reference Books:

3. Fluid Mechanic, Hydraulics and Hydraulic Machines by K.K. Arora; Standard Publishers Distributors, Delhi.
4. Fluid Mechanics, Hydraulics and Fluid Machines by S. Ramamruthan; DhanpatRai and Sons, Delhi.
5. Hydraulic and Pneumatic Control by K ShammugaSundaram, S. Chand & Co. Ltd., New Delhi

FLUID MECHANICS & MACHINES LAB

List of Practical

1. To Verify the Bernoulli's Theorem.
2. To Determine the Minor Losses due to sudden Enlargement, Contraction, and Bends.
3. To Determine the Coefficient of Discharge of Notch (V and Rectangular type) .
4. To Determine the Coefficient of Discharge of Venturimeter.
5. To Study the working of a pelton wheel and Francis turbines.
6. To Measure the Pressure Head by using PiezometerTube, Single and Double Column Manometer.
7. To Study Hydraulic Circuit of an Automobile Brake and Hydraulic Ram.
8. To Study a Single Stage Centrifugal Pump for Constructional details and its Operation to find out its Normal Head and Discharge.
9. To Measure the flow Rate of Water by Using Venturimeter.
10. Operation and Maintenance of Single Stage Reciprocating and Centrifugal pumps.
11. To Determine the Coefficient of Discharge, Contraction, and Velocity of an Orifice.
12. To Determine Friction Factor for the Pipes.

INTERNAL COMBUSTION ENGINE

MEL 036	INTERNAL COMBUSTION ENGINE	L	T	P	Cr
		3	0	2	4

SECTION A

Unit I

Fundamentals: Development of IC engine, Classification, Working Cycles, Indicator diagram, comparison of SI Engine and CI Engine, two stroke and four-stroke engine, Valve timing diagram of SI and CI engine.

Unit II

Air Standard Cycle: Assumptions in air standard cycle & fuel-air cycle, fuel-air cycle calculations, factors influencing fuel-air cycle, effects of variable specific heats, dissociation.

Unit III

Fuel and Combustion: Combustion of SI engine, ignition limits, normal combustion, abnormal combustion, effect of engine Variable in ignition lag, spark advance and factors affecting ignition timing, pre-ignition, theory, and factors affecting detonation, PN, HUCR. Combustion in CI engine, fundamentals of combustion process in Diesel engine, delay period, diesel knock, and cold starting of CI engine. IC engine Fuel, combustion equations, theoretical air and excess air, stoichiometric air fuel ratio, desirable Properties of good IC engine fuels knock rating of SI engine fuel.

SECTION B

Unit IV

Performance & Testing: Testing and performance of IC engine, performance parameters, basic measurement, engine Performance curve, fuel consumption, load outputs, engine power, heat balance.

Unit V

Compressor: Working of a single stage reciprocating air compressor; Calculation of work input; Volumetric efficiency; Isothermal efficiency; Advantages of multi stage compression; Two stage compressor with inter-cooling; Perfect inter cooling; Optimum intercooler pressure; Rotary air compressors and their applications; Isentropic efficiency.

Unit VI

Gas Turbine: General aspect of gas turbine, Jules cycle, Brayton cycle, classification, merits of gas turbine, open- cycle gas turbine, closed cycle gas turbine, Inter cooling, Reheating, Re-generation in gas turbine.

Text Books:

1. Ganesan, V. Internal Combustion Engine, Tata McGraw-Hill.
2. Mathur, M.L. and Sharma, R.P. Internal Combustion Engine. DhanpatRai Publication
3. Vladimir Leonidas Maleev. Internal-combustion Engines, Theory and Design. McGraw-Hill.

References Books:

1. Lester Clyde Lichty, Robert Leroy Streeter. Internal Combustion Engines, McGraw-Hill

2. Wallace Ludwig Lind. Internal-combustion Engines: Their Principles and Applications to Automobile, Aircraft, Ginn.
3. Edward Frederic Obert, Burgess Hill Jennings, Internal Combustion Engines: Analysis and Practice
4. Joseph Albert Polson. Internal Combustion Engines, Chapman & Hall, limited
5. Rolla Clinton Carpenter, Herman Diederichs. Internal Combustion Engines, Their Theory Construction and Operation. Van NostrandcompaniesJohn Benjamin Heywood. Internal Combustion Engine Fundamentals. McGraw-Hill.

List of Experiments :

1. To study the constructional details & working principles of two-stroke/ four stroke petrol engine.
2. To study the constructional detail & working of two-stroke/ four stroke diesel engine.
3. Analysis of exhaust gases from single cylinder/multi cylinder diesel/petrol engine by Orsat Apparatus.
4. To prepare heat balance sheet on multi-cylinder diesel engine/petrol engine.
5. To find the indicated horse power (IHP) on multi-cylinder petrol engine/diesel engine by Morse Test.
6. To prepare variable speed performance test of a multi-cylinder/single cylinder petrol engine/diesel engine and prepare the curves (i) bhp, ihp, fhp, vs speed (ii) volumetric efficiency & indicated specific specific fuel consumption vs speed.
7. To find fhp of a multi-cylinder diesel engine/petrol engine by Willian's line method & by motoring method.
8. To perform constant speed performance test on a single cylinder/multi-cylinder diesel engine & draw curves of (i) bhp vs fuel rate, air rate and A/F and (ii) bhp vs mep, mech efficiency & sfc.
9. To measure CO & Hydrocarbons in the exhaust of 2- stroke / 4-stroke petrol engine.
10. To find intensity of smoke from a single cylinder / multi-cylinder diesel engine.
11. To draw the scavenging characteristic curves of single cylinder petrol engine.
12. To study the effects of secondary air flow on bhp, sfc, Mech. Efficiency & emission of a two-stroke petrol engine.

MANUFACTURING TECHNOLOGY-II

MEL 038	MANUFACTURING TECHNOLOGY-II	L	T	P	Cr
		3	0	2	4

SECTION A

UNIT I

Lathe Machine: Nomenclature and application of Lathe machine, Principle of Turning Operation, Function of Various Parts of a Lathe, Classification and Specification of Various Types of Lathe, Lathe Accessories:- Centers, Dogs, Chucks, Collets, Face Plate, Angle Plate, Mandrel, Steady Rest, Taper Turning Attachment, Tool Post Grinder, Milling Attachment, Lathe Operations: Plain and Step Turning, Facing, Parting Off, taper Turning, Drilling, Reaming, Boring, Threading, Knurling, Spinning.

UNIT II

Milling Machine: Specification and Working Principle of Milling machine, Classification, Brief Description and Application of Milling Machine, Details of Column and Knee Type Milling Machine, Milling Methods- Up Milling and Down Milling, Indexing on Dividing Heads, Plain and Universal Dividing Heads, Milling Machine Accessories and Attachment – Arbors, Adaptors, Collets, Vices, Circular Table, Indexing Head and Tail Stock, Vertical Milling Attachment Milling Operations- Face Milling, Angular Milling, Form Milling, Straddle Milling and Gang Milling

UNIT III

Drilling Machine: Construction and Working Principle of Drilling Machine, Classification of Drilling Machine, Types of Drills and Their Features, Nomenclature of a Drill, Various Operation Performed On Drilling machine- Drilling, Spot Facing, Reaming, Boring, Counter Boring, Counter Sinking, Tapping.

Shaping, Planning and Slotting Machine:- Working Principle of Shaper, Planner and Slotter Machine, Difference Between Shaper, Planner and Slotter.

SECTION B

UNIT IV

Gear Manufacturing and Finishing Processes: Introduction, Gear Hobbing, Gear Shaping, Gear Shaving, Gear Burnishing, Purpose of Finishing Surfaces, Surface Roughness Definition and Units, Methods of Surface Finishing, Honning Process, Its Applications, Description of Hones, Lapping Process, Its Applications, description of Lapping Compounds and Tools, Super Finishing Process, Its Applications, Use of Super Finishing Attachment on Center Lathe, Polishing Buffing.

UNIT V

Grinding: Purpose of Grinding, Various Elements of Grinding Wheel- Abrasive, Grade, Structure, Bond, Common Wheel Shapes and Types of Wheel – Built up Wheels, Mounted

Wheels and Diamond Wheels, Specification Of Grinding Wheels as Per BIS, Truing, dressing, Balancing and Mounting of Wheel, Grinding Methods- Surface Grinding, Cylindrical grinding and Centre less Grinding.

UNIT VI

Jigs and Fixtures: Importance and Use of Jigs and Fixture, Principle of Location, Locating Devices, Clamping Devices, Types of Jigs- Drilling Jigs, Bushes, Template Jigs, Plate Jig, Channel Jig, Fixture For Milling, Advantages of Jigs and Fixtures.

Text Books:

1. Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Sons; Delhi
2. A Text Book of Production Engineering by PC Sharma; S Chand and Company Ltd. Delhi
3. Manufacturing Technology by P N Rao; Tata McGraw Hill Publishers, New Delhi.
4. Elements of Workshop Technology by SK Choudhry and Hajra; Asia Publishing House
5. Manufacturing Technology by M. Adithan and A.B. Gupta; New Age International (P) Ltd, Delhi.

Reference Books:

6. Practical Handbook for Mechanical Engineers by Dr. AB Gupta; Galgotia Publications, New Delhi.
7. Workshop Technology – III by Sandeep Bajaj., Ishan Publication.
8. Workshop Technology – III by K.P.S.Chauhan ; Eagle Parkashan Jalandhar.
9. Production Engineering and Science by Pandey and Singh; Standard Publishers Distributors, New Delhi.
10. Work shop Technology-II by V.K. Manchanda ; India Publishing House, Jalandhar.

MANUFACTURING TECHNOLOGY LAB

List of Practical

1. Grinding of Single Point Turning Tool.
2. Exercises on Internal/External Turning on Lathe Machine.
3. Resharpening of Single Point Cutting Tool with Given Geometry.
4. A Composite Job Involving, Turning, Taper Turning, Thread Cutting and Knurling.
5. Exercise on Drilling, Reaming, Counter Boring, Counter Sinking and Taping.
6. Pipe Threading with Die.
7. Exercise on Key Way Cutting and Spline Cutting on Shaper Machine.
8. Produce a Rectangular Slot on one Face with a Slotting Cutter.
9. Produce a Rectangular Block Using a Milling Machine with a Side and Face Cutter.
10. Prepare a Slot on one Face using Milling Machine.
11. Job on Grinding Machine using a Surface Grinder.
12. Exercise on Dressing a Grinding Wheel.

MACHINE DESIGN

MEL 040	MACHINE DESIGN	L	T	P	Cr
		3	2	0	5

SECTION-A

Unit-I

Introduction: Definition, Types of Design, Necessity of Design, Comparison of Designed and Undersigned work. Design Procedure. Characteristics of a Good Designer, Code and Standards.

Design Terminology: Stress, Strain, Factor of Safety, Factors affecting Factor of Safety, Stress Concentration, Methods to reduce Stress Concentration, Fatigue and Endurance Limits.

Unit-II

Engineering Materials And Their Mechanical Properties: Elasticity, Plasticity, Malleability, Ductility, Toughness, Hardness and Resilience, Fatigue, Creep, Tenacity, Strength. Selection of Materials, Criterion of Material Selection, Problems.

Design Failure: Various Design Failures, Maximum Stress Theory, Maximum Strain Theory Design for Tensile. Compressive and Torsional Loading, Problems.

Unit-III

Design Of Keys: Types of Keys, Material of Keys, and Functions of Keys, Design of Keys. Problems.

Design Of Shaft: Types of Shaft, Types of Loading on Shaft, Shaft Material, Effect of Key way on Shaft Strength, Design of Shaft Under Various Loading. Problems.

SECTION-B

UNIT-IV

Design of Joints: Introduction, Types of Joints, Utility of Various Joints. Problems.

Temporary Joints: Knuckle Joints- Different Parts of the Joints, Material Used for the Joints, Types of Knuckle Joints, Design of the Knuckle Joint. Cotter Joints: Different Parts of the Spigot and Socket Joints, Design of Spigot and Socket Joint. Problems.

UNIT-V

Permanent Joints: Welding Joint: Welding Symbols, Types of Welding Joints, Strength of Parallel and Transverse Fillet Welds. Problems.

Riveted Joints: Rivet Material, Rivet heads, Leak Proofing of Riveted Joints, Design of Riveted Joints- Lap and Butt Single and Multi Riveted Joints. Problems.

UNIT-VI

Mechanical Springs: Introduction, Classification, Cylindrical Helical Springs, With Axial Loading. Curvature of Coil, spring Scale, Resilience, Impact Loading, Helical spring of Non-Circular Wire, Design of Helical Springs subjected to Static and Fatigue Loading, Problems.

Text Books:

1. Design of Machine Elements By R.S Khurmi
2. Design of Machine Elements – V.B. Bhandari – Tata McGraw Hill, New Delhi.
3. PSG Design Data Book

Reference Books:

1. Engineering Design – George Dieter, MGH, New York.
2. Product Design and Manufacturing ,A.K.Chitale and R.C.Gupta, PHI.
3. Machine Design An Integrated Approach: Robert L.Norton, Addison Wesley.
4. Machine Design : S.G. Kulkarni - Tata MacGraw Hill.
5. Design of machine elements-C S Sharma, KamleshPurohit, PHI.

CAD LAB

MEP 042	CAD LAB	L	T	P	Credit
		0	0	2	1

List of Practical

(1) Introduction to AUTO-CAD Commands

(A) Concept of AUTO-CAD, Tool bars in AUTO-CAD, Coordinate System, Snap, Grid and Ortho Mode.

(B) Drawing Commands- Points, Line, Arc, Circle, Ellipse.

(C) Editing Commands- Scale, Erase, Copy, Stretch, Length and Explode.

(2) Detail and Assembly Drawing of the Following Using AUTO-CAD.

(A) Journal Bearing

(B) Flanged Coupling

(C) Spur Gear

(D) Screw Jack

(3) To Draw Orthographic Projection Drawings (Front, Top and side) of Screw Jacks.

(4) Draw Quarter Sectional Isometric View of a Cotter Joint.

(5) Draw 3-D Models by Extruding Simple 2-D Object, Dimension and Name of the Object.

LANGUAGE COMMUNICATION-IV

AHP032	LANGUAGE COMMUNICATION-IV	L	T	P	Credits
		1	0	2	0

UNIT-1: Phonetics

- Phonetic Transcription of Words-IV
- Words Commonly Mispronounced- IV
- Word Stress-II

UNIT-2: Reading Practice

- Reading newspaper articles
- Reading story books
- Reading magazines

UNIT-3: Oral Practice

- Group Discussion
- Debate
- Role Plays and Simulations
- Mock Interview
- Classroom Presentations

UNIT-4: Study Skills

- Commonly Misspell Words-IV
- Dictation
- Looking up a dictionary
- Learning pronunciation from a dictionary (Practical implementation of IPA symbols)
- Learning classification and context of words from the dictionary
- Crosswords

BASICS OF ENVIRONMENTAL STUDIES

AHL034	BASICS OF ENVIRONMENTAL STUDIES	L	T	P	Credit
		2	0	0	2

SECTION-A

UNIT-I

The Multidisciplinary Nature of Environmental Studies: – Definition of environment; multidisciplinary nature of environmental studies; need for public awareness; concept of Ecomark.

UNIT-II

Ecosystems: Concept; ecosystem characteristics (structure and functions of ecosystem: food chains, food webs and ecological pyramids); primary production; ecosystem regulation; some types of ecosystem-forest ecosystem, grassland ecosystem.

UNIT-III

Natural Resources: – Renewable and non-renewable resources, natural resources and associated problems:

- a) **Forest resources:** Use and over-exploitation, deforestation.
- b) **Food resources:** World food problems, changes caused by agriculture and over-grazing, fertilizer-pesticide problem, water logging.
- c) **Land resources:** Land as a resource, land degradation, soil erosion and desertification, water logging.

SECTION-B

UNIT-IV

Environmental Pollution:– Definition, cause, effects and control measures of different types of pollutions-air pollution; water pollution; soil pollution; thermal pollution, solid waste management- causes; role of an individual in prevention of pollution.

UNIT-V

Social Issues and Environment:Urban problems related to energy; water conservation; rain water harvesting; global warming, acid rain; ozone layer depletion, waste-land reclamation.

UNIT-VI

Environmental Legislation:Air (prevention and control of pollution) Act; water (prevention and control of pollution) Act; Forest conservation Act; public awareness.

Text Books:

- 1). Kaushik Anubha, C.P. Kaushik, Perspective in Environmental Studies, New Age International (P) Ltd. Publishers

MVN University, Palwal

2). Joseph Benny, Environmental Studies, Tata McGraw Hill Publishing Company Ltd., New Delhi

Scheme of Studies, Syllabus & Examinations
Integrated B.Tech(M.E) 3rd Year
Semester - V

Sr. no	Course title	Paper code	Teaching schedule			Total hours	Credit
			L	T	P		
1	Theory of Machines	MEL061	3	1	2	6	5
2	Refrigeration & Air Conditioning	MEL 063	3	1	2	6	5
3	Industrial Engineering	MEL 065	4	0	0	4	4
4	Manufacturing Science	MEL 067	3	0	0	3	3
5	Strength of Materials	MEL 031	3	1	2	6	5
6	CNC Machines and Automation	MEL 069	3	0	0	3	3
7	Minor Project	MED 071	0	0	2	2	1
8	Lang. Comm. V	AHL 061	2	0	0	0	0
			21	3	8	30	26

THEORY OF MACHINES

MEL-061	THEORY OF MACHINES	L	T	P	Cr
		3	1	2	5

SECTION-A

UNIT-1

Simple Mechanisms

Introduction to link, kinematic pair, lower and higher pair, Kinematic chain, mechanism, Inversions. Different types of mechanisms (with examples)

UNIT-II

Power Transmission

Introduction to Belt and Rope drives, Types of belt drives and types of pulleys, Concept of velocity ratio, slip and creep; crowning of pulleys (simple numericals), Flat and V belt drive: Ratio of driving tensions, power transmitted, centrifugal tension, and condition for maximum horse power (simple numericals), Different types of chains and their terminology, Gear terminology, types of gears and their applications; simple and compound gear trains; power transmitted by simple spur gear.

UNIT-3

Flywheel

Principle and applications of flywheel, Turning - moment diagram of flywheel for different engines, Fluctuation of speed and fluctuation of energy - Concept only, Coefficient of fluctuation of speed and coefficient of fluctuation of energy, Simple numerical problems on fluctuation of speed and fluctuation of energy

SECTION-B

UNIT-4

Governor

Principal of governor, Simple description and working of Watt, Porter and Hartnel governor (simple numericals based on watt governor) , Hunting, isochronism, stability, sensitiveness of a governor

UNIT-5

Balancing

Concept of balancing, Introduction to balancing of rotating masses (simple numericals), Simple problems related to several masses rotating in different planes.

UNIT-6

Vibrations

Concept of vibrations and its types - longitudinal, transverse and torsional vibrations (simple numericals), Damping of vibrations, Causes of vibrations in machines, their harmful effects and remedies

LIST OF EXPERIMENTS:

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
11. Study of dynamic balancing procedure of rotating part

RECOMMENDED BOOKS

1. Theory of Machines by D.R. Malhotra; Satya Prakashan, New Delhi.
2. Theory of Machines by V.P Singh; Dhanpat Rai and Sons, New Delhi.
3. Theory of Machines by Jagdish Lal; Metropolitan Publishers, New Delhi.
4. Theory of Machines by R.C. Jindal; North Publications.

REFRIGERATION AND AIR CONDITIONING

MEL-063	REFRIGERATION AND AIR CONDITIONING	L	T	P	Cr
		3	1	2	5

SECTION-A

UNIT-1.

Fundamentals of Refrigeration

Introduction to refrigeration, and air conditioning, meaning of refrigerating effect, units of refrigeration, COP, methods of refrigeration. Introduction to air refrigerator working on reversed carnot cycle.

UNIT-2.

Vapour Compression System

Introduction, principle, function, parts and necessity of vapour compression system, T- ϕ and p- H charts, dry, wet and superheated compression. Effect of sub cooling, super heating, mass flow rate, entropy, enthalpy, work done, Refrigerating effect and COP. actual vapour compression system

Refrigerants

Functions, classification of refrigerants, properties of R - 717, R - 22, R-134 (a) and CO₂. Properties of ideal refrigerant, selection of refrigerant

UNIT-3

Vapour Absorption System

Introduction, principle and working of simple absorption system and domestic Electrolux refrigeration systems. Solar power refrigeration system, advantages and disadvantages of solar power refrigeration system over vapour compression system.

SECTION-B

UNIT-4

Refrigeration Equipment

Compressor - Function, various types of compressors, Condenser - Function, various types of condensers, Evaporator - Function, types of evaporators, Expansion Valve - Function, various types such as capillary tube, thermostatic expansion valve, low side and high side float valves, application of various expansion valves, Safety Devices- Thermostat, overload protector LP, HP cut out switch.

AIR CONDITIONING

UNIT-5

Psychrometry

Definition, importance, specific humidity, relative humidity, degree of saturation, DBT, WBT, DPT, sensible heat, latent heat, Total enthalpy of air. Psychrometry chart and various processes of psychrometry

UNIT-6

Air-Conditioner

Study of window air-conditioning, split type air conditioning, concept of central aircondition, automobile air-conditioning

LIST OF PRACTICALS

1. Identify various tools of refrigeration kit and practice in cutting, bending, flaring, swaging and brazing of tubes.
2. Study of thermostatic switch, LP/HP cut out overload protector filters, strainers and filter driers.
3. Identify various parts of a refrigerator and window air conditioner.
4. To find COP of Refrigeration system
5. To detect trouble/faults in a refrigerator/window type air conditioner
6. Charging of a refrigerator/window type air conditioner.
7. Study of cut section of single cylinder compressor
8. Visit to an ice plant, cold storage plant, central air conditioning plant

RECOMMENDED BOOKS

1. Refrigeration and Air Conditioning by Domkundwar; Dhanpat Rai and Sons, Delhi.
2. Refrigeration and Air Conditioning by CP Arora; Tata McGraw Hill, New Delhi.
3. Refrigeration and Air Conditioning by R.S Khurmi and J.K. Gupta; S Chand and Company Limited, New Delhi.

INDUSTRIAL ENGINEERING

MEL-065	INDUSTRIAL ENGINEERING	L	T	P	Cr
		4	0	0	4

SECTION-A

UNIT-1.

Productivity

Introduction to productivity, factors affecting productivity, Measurement of productivity, causes of low productivity and methods to improve productivity.

Work Study

Definition and scope of work study; Inter-relation between method study and work measurement; Human aspects of work study; Role of work study in improving productivity.

UNIT-2

Method Study

Objectives and procedure for Method analysis; Information collection and recording techniques.

Motion Analysis

Principles of Motion analysis; Therbligs and SIMO charts; Normal work area and design of work places. ergonomics

UNIT-3

Work Measurement

Objectives; work measurement techniques, stop watch time study; principle,used and procedure; systems of performance rating; calculation of basic times; various allowances; calculation of standard time, work sampling, standard data and its usage.

SECTION-B

UNIT-4

Wages and Incentive Schemes

Introduction to wages, Wage payment for direct and indirect labour, wage payment plans and incentives, various incentive plans, incentives for indirect labour.

UNIT-5

Production Planning and Control

Introduction, objectives and components (functions) of P.P.C, Advantages of production planning and Production Control, stages of P.P.C, process planning, routing, scheduling, dispatching and follow up, routing purpose, route sheets,scheduling – purpose, machine loading chart, Gantt chart, dispatching –purpose, and procedure, follow up – purpose and procedure. CPM/PERT technique, drawing of simple networks and critical time calculation. Production Control in job order, batch type and continuous type of productions.Difference between these controls.

UNIT-6

Estimating and Costing

Introduction, purpose/functions of estimating, costing concept, ladder and elements of cost, difference between estimation and costing. Overheads and their types, estimation of material cost, estimation of cost for machining processes, numerical problems.

RECOMMENDED BOOKS

1. Work Study and Ergonomics by S Dalela and Sourabh
2. Industrial Engineering and Management by O.P. Khanna Dhanpat Rai and Sons, Delhi.
3. Industrial Engineering and Management by M. Mahajan; Dhanpat Rai and Sons, New Delhi.
4. Introduction to Work Study, ILO Publication

Manufacturing Science

MEL 067	Manufacturing Science	L	T	P	Cr
		3	0	0	3

SECTION-A

UNIT-1.

Cutting Materials

Cutting Tool Materials - Properties of cutting tool material, Study of various cutting tool materials viz. High-speed steel, tungsten carbide, cobalt steel cemented carbides, stellite, ceramics and diamond.

UNIT-2

Broaching

Introduction, Types of broaching machines – Single ram and duplex ram horizontal type, vertical type pull up, pull down, push down. Elements of broach tool, broach tooth details – nomenclature, types, and tool material.

Gear Manufacturing and Finishing Processes

Gear hobbing, Gear shaping

UNIT-3.

Boring

Principle of boring, Classification of boring machines and their brief description. Boring tools, boring bars and boring heads.

Metallic Coating Processes

Metal spraying – Wire process, powder process, applications, Powder coating

SECTION-B

UNIT-4.

Modern Machining Processes

Mechanical Process - Ultrasonic machining (USM): Introduction, principle, process, advantages and limitations, applications, Electro Chemical Processes - Electro chemical machining (ECM) – Fundamental principle, process, applications, Electro chemical Grinding (ECG) – Fundamental principle, process, application, Electrical Discharge Machining (EDM) - Introduction, basic EDM circuit, Principle, metal removing rate, dielectric fluid, applications, Laser beam machining (LBM) – Introduction, machining process and applications, Electro beam machining (EBM)- Introduction, principle, process and applications

UNIT-5

Metal Finishing Processes

Purpose of finishing surfaces. Surface roughness-Definition and units, Honing Process, its applications, Description of hones. Brief idea of honing machines. Lapping process, its

applications. Description of lapping compounds and tools. Brief idea of lapping machines. Super finishing process, its applications. Polishing, Buffing

UNIT-6

Cutting Fluids and Lubricants

Function of cutting fluid, Types of cutting fluids, Difference between cutting fluid and lubricant

Selection of cutting fluids for different materials and operations, Common methods of lubrication of machine tools.

RECOMMENDED BOOKS

1. Manufacturing Technology by Rao; Tata McGraw Hill Publishers, New Delhi.
2. Workshop Technology Vol. I, II, III by Chapman; Standard Publishers Distributors, New Delhi.
3. Production Technology by HMT; Tata McGraw Publishers, New Delhi.
4. Production Engineering and Science by Pandey and Singh; Standard Publishers Distributors, New Delhi.
5. Modern Machining Processes by Pandey; Tata McGraw Publishers, New Delhi.
6. A Text Book of Production Engineering by P.C. Sharma; S. Chand and Company Ltd., New Delhi. Workshop Technology Vol-III, by R.P. Dhiman, Ishan Publications Jalandhar

STRENGTH OF MATERIALS

MEL 031	STRENGTH OF MATERIALS	L	T	P	Cr
		3	1	2	5

SECTION-A

UNIT-1.

Stresses and Strains

Concept of load, stresses and strain, Tensile compressive and shear stresses and strains, Concept of Elasticity, Elastic limit and limit of proportionality. Hook's Law, Young Modulus of elasticity, Nominal stress, Stress strain diagram, Yield point, plastic stage, Ultimate strength and breaking stress, Percentage elongation, Proof stress and working stress, Factor of safety, Poisson's ratio, Shear modulus, Longitudinal and circumferential stresses in seamless thin walled

cylindrical shells (derivation of these formulae not required)

Resilience

Resilience, proof resilience and modulus of resilience, Strain energy due to direct stresses, Stresses due to gradual, sudden and falling load. Numerical problems

UNIT-2

Moment of Inertia

Concept of moment of Inertia and second moment of area, Radius of gyration, section modulus

Theorem of perpendicular axis and parallel axis (without derivation), Second moment of area of common geometrical sections: Rectangle, Triangle, Circle (without derivation) Second moment of area for I, T, L, Z section. Simple numerical problems.

UNIT-3.

Bending Moment and Shearing Force

Concept of beam and type of loading, Concept of end supports-Roller, hinged and fixed, Concept of bending moment and shearing force, B.M. and S.F. Diagram for cantilever and simply

supported beams with and without overhang subjected to concentrated and U.D.L, Simple numerical problems

SECTION-B

UNIT-4.

Bending stresses

Concept of Bending stresses, Theory of simple bending, Use of the equation $f/y = M/I = E/R$ Concept of moment of resistance, Bending stress diagram, Calculation of maximum bending stress in beams of rectangular, circular, and T section., Permissible bending stress Section modulus for rectangular, circular and symmetrical I section. Simple numerical problems

UNIT-5 .

Columns

Concept of column, modes of failure, Types of columns, Buckling load, crushing load Slenderness ratio, Factors effecting strength of a column, End restraints, Effective length

Strength of column by Euler Formula without derivation, Rankine Gouddan formula (without derivation), Simple numerical problems

UNIT-6 .

Torsion

Concept of torsion- difference between torque and torsion. Use of torque equation for circular shaft, Comparison between solid and hollow shaft with regard to their strength and weight. Power transmitted by shaft, Concept of mean and maximum torque, Simple numerical problems.

Springs

Closed coil helical springs subjected to axial load and impact load, Stress deformation, Stiffness and angle of twist and strain energy, Proof resilience, Laminated spring (semi elliptical type only), Determination of number of plates, Simple numerical problems

LIST OF PRACTICALS

1. Tensile test on bars of Mild steel and Aluminium.
2. Bending tests on a steel bar or a wooden beam.
3. Impact test on metals
 - a) Izod test
 - b) Charpy test
4. Torsion test on specimens of different metals for determining modulus of rigidity.
5. To determine the stiffness of a helical spring and to plot a graph between load and extension.
6. Hardness test on different metals.

RECOMMENDED BOOKS

1. SOM by Birinder Singh,; Katson Publishing House, New Delhi.
2. SOM by RS Khurmi; S.Chand & Co; New Delhi
3. Elements of SOM by D.R. Malhotra & H.C.Gupta; Satya Prakashan, New Delhi.

CNC MACHINES AND AUTOMATION

MEL 069	CNC MACHINES AND AUTOMATION	L	T	P	Cr
		3	0	0	3

SECTION-A

UNIT-1.

Introduction

Introduction to NC, CNC & DNC, their advantages, disadvantages and applications. Basic components of CNC machines, Machine Control Unit, input devices, selection of components to be machined on CNC machines, Axis identification

UNIT-2.

Construction and Tooling

Design features, specification of CNC machines, use of slideways, balls, rollers and coatings, motor and leadscrew, swarf removal, safety and guarding devices, various cutting tools for CNC machines, Concept of CNC tool holder, different pallet systems and automatic tool changer system, management of a tool room.

UNIT- 3.

System Devices

Control System; Open Loop and Closed Loop System, Concept of Actuators, Transducers and Sensors, Tachometer, LVDT, opto-interrupters, potentiometers for linear and angular position, encoder and decoder and axis drives.

SECTION-B

UNIT-4.

Part Programming

Introduction to Part programming, Basic concepts of part programming, NC words, part programming formats, simple programming for rational components, part programming using coned cycles, subroutines and do loops, tool off sets, cutter radius compensation and tool wear compensation.

UNIT-5.

Problems in CNC Machines

Common problems in CNC machines related to mechanical, electrical and pneumatic, electronic components. Study of common problems and remedies, use of on-time fault finding diagnosis tools in CNC machines.

UNIT-6. Automation and NC system

Concept of automation, emerging trends in automation, automatic assembly. Overview of FMS, Group technology, CAD/CAM and CIM.

Robot Technology

Introduction to robot technology, basic robot motion and its applications

RECOMMENDED BOOKS

1. CNC Machines – Programming and Applications by M Adithan and BS Pabla; New Age International (P) Ltd., Delhi.
2. CNC Machines by M.S. Sehwat and J.S. Narang; Dhanpat Rai and Co., New Delhi.
3. Computer Aided Manufacturing by Rao, Kundra and Tiwari; Tata Mc Graw Hill, New Delhi. CNC Machine by Bharaj; Satya Publications, New Delhi.

LANGUAGE COMMUNICATION-V

AHL 061	LANGUAGE COMMUNICATION-V	L	T	P	Credits
		2	0	0	0

UNIT-1: Phonetics

- Phonetic Transcription of Words-IV
- Words Commonly Mispronounced- IV
- Word Stress-II

UNIT-2: Reading Practice

- Reading newspaper articles
- Reading story books
- Reading magazines

UNIT-3: Oral Practice

- Group Discussion
- Debate
- Role Plays and Simulations
- Mock Interview
- Classroom Presentations

UNIT-4: Study Skills

- Commonly Misspell Words-IV
- Dictation
- Looking up a dictionary
- Learning pronunciation from a dictionary (Practical implementation of IPA symbols)
- Learning classification and context of words from the dictionary

Crosswords

Scheme of Studies, Syllabus & Examinations
Integrated B.Tech(M.E) 3rd Year
Semester - VI

Sr. No	Course title	Paper code	Teaching schedule			Total hours	Credit
			L	T	P		
1	Industrial Management	MEL 062	3	0	0	3	3
2	Automobile Engineering	MEL 066	3	0	2	5	4
3	Entrepreneurship Development and Management	MEL 068	3	0	0	3	3
4	Inspection and Quality Control	MEL 405	3	0	2	5	4
5	Installation, Testing & Maintenance	MEL 070	3	0	4	5	4
6	Project Work	MEL 072	0	0	12	12	6
7	Lang. Comm. VI	AHL 062	2	0	0	2	0

INDUSTRIAL MANAGEMENT

MEL-062	INDUSTRIAL MANAGEMENT	L	T	P	Cr
		3	0	0	3

SECTION-A

UNIT-1

Principles of Management

Management, different functions of management: Planning, organizing, coordination and control. Structure of an industrial organization. Functions of different departments. Relationship between individual departments.

Human and Industrial Relations

Human relations and performance in organization. Understand self and others for effective behaviour. Behaviour modification techniques. Industrial relations and disputes. Relations with subordinates, peers and superiors. Characteristics of group behaviour and trade unionism. Mob psychology Grievance, handling of grievances. Agitations, strikes, lockouts, picketing and gherao, Labour welfare. Workers' participation in management.

UNIT-2

Professional Ethics

Concept of ethics. Concept of professionalism. Need for professional ethics. Code of professional ethics. Typical problems of professional engineers. Professional bodies and their role.

Motivation

Factors determining motivation, Characteristics of motivation, Methods for improving motivation. Incentives, pay, promotion, rewards. Job satisfaction and job enrichment.

UNIT-3

Leadership

Need for leadership. Functions of a leader. Factors for accomplishing effective leadership. Manager as a leader.

Human Resource Development

Introduction. Staff development and career development. Training strategies and methods

Wage Payment

Introduction, Classification of wage payment scheme.

SECTION-B

UNIT-4

Labour, Industrial and Tax Laws

Importance and necessity of industrial legislation. Types of labour laws and disputes. Brief description of the following Acts: The Factory Act 1948; Payment of Wages Act 1936; Workmen Compensation Act 1923; Industrial Dispute Act 1947; Employee' State Insurance Act, 1948; Provident Fund Act. Various types of Taxes-Production Tax, Local Tax, Sales Tax, Excise Duty, Income Tax. Labour Welfare schemes.

Accidents and Safety

Classification of accidents; according to nature of injuries i.e. fatal,temporary; according to event and according to place. Causes of accidents-psychological, physiological and other industrial hazards.Effects of accidents.Accidents-prone workers.Action to be taken in case of accident with machines, electric shock, road accident, fires and erection and construction accidents.Safety consciousness & publicity.Safety procedures.Safety measures-Do's and don'ts & good housekeeping (5S).Safety measures during executions of Electrical Engineering works.

UNIT-5

Environmental Management

Basics of environmental pollution, various management techniques for control of environmental pollution, various control acts for air, water, solid waste and noise.

Materials Management

Material in industry, inventory control model, ABC Analysis, Safety stock, Reorder,level, Economic ordering quantity, Stores equipment, Stores records,purchasing procedures, purchase records, Bin card, Cardex, Material handling,Manual lifting, Hoist, Cranes, conveyors, trucks, fork trucks.

UNIT-6

Financial Management

Important, ledger, Journal, Profit and Loss Account, Balance Sheet, Interpretation of Statements, Ration Analysis, Project financing, Project appraisal, return on investments.

Marketing and Sales

Sellers and Buyers markets, Marketing, Sales, Market conditions, monopoly,oligraphy, perfect competition, Cost Elements of Cost, Contribution, Break even analysis, Budgets, Pricing Policies.

RECOMMENDED BOOKS

1. Industrial Engineering and Management by TR Banga.
2. Industrial Engineering and Management by OP Khanna, Dhanpat Rai Publications,Delhi.
3. Industrial Management by VK Sharma, OP Harkut.

AUTOMOBILE ENGINEERING

MEL-066	AUTOMOBILE ENGINEERING	L	T	P	Cr
		3	0	2	4

SECTION-A

UNIT-1

Introduction

Components of an automobile, Classification of automobiles, Layout of chassis, Types of drives-front wheel, rear wheel, four wheel, left hand, right hand

UNIT-2

Transmission System

Clutch Function, Constructional details and working of single plate and multiplate friction clutches, Centrifugal and semi centrifugal clutch Gear Box – Function, construction and working of sliding mesh, constant mesh and synchromesh gear box, Torque converter and overdrive, fluid coupling, Function of Universal joint, propeller shaft, Function and construction of differential, Rear axle drives. Function of rear axle and different types of rear axles, Wheels and Tyres-Types of wheels - disc wheels and wire wheel, Types of tyres used in Indian vehicles, Toe in, toe out, camber, caster, kingpin inclination, Tubeless tyres

UNIT-3

Steering System

Function and principle, Ackerman and Davis steering gears, Types of steering gears - worm and nut, worm and wheel, worm and roller, rack and pinion type.

Braking system

Constructional details and working of mechanical, hydraulic and vacuum brake, Details of master cylinder, wheel cylinder, Concept of brake drum, brake lining and brake adjustment

SECTION-B

UNIT-4

Suspension System

Function, Types, Working of coil spring, leaf spring Shock absorber, Shock absorber

Battery : Constructional details of lead acid cell battery, Specific gravity of electrolyte - effect of temperatures on specific gravity, Capacity and efficiency of battery, Battery charging, chemical reactions during charge and discharge. Maintenance of batteries, Checking of batteries for voltage and specific gravity.

UNIT-5

Dynamo and Alternator

Dynamo - Function and details, Regulators - voltage current and compensated type, Cutout - construction, working and their adjustment, Alternator-Construction and working, Charging of battery from alternator.

UNIT-6

Diagram of a Typical Wiring System ,Lighting System and Accessories,Lighting system,Wiring circuit,Headlight, aiming of headlights,Lighting switches,Direction indicators,Windscreen wiper, Horn,Speedometer,Heater,Air conditioning

LIST OF PRACTICALS

1. Fault and their remedies in (i) Battery Ignition system (ii) Magneto Ignition system
2. Study and sketch of (i) Head Light Model (ii) Wiper and Indicators
3. Study and sketch of (i) AC Pump (ii) SU Pump (iii) Master Cylinders
4. Study and sketch of (i) rear axle (ii) differential (iii) steering system
5. Fault finding practices on an automobile - four wheelers (petrol and diesel vehicles)
6. Assembly and disassembly of petrol and diesel engine of an automobile.
7. Tuning of an automobile engine.
8. Driving practice on a four wheeler.
9. Charging of an automobile battery and measuring cell voltage and specific gravity of electrolyte.
10. Phasing and calibration of fuel injection pump
11. Checking and adjusting clutch pedal play and brake pedal play, tightness of fan belt plate and brake shoe
12. Rotation of wheels and inflation of tyres, alignment of wheels
13. Measuring spark gap, valve clearance and ring clearance
14. Cleaning and adjusting a carburetor
15. Nozzle cleaning, testing and adjustment

RECOMMENDED BOOKS

1. Automobile Engineering Vol. I&II by Kirpal Singh; Standard Publishers, New Delhi.

ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT

MEL-068	ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT	L	T	P	Cr
		3	0	0	3

SECTION-A

UNIT-1

Entrepreneurship

Concept/Meaning,Need,Competencies/qualities of an entrepreneur

Entrepreneurial Support System

District Industry Centres (DICs),Commercial Banks,State Financial Corporations,Small Industries Service Institutes (SISIs), Small Industries Development,Bank of India (SIDBI), National Bank for Agriculture and Rural Development (NABARD), National Small Industries Corporation (NSIC) and other relevant institutions/organizations at State level.

UNIT-2

Market Survey and Opportunity Identification (Business Planning)

How to start a small scale industry,Procedures for registration of small scale industry,List of items reserved for exclusive manufacture in small scale industry,Assessment of demand and supply in potential areas of growth,Understanding business opportunity, Considerations in product selection Data collection for setting up small ventures.

Project Report Preparation

Preliminary Project Report, Techno-Economic feasibility report,Project Viability.

UNIT-3

Managerial Aspects of Small Business

Principles of Management (Definition, functions of management viz planning, organisation, coordination and control,Operational Aspects of Production, Inventory Management,Basic principles of financial management,Marketing Techniques,Personnel Management,Importance of Communication in business.

SECTION-B

UNIT-4

Legal Aspects of Small Business

Elementary knowledge of Income Tax, Sales Tax, Patent Rules, Excise Rules, Factory Act and Payment of Wages Act.

UNIT-5

Environmental considerations

Concept of ecology and environment,Factors contributing to Air, Water, Noise pollution Air, water and noise pollution standards and control,Personal Protection Equipment (PPEs) for safety at work places.

UNIT-6

Miscellaneous

Human relations and performance in organization, Industrial Relations and Disputes, Relations with subordinates, peers and superiors, Motivation – Incentives, Rewards, Job Satisfaction, Leadership, Labour Welfare, Workers participation in management.

RECOMMENDED BOOKS

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)

INSPECTION AND QUALITY CONTROL

MEL 405	INSPECTION AND QUALITY CONTROL	L	T	P	Cr
		3	0	2	4

SECTION-A

UNIT-1

Inspection

Introduction, units of measurement, standards for measurement and interchangeability. International, national and company standard, line and wavelength standards. Limits fits and tolerances: study of natural variability of process. Indian standards on limits, fits and tolerances including terminology, guide for selection of fits, clearance, transition and interference. Positional tolerances: maximum material condition usage of standards for deciding tolerance. Planning of inspection: what to inspect? When to inspect? Who should inspect? Where to inspect? Types of inspection: remedial, preventive and operative inspection, incoming, in process and final inspection. Study of factors influencing the quality of manufacture.

UNIT-2

Measurement

Basic principles used in measurement and gauging, mechanical, optical, electrical and electronic. Study of various measuring instruments like: calipers, micrometers, dial indicators, surface plate, straight edge, try square, protectors, sine bar, clinometer, comparators – mechanical, electrical and pneumatic. Slip gauges, tool room microscope, and profile projector, talysurf. Limit gauges: plug, ring, snap, taper, thread, height, depth, form, feeler, wire and their applications for linear, angular, surface, thread and gear measurements,

UNIT-3

Gauging gauge tolerances. Geometrical parameters & errors: Errors & their effect on quality, concept of errors, measurement of geometrical parameter such as straightness, flatness & parallelism. Study of procedure for alignment tests on lathes, drilling and milling machines, Testing and maintenance of measuring instruments.

SECTION-B

UNIT-4

Statistical Quality Control

Basic statistical concepts, empirical distribution and histograms, frequency, mean, mode, standard deviation, normal distribution, binomial and Poisson (No mathematical derivations). Introduction to control charts, namely X, R, P and C charts and their applications. Sampling plans, selection of sample size, method of taking samples, frequency of samples. Inspection plan format and test reports, Concept of total quality management (TQM)

UNIT-5

Standards and Codes

National and International Codes. ISO-9000, concept and its evolution and implications.

UNIT-6

Instrumentation

Measurement of mechanical quantities such as displacement, vibration, frequency, pressure, temperature, humidity by electro mechanical transducers of resistance, capacitance & inductance type.

LIST OF PRACTICALS

1. Use of dial indicator for measuring taper.
2. Use of combination set, bevel protector and sine bar for measuring taper.
3. Measurement of thread characteristic using vernier and gauges.
4. Measurement of all elements of gauges by using flange micrometer, gear roller tester, gear tooth vernier and profile projector.
5. Use of slip gauge in measurement of center distance between two pins.
6. Use of tool maker's microscope and comparator.
7. Verify that when random samples are taken from a universe with a certain percentage of defectives same percentage tends to appear in random samples by using (Shewart's plastic kit box).
8. Plot frequency distribution for 50 turned components.
9. With the help of given data, plot X, R, P and C charts.

LIST OF RECOMMENDED BOOKS

1. Statistical Quality Control by M. Mahajan: Dhanpat Rai and Sons, Delhi
2. Engineering Metrology by RK Rajput; SK Kataria and Sons

INSTALLATION, TESTING & MAINTENANCE

MEL-070	INSTALLATION, TESTING & MAINTENANCE	L	T	P	Cr
		3	0	2	4

SECTION-A

UNIT-1

Introduction

Necessity of testing, repair and maintenance, Economic aspects, manpower planning and materials management, Fits and tolerances – common fits and tolerances used for various machine parts

UNIT-2

Execution and Commissioning of Machines (Installation)

Location, layout and positioning of machines, Foundation – types of foundation, foundation plan, erection and leveling, grouping, vibration damping, vibration isolation – methods of isolation

UNIT-3

Inspection, Servicing, Repair & Overhauling of machines and equipment

Inspection of various machines and equipment, Servicing of various machines and equipment
Repair of various machines and equipment, Overhauling of various machines and equipment,
Recalibration of various measuring instruments, testing the speed of machines, accuracy of machines, alignment and performance of machines.

SECTION-B

UNIT-4.

Maintenance planning & stages of maintenance

Maintenance planning, Various stages of maintenance, Reliability, availability and Maintainability

Overhauling

Frequent failure of common parts, their causes & remedial measures. Maintenance schedule.
Parts which require frequent maintenance such as belts, couplings, nut, bolts, their repair & maintenance to avoid downtime.

UNIT-5

Maintenance

Meaning of maintenance, advantages & disadvantages, Types of maintenance, Preventive, predictive & breakdown maintenance. Maintenance organization. Centralized maintenance & decentralized maintenance. Computerization of maintenance.

UNIT-6

Storage of parts

Storage of parts used frequently for replacement and parts which are not easily available in local market. History cards of different machines. Machines repair/replacement decision.

LIST OF PRACTICALS

1. Preparation of prevention & maintenance check sheet.
2. Maintenance of screw jack.
3. Maintenance of worm gearing set.
4. Maintenance of winch crab machine.
5. Routine maintenance of Lathe machine.
6. Maintenance of fitting bench.
7. Maintenance of carpentry vice.
8. Maintenance of power hacksaw.
9. Precaution for maintenance of electrical machines & maintenance of power hacksaw.
10. Maintenance of power transformer.
11. General preventive machine maintenance.
12. S.T.P Plant maintenance.
13. Preparation of maintenance report.

RECOMMENDED BOOKS

1. Industrial Maintenance by HP Garg; S. Chand and Company.
2. Plant Maintenance Engineering by RK Jain; Khanna Publishers.

PROJECT WORK

MEL-072	PROJECT WORK	L	T	P	Cr
		0	0	12	6

Project work aims at developing skills in the students whereby they apply the totality of knowledge and skills gained through the course in the solution of particular problem or undertaking a project. The students have various aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given for a group. The students should identify or given project assignment at least two to three months in advance. The project work identified in collaboration with industry may be preferred.

Each teacher is expected to guide the project work of 5-6 students.

- Projects related to increasing productivity
- Projects related to quality assurance
- Projects related to estimation and economics of production
- Projects connected with repair and maintenance of plant and equipment
- Projects related to identification of raw material thereby reducing the wastage
- Any other related problems of interest of host industry

A suggestive criteria for assessing student performance by the external (personnel from industry) and internal (teacher) examiner is given in table below:

Sr. No.	Performance criteria	Max. Marks	Rating Scale				
			Excellent	Very Good	Good	Satisfactory	Poor
1	Selection of project assignment	10	10	8	6	4	2
2	Planning and execution of considerations	10	10	8	6	4	2
3	Quality of performance	20	20	16	12	8	4
4	Providing solution of the problems or production of final product	20	20	16	12	8	4
5	Sense of responsibility	10	10	8	6	4	2
6	Selfexpression/Communication skill	5	5	4	3	2	1
7	Interpersonal skills	5	5	4	3	2	1
8	Report writing skills	10	10	8	6	4	2
9	Viva voce	10	10	8	6	4	2
Total Marks		100	100	80	60	40	20

Important Notes

- 1. This criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.**
- 2. The criteria for evaluation of the students have been worked out for 100 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.**
- 3. The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.**
- 4. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.**

The teachers are free to evolve another criteria of assessment, depending upon the type of project work. It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations in such an exhibition. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific industries are approached for instituting such awards.

LANGUAGE COMMUNICATION-VI

AHL 062	LANGUAGE COMMUNICATION-VI	L	T	P	Credits
		2	0	0	0

EMPLOYABILITY SKILLS

MET 074	EMPLOYABILITY SKILL	L	T	P	Cr
		0	0	2	1

RATIONALE

The present day world requires professionals who are not only well qualified and competent but also possess good communication skills. Our diploma students not only need to possess subject related knowledge but also soft skills to get good jobs or to rise steadily at their work place. The objective of this subject to prepare students for employability in job market and survive in cut throat competition among professionals.

DETAILED CONTENTS

1. Oral Practice

- i) Mock interview (05 hrs)
- ii) Preparing for meeting (05 hrs)
- iii) Group discussion (05 hrs)
- iv) Seminar presentation (05 hrs)
- v) Making a presentation (12 hrs)
 - a) Elements of good presentation
 - b) Structure and tools of presentation
 - c) Paper reading
 - d) Power point presentation