

**VINAYAKA MISSION'S KIRUPANANDA VARIYAR ENGINEERING COLLEGE  
SALEM  
AND  
AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR, CHENNAI  
SCHOOL OF MECHANICAL SCIENCES**

**BOARD : MECHANICAL ENGINEERING  
REGULATION : 2017  
PROGRAM : B.Tech – MECHANICAL ENGINEERING - PART TIME**

**CURRICULUM & SYLLABUS**

**SEMESTER I**

SL.NO.	COURSE CODE	COURSE TITLE	DEPT	L	T	P	C
<b>THEORY</b>							
1		ENGINEERING MATHEMATICS	MATHS	3	1	0	4
2		ENVIRONMENTAL SCIENCE AND ENGINEERING	CHEM	3	0	0	3
3		MANUFACTURING ENGINEERING	MECH	3	0	0	3
4		ENGINEERING MECHANICS	MECH	3	1	0	4
<b>PRACTICAL</b>							
5		MANUFACTURING ENGINEERING LAB	MECH	0	0	4	2
<b>TOTAL</b>				<b>12</b>	<b>2</b>	<b>4</b>	<b>16</b>

**SEMESTER II**

<b>SL. NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>DEPT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>							
1		ADVANCED ENGINEERING MATHEMATICS	MATHS	3	1	0	4
2		STRENGTH OF MATERIALS	CIVIL	3	0	0	3
3		FLUID MECHANICS AND MACHINERY	CIVIL	3	1	0	4
4		ENGINEERING THERMODYNAMICS	MECH	3	1	0	4
<b>PRACTICAL</b>							
5		COMPUTER AIDED DRAFTING LAB	MECH	0	0	4	2
<b>TOTAL</b>				<b>12</b>	<b>3</b>	<b>4</b>	<b>17</b>

**ENGINEERING MATHEMATICS**  
 (COMMON TO THE BRANCHES MECH,ECE,CSE,  
 CSSE,EEE,EIE,CIVIL,IT,MECHTRONICS,AERONAUTICAL ,ETC,AUTOMOBILE)  
 (PART TIME)

**UNIT I**

**MATRICES**

09

Characteristic equation – Eigen values and eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors (Without proof) – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form.

**UNIT II**

**ORDINARY DIFFERENTIAL EQUATIONS**

09

Solutions of First and Second order linear ordinary differential equation with constant coefficients – Method of variation of parameters – Simultaneous first order linear equations with constant coefficients.

**UNIT III**

**MULTIPLE INTEGRALS AND VECTOR CALCULUS**

09

Double integration - Cartesian and polar coordinates – Area as a double integral – Triple integration – volume as a triple integral- Directional derivatives – Gradient, Divergence and Curl – Irrotational and solenoidal- vector fields – vector integration.

**UNIT IV**

**LAPLACE TRANSFORMS**

09

Laplace transform – transform of elementary functions – basic properties – derivatives and integrals of transforms – transforms of derivatives and integrals – initial and final value theorems – Transform of periodic functions.

**UNIT V**

**APPLICATIONS OF LAPLACE TRANSFORMS**

09

Inverse Laplace transform – Convolution theorem – Initial and Final value theorem-Solution of linear

ODE of second order with constant coefficients and first order simultaneous equation with constant coefficients using Laplace transforms.

**Total hours : 60**  
**Lecture Hours: 45**

**TEXT BOOKS**

1. “Engineering Mathematics” by Department of Mathematics, VMU
2. Veerarajan, T., “Engineering Mathematics”, Tata McGraw Hill Publishing Co., NewDelhi, 2006.
3. Prof.Dr.A .Singaravelu , Engineering Mathematics Volume I & Volume II by Meenakshi Publications.

**REFERENCE BOOKS**

1. Grewal, B.S., “Higher Engineering Mathematics” (36<sup>th</sup> Edition), Khanna Publishers, Delhi 2001.
2. Kreyszig, E., “Advanced Engineering Mathematics” (8<sup>th</sup> Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.
3. Kandasamy .P., Thilagavathy. K., and Gunavathy. K., “Engineering Mathematics”, Volumes I & II (4<sup>th</sup> edition), S.Chand & Co., New Delhi., 2001.

**ENVIRONMENTAL SCIENCE AND ENGINEERING Credit: 3**  
**(Common to B.E all branches)**

**OBJECTIVE:** It is the branch of science which deals with the effects of human activities & modern technology on environment. It creates awareness among the engineering students about environmental pollution and the role of the engineers in conservation of environment.

**OUT COME:** The students will get the knowledge about environment and they will work their corresponding field with eco friendly. It will protect our environment from pollution

**UNIT – I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES** **10**

Definition, scope and importance – need for public awareness- forest resources: use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their ground water, floods, drought, conflicts over water, dams-benefits and problems-mineral resources: use effects on forests and tribal people-water resources: use and over-utilization of surface and exploitation, environmental effects if extracting and using mineral resources, case studies-food resources: world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies-energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies –land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification –role of an individual in conservation of natural resources-equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets-river/forest./grassland/hill/mountain.

**UNIT – II ECOSYSTEMS AND BIODIVERSITY** **14**

Concept of and ecosystem –structure and function of an ecosystem-producers, consumers and decomposers-energy flow in the ecosystem-ecological succession-food chains, food webs and ecological pyramids-introduction, types, characteristic features, structure and function of the (a)forest ecosystem (b). grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)-introduction to biodiversity- definition: genetic, species and ecosystem diversity- biogeographical classification of India-value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values-biodiversity at global, national and local levels-India as a mega-diversity nation-hot-spots of biodiversity-threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts-endangered and endemic species of India –conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

**UNIT - III ENVIRONMENTAL POLLUTION****8**

Definition-causes, effects and control measures of: (a) air pollution (b) water pollution (c) soil pollution (d) marine pollution (e) noise pollution (f) thermal pollution (g) nuclear hazards – solid waste management: causes, effects and control measures of urban and industrial wastes-role of an individual in prevention of pollution-pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site-urban / rural / industrial / agriculture

**UNIT - IV SOCIAL ISSUES AND THEIR ENVIRONMENT****7**

From unsustainable to sustainable development-urban problems related to energy- water conservation, rain water harvesting, watershed management –resettlement and rehabilitation of people, its problems and concerns, case studies – environmental ethics: issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – wasteland reclamation-consumerism and waste products-environment protection act-air (prevention and control of pollution) act-water (prevention and control of pollution) act- wildlife protection act-forest conservation act-issues involved in enforcement of environmental legislation-public awareness.

**UNIT – V HUMAN POPULATION AND THE ENVIRONMENT****6**

Population growth, variation among nations – population explosion – family welfare programme- environment and human health – human rights- value education- HIV/ AIDS – women and child welfare –role of information technology in environment and human health –case studies.

Total Hours : 45

**TEXT BOOK:**

1. Raman Sivakumar, Environmental Science and Engineering, Vijay Nicole imprints Pvt.Ltd.

**REFERENCE BOOKS :**

1. Bharucha Erach, The Biodiversity of India, publishing Pvt. Ahmedabad, India,
2. Trivedi R.K. Hand book of Environmental laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media.
3. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, jaico., House, Mumbai, 2001.
4. Weger K.D., Environmental Management, W.B. Saunders, Co., Philadelphia, USA., 1998.
5. Gilbert M.Masters, Introduction to Environmental Engineering and science, pearson Education Pvt., Ltd., Second Edition, 2004
6. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co.
7. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science
8. Trivedi R.K And P.K. Goel, Introduction to air pollution, Techno-Science publications.

**MANUFACTURING ENGINEERING** 3 0 0 3

**UNIT I CASTING** 9

Classification and comparison of manufacturing processes- criteria for selection of a process. Casting- sand casting- Types – procedure to make sand moulds- Cores-Principle of die casting – centrifugal casting, Investment casting- shell moulding- Continuous casting.

**UNIT II METAL FORMING AND POWDER METALLURGY** 9

Basic concepts and classification of forming processes- principles- Application of the following processes- Forging, rolling, extrusion, wire drawing, spinning, sheet metal forming- powder metallurgy- steps involved, applications.

**UNIT III COVENTIONAL MACHINING** 9

General principles(with schematic diagrams only) of working, types and commonly performed operations in the following machines- Lathe, shaper, planer, milling machining, drilling machines- basic of CNC machines.

**UNIT IV WELDING** 9

Classification of welding processes- principles and equipment used in the following processes- gas welding- Arc welding- Resistance welding- Thermit welding- soldering, brazing.

**UNIT V UNCONVENTIONAL MACHINING PROCESSES** 9

Need for unconventional machining processes- principles and applications of the following processes- Abrasive jet machining, Ultrasonic machining, Electro discharge machining, Electrochemical machining, Chemical machining, LASER beam machining, Electro beam machining, plasma arc machining

**TOTAL: 45 PERIODS**

#### **TEXT BOOKS**

1. Nagpal, “ Machine Tool Engineering” Tata McGraw Hill, 2002.
2. Rao .P.N. “ Manufacturing Technology” Tata McGraw Hill, 2002.

#### **REFERENCE BOOKS**

1. Hajra Choudhury, Elements of Workshop Technology, Vol. I and Vol.II Asia Publising House, 1996.
2. R.K. Jain and S.C. Gupta, Production Technology – Khanna Publishers, 1997
3. H.M.T Production Technology– Hand book, Tata McGraw Hill,

**ENGINEERING MECHANICS****3 1 0 4****UNIT 1. BASICS & STATICS OF PARTICLES 9**

Introduction - Units and Dimensions - Laws of Mechanics - Lame's theorem. Parallelogram and triangular law of forces - Vectors - Vectorial representation of forces and moments - Vector operations: addition, subtraction, dot product, cross product - Coplanar Forces - Resolution and Composition of forces - Equilibrium of a particle - Forces in space - Equilibrium of a particle in space - Equivalent systems of forces - Principle of transmissibility - Single equivalent force.

**UNIT 2. EQUILIBRIUM OF RIGID BODIES 9**

Free body diagram - Types of supports and their reactions - requirements of stable equilibrium - Moments and Couples - Moment of a force about a point and about an axis - Vectorial representation of moments and couples - Scalar components of a moment - Varignon's theorem - Equilibrium of Rigid bodies in two dimension - Equilibrium of RIGid bodies in three dimensions - Examples.

**UNIT 3. PROPERTIES OF SURFACES AND SOLIDS 9**

Determination of Areas and Volumes - First moment of area the Centroid of sections - Rectangle, circle, triangle from integration - T section, I section, Angle section, Hollow section by using standard formula - second and product moments of plane area - Rectangle, triangle, circle from integration - T section, I section, Angle section, Hollow section by using standard formula - Parallel axis theorem and perpendicular axis theorem - Polar moment of inertia - Principle moments of inertia of plane areas - Principle axes of inertia - Mass moment of inertia - Derivation of mass moment of inertia for rectangular section, prism, sphere from first principle - Relation to area moments of inertia.

**UNIT 4. DYNAMICS OF PARTICLES 9**

Displacement, Velocity and acceleration, their relationship - Relative motion - Curvilinear motion - Newton's law - Work Energy equation of particles - Impulse and Momentum - Impact of elastic bodies.

**UNIT 5. FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS 9**

Frictional force - Laws of Coloumb friction - simple contact friction - Rolling resistance - Belt friction. Translation and Rotation of Ridid Bodies - Velocity and acceleration - General Plane motion.

**TOTAL: 45 PERIODS****TEXT BOOKS :**

1. Beer & Johnson, Vector Mechanics for Engineers. Vol. I Statics and Vol. II Dynamics McGraw Hill International Edition, 1995.
2. Meriam, Engineering Mechanics, Vol. I Statics & Vol. II Dynamics 2/e, Wiley Intl., 1998.

**REFERENCE BOOKS :**

1. Rajasekaran.S, and Sankara Subramanian G, "Engineering Mechanics", Vikas Publishing Co. New Delhi.
2. Irving H. Sharma, Engineering Mechanics - Statics & Dynamics, III Edition, Prentice Hall of India Pvt. Ltd., 1993.
3. K.L.Kumar, Engineering Mechanics III Edition, Tata McGraw Hill Publishing Co. Ltd., 1998



**MANUFACTURING ENGINEERING LAB****0 0 3 2****List of Experiments**

1. Plain Turning and Step Turning on a Lathe.
2. Taper Turning on a lathe
3. Thread Cutting on a lathe
4. Drilling, reaming and tapping in a drilling machine
5. Plain Milling
6. Undercut Step Milling
7. Hexagonal Milling
8. Cutting Keyways in a Slotting Machine
9. Grinding using a grinding machine.

**TOTAL: 30 PERIODS**

SEMESTER	SUBJECT	L	T	P	C
II	<b>ADVANCED ENGINEERING MATHEMATICS.</b> (Common to CIVIL, MECH, MECHAT,AUTO, AERO, ECE, EEE, CSE,EIE, IT)	3	1	0	4

**OBJECTIVES:**

The syllabus for the Advanced Engineering Mathematics has been framed catering to the needs of the Engineering students. It is purely application oriented. To mention a few (i) Partial differential equations arises in most of the Engineering discipline when the number of independent variables in the given problem under discussion is two or more. (ii) Fourier series has the wide application in the field of heat propagation and diffusion, wave propagation and in signal and systems analysis. (iii) Transform techniques are very useful in the field of signal and system analysis. Z - transform plays an important role in analysis of Discrete signals. This is a prelude to learn higher semester courses.

**1. PARTIAL DIFFERENTIAL EQUATIONS****9**

Formation - Solutions of standard types  $f(p,q)=0$ , Clairauts form,  $f(z,p,q)=0, f(p,x)=g(q,y)$  of first order equations - Lagrange's Linear equation - Linear partial differential equations of second and higher order with constant coefficients.

**2. FOURIER SERIES****9**

Dirichlet's conditions - General Fourier series - Half-range Sine and Cosine series - Parseval's identity - Harmonic Analysis.

**3. BOUNDARY VALUE PROBLEMS****9**

Classification of second order linear partial differential equations - Solutions of one - dimensional wave equation, one-dimensional heat equation - Steady state solution of two-dimensional heat equation - Fourier series solutions in Cartesian coordinates.

**4. FOURIER TRANSFORMS****9**

Statement of Fourier integral theorem - Fourier transform pairs - Fourier Sine and Cosine transforms - Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

**5. Z - TRANSFORM****9**

Z-Transform - Elementary Properties - Inverse Z-Transform - Convolution Theorem - Formation of Difference Equations - Solution of Difference Equations using Z-Transform.

**Tutorial : 15;****Total hours: 60****TEXT BOOK:**

A.Singaravelu, "Transforms and Partial Differential Equations", Meenakshi Agencies, Chennai

**REFERENCES:**

1. T. Veerarajan, "Engineering Mathematics" (for semester III), Third Edition Tata McGraw- Hill Publishing Company limited.
2. Grewal, B.S., "Higher Engineering Mathematics" (35th Edition), Khanna Publishers, Delhi 2000.
3. Kreyszig, E., "Advanced Engineering Mathematics" (8th Edition), John Wiley and Sons, (Asia) Pte Ltd., Singapore, 2000.

**STRENGTH OF MATERIALS**

3 0 0 3

**UNIT –I -STRESS- STRAIN AND DEFORMATION OF SOLIDS****9**

Rigid and Deformable bodies – Strength- Stiffness and Stability – Stresses; Tensile- Compressive and Shear – Deformation of simple and compound bars under axial load – Thermal stress – Elastic constants – Strain energy and unit strain energy – Strain energy in uniaxial loads.

**UNIT –II -BEAMS - LOADS AND STRESSES****9**

Types of beams: Supports and Loads – Shear force and Bending Moment in beams – **Cantilever-** Simply supported and Overhanging beams – Stresses in beams – Theory of simple bending – Stress variation along the length and in the beam section – Shear stresses in beams.

**UNIT –III -TORSION****9**

Analysis of torsion of circular bars – Shear stress distribution – Bars of Solid and hollow circular section – Stepped shaft – Twist and torsion stiffness – Compound shafts – Fixed and simply supported shafts – Application to close-coiled helical springs – Maximum shear stress in spring section including Wahl Factor – Deflection of helical coil springs under axial loads – Design of helical coil springs.

**UNIT –IV -DEFLECTION OF BEAMS****9**

Elastic curve of Neutral axis of the beam under normal loads – Evaluation of beam deflection and slope : Double integration method- Macaulay Method- and Moment-area Method –Columns – End conditions – Equivalent length of a column – Euler equation – Slenderness ratio – Rankine formula for columns – Introduction to curved beams.

**UNIT –V -ANALYSIS OF STRESSES IN TWO DIMENSIONS****9**

Biaxial state of stresses – Thin cylindrical and spherical shells – Deformation in thin cylindrical and spherical shells – Biaxial stresses at a point – Stresses on inclined plane – Principal planes and stresses – Mohr’s circle for biaxial stresses – Maximum shear stress - Strain energy in bending and torsion.

**TOTAL: 45 PERIODS****TEXT BOOKS**

1. Ramamutham.S- Strength of Materials- S.Chand &B Co.- New Delhi-2005.
2. Beer F. P. and Johnston R- “Mechanics of Materials”- McGraw-Hill Book Co- Third Edition- 2002.

**REFERENCES**

1. Nash W.A- “Theory and problems in Strength of Materials”- Schaum Outline Series- McGraw-Hill Book Co- New York- 1995
2. Ryder G.H- “Strength of Materials”- Macmillan India Ltd.- Third Edition- 2002
3. Ray Hulse- Keith Sherwin & Jack Cain- “Solid Mechanics”- Palgrave ANE Books- 2004.

**FLUID MECHANICS AND MACHINERY****3 1 0 4****UNIT –I - BASIC CONCEPTS AND PROPERTIES 6**

Fluid – Definition - solid and fluid - Units and dimensions - Properties of fluids – Temperature - Viscosity - Compressibility - Vapour pressure - Capillary and surface tension - Fluid statics: concept of fluid static pressure - Pressure measurements by manometers and pressure gauges. Introduction to CFD, geophysical fluid dynamic.

**UNIT –II - FLUID KINEMATICS AND SIMILARITIES 12**

Fluid Kinematics - Flow visualization - Lines of flow - Types of flow - Velocity field and acceleration - Continuity equation (one and three dimensional differential forms)- Equation of streamline - Stream function - Velocity potential function - Circulation - Flow net – Fluid dynamics - Equations of motion - Euler's equation along a streamline - Bernoulli's equation – Applications - Venturi meter - Orifice meter - Pitot tube - Dimensional analysis - Buckingham's  $\pi$  theorem- Applications - Similarity laws and models.

**UNIT –III - INCOMPRESSIBLE FLUID FLOW 9**

Viscous flow - Navier-Stoke's equation (Statement only) - Shear stress - Pressure gradient relationship - Laminar flow between parallel plates - Laminar flow through circular tubes (Hagen poiseulle's) - Hydraulic and energy gradient - Flow through pipes - Darcy - Weisback's equation - Pipe roughness -Friction factor- Moody's diagram - Minor losses - Flow through pipes in series and in parallel - Power transmission - Boundary layer flows - Boundary layer thickness - Boundary layer separation - Drag and lift coefficients.

**UNIT –IV - HYDRAULIC TURBINES 9**

Fluid machines: definition and classification - Exchange of energy - Euler's equation for turbo machines - Construction of velocity vector diagrams - Head and specific work - Components of energy transfer - Degree of reaction.

Hydro turbines: definition and classifications - Pelton turbine - Francis turbine - propeller turbine - Kaplan turbine - Working principles - Velocity triangles - Work done - Specific speed - Efficiencies - Performance curve for turbines.

**UNIT –V - HYDRAULIC PUMPS 9**

Pumps: definition and classifications - Centrifugal pump: classifications - Working principle- velocity triangles - Specific speed - Efficiency and performance curves - Reciprocating pump: classification - Working principle - Indicator diagram -Work saved by air vessels and performance curves - Cavitations in pumps - Rotary pumps.

**TOTAL: 45 PERIODS****TEXT BOOKS**

1. Bansal- R.K.- “Fluid Mechanics and Hydraulics Machines”- (5th edition)- Laxmi publications (P) Ltd- New Delhi- 1995
2. Kumar- K.L.- “Engineering Fluid Mechanics”- Eurasia Publishing House (P) Ltd- New Delhi (7<sup>th</sup> edition)- 1995.

**REFERENCES**

1. White- F.M.- “Fluid Mechanics”- Tata McGraw-Hill- 5<sup>th</sup> Edition- New Delhi- 2003.
2. Ramamurtham. S- "Fluid Mechanics and Hydraulics and Fluid Machines"- Dhanpat Rai and Sons- Delhi- 2003.
3. Streeter- V.L.- and Wylie- E.B.- “Fluid Mechanics”- McGraw-Hill- 1983

**ENGINEERING THERMODYNAMICS****3 1 0 4****UNIT 1. BASIC CONCEPT AND FIRST LAW****9**

Basic concepts-concept of continuum, macroscopic approach, thermodynamic systems-closed, open and isolated. Property, state, path and process, quasi-static process, work, modes of work, Zeroth law of thermodynamics – concept of temperature and heat. Concept of ideal and real gases. First law of thermodynamics –application to closed and open systems, internal energy, specific heat capacities, enthalpy, steady flow process with reference to various thermal equipments.

**UNIT 2. SECOND LAW, ENTROPY AND AVAILABILITY****9**

Second law of thermodynamics – Kelvin’s and Clausius statement of second law. Reversibility and irreversibility. Carnot cycle reversed Carnot cycle, efficiency, COP. Thermodynamic temperature scale, Clausius inequality, concept of entropy, entropy of ideal gas, and principle of increase of entropy – Carnot theorem, absolute entropy, and availability.

**UNIT 3. PROPERTIES OF PURE SUBSTANCE AND STEAM POWER CYCLE****9**

Properties of pure substances – thermodynamics properties of pure substance in solid, liquid and vapour phases, phase rule, P-V, P-T, T-V, T-S, H-S diagrams PVT surface, thermodynamics properties of steam. Calculations of work done and heat transfer in non-flow and flow processes Standard Rankine cycle, Reheat and regenerative cycle.

**UNIT 4. IDEAL & REAL GASES AND THERMODYNAMICS RELATIONS****9**

Gas mixtures-Properties of ideal and real gases, equation of state, Avogadro’s law, Vander Waal’s equation of states, compressibility, chart. Dalton’s law of partial pressure, Exact differentials, TDS relations, Maxwell relations, Clausius Clapeyron equations, Joule Thomson Coefficient.

**UNIT 5. PSYCHROMETRY****9**

Psychrometry and psychrometric charts, property calculations of air vapour mixtures psychrometric process - Sensible heat exchange processes. Latent heat exchange processes. Adiabatic mixing, evaporative cooling, problems.

**TOTAL: 45 PERIODS**

(Use of standard thermodynamic tables, Mollier diagram, Psychrometric chart and Refrigerant property tables are permitted).

**TEXT BOOKS:**

1. Nag. P.K., “Engineering Thermodynamics”. Tata McGraw-Hill New Delhi, 1998.
2. Cengel, “Thermodynamics” An Engineering Approach, third Edition – 2003, Tata McGraw Hill, New Delhi.

**REFERENCE BOOKS :**

1. Holman.J.P., “Thermodynamics”, 3<sup>rd</sup> Edition McGraw-Hill, 1995
2. Venwylen and Sonntag, “Classical Thermodynamics”, Wiley Eastern, 1987
3. Arora C.P.,”Thermodynamics”, Tata McGraw –Hill, New Delhi, 2003
4. Merala C, Pother, Craig W, Somerton, “Thermodynamics for Engineering”, Schaum Outline Series, Tata McGraw-Hill, New Delhi, 2004
5. Sri Vastave R.C, Saha S.K, Jan A.K, “Thermodynamics” Prentice Hall of India, New Delhi, 2004

**COMPUTER AIDED DRAFTING LAB****0 0 3 2****UNIT –I - INTRODUCTION TO DRAFTING SOFTWARE**

Drawing- Editing- Dimensioning- Plotting Commands- Layering concepts- Limits- Fits and Tolerances.

**UNIT –II -PREPARATION OF 2-D DRAWINGS**

Orthographic views of standard machine components: Brackets- V Blocks- Stop Block- Screw threads and Threaded fasteners.

**UNIT –III -ASSEMBLY DRAWING (Preparation of assembled view)**

Flange coupling

Plummer block bearing

Lathe Tailstock

Universal Joint.

Machine vice

Stuffing box

Piston and connecting rod

**UNIT –IV -Introduction to Solid Modeling.**

Conversion of basic 2D diagrams into 3D models – flange coupling, universal joint and piston and connecting rod

**TOTAL: 30 PERIODS**