VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- II

Mechanical

Semester -IV

MED 401 MP Material Science and Metallurgy

	Lecture	Tutorial	Practical
Teaching Hours	3	0	2
Examination Scheme Marks	100	00	Continuous Evaluations 20 Examination 30

1. **Structure of Matter and Mechanical Behavior:** Electronic Configuration, Bonds, Co-ordinators No., Lattice and Crystal System, Bragg's law, X-Ray Diffraction pattern, Crystal Imperfection, Mechanical properties and Testing Including, Destructive and Non-destructive Testing of Materials.

2. **Electronic Structure of Solid:** Insulators, Semi-conductors, super conductors, Magnetic properties and Thermal Conductivity. Problem Related to the Electronic structure of solids.

3. **Polymers and Ceramics:** Polymerization, molecular weights, Properties of polymers, Natural synthetic Rubbers, Unsaturated Polymers, Valcanization ceramics, Cerments and Composite materials and their properties and Engg. Applications.

4. **Iron making and steels:** Pig irons productions, various method of production of steels including latest steel making Processes Sponge iron Productions, steels and Cast irons. Study of some Important Special Steel Including H.S.S. Stainless Steel and creep Resisting steels, Tool steels etc.

5. **Equilibrium Diagrams and Phase Diagrams:** Binary phase diagram system. Construction and Importents of the phase diagrams, lever rule and phase rule and their Applications. Eutectoid, Ententic, peritectic and peritectoid and monotectic systems. Some Non- ferrous systems and Alloys.

6. **Heat Treat and Power Metallurgy :**Heat Treating Process, T.T.T. and C.C.T. Curves, Hardenbility surface hardening and precipation and hardening, Production of metals powders compaction. Sintering and post sintering Treatment, production of connected Tools, Bearings, and lamp flaments etc.

Note: Term work will be based on the experiments pertaining to the topic mentioned in the syllabus.

REFERENCES:

1. Guy, A.G. " Introduction to material science'' International student Edition

2. Raghavan,V. " Materials Science and Engineering'' Prentice hall of India private Limited, New Delhi ,1993.

3. Khurmi R.S. Sedha R.S " Material Science and, S .Chand and company private Limited.,. New-Delhi,1989.

4. Rajan T.V. ,Sharma C.P ,Sharma Ashok, " Heat Treatment of principles and techniques'' Prentice hall of India private Limited, New Delhi ,1988.

5. J.P.Patel and G.H.Upadhyay : "Materials Science"

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- II

Mechanical

Semester -IV

MED 405 MP Thermodynamics

	Lecture	**Tutorial**	**Practical**
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Internal Evaluations : 20 End. Sem. Examination : 30

1. **Basic concepts and Definition:** Macroscopic vs. microscopic point of view, thermodynamics systems and control volume, Thermodynamic Properties, states, processes and cycles. Thermodynamic, Quasistatic Process Temperature, Scales, Units and Dimensions.
2. **Properties of Pure substance:** The pure substance, Vapour-liquid-solid phase in a pure Substance , P-V-T Surface , Critical and Triple point, of pure substance ,Equation of Substance, Equation of State, Mollier Diagrams, Stem Tables ,Dryness Fraction of steam, Thermodynamics charts, .Measurement of quality of stem, separating, Throttling Calorimeter,
3. Work and Heat : Definition of work, Units of Work, Work transfer, work done in various process ,Definition of Heat, Specific heat of a Substance, Latent heat of Substance Heat Transfer, Path Function, Comparison of work and heat.
4. **First law of Thermodynamics:** The first law for a closed system under going a cycle and a change of state. Internal Energy, Enthalpy, Specific heat at constant volume and constant pressure, Control volume, Conservation of Mass and energy, First law of Thermodynamics for a control volume, stead flow process, Variable floe processes. Application of first law of thermodynamics to boilers, Engines, Turbines, Compressors.
5. **Second law of Thermodynamics:** Heat Engines and Refrigerators Statement of second law of Thermodynamics. The Reversible Process Causes of Irreversibility, The Carnot Cycles Carnot's theorem, Corollary of Carnot's theorem, Absolute Thermodynamics Temperature scales, Reversed Carnot cycles Efficiency of reversible Engine .
6. **Entropy :** Clausis Theorem, Inequality of clausius theorem, Entropy as a Property ,The entropy of Pure substance Entropy change in reversible processes, Entropy change in Irreversible processes , Principle of Increase of Entropy, Entropy change of an ideal gas, Entropy change in polytrophic processes ,the second law of Thermodynamics for a control volume , Second law of Thermodynamics for steady flow process, principle of increase of Entropy for a control volume ,Entropy and Disorder ,Absolute Entropy.
7. **Properties of gases and Gas Mixtures :** Adogadro's law, Equation of state of gas, Ideal Gas Equation, Specific heats, Internal Energy and Equation of ideal gas ,Entropy change of an Ideal gas in various processes ,Daltan' s law of partial pressure, Internal energy, Enthalpy specific heat and Entropy of gas mixture ,Gibb's Function of a mixture of ideal gases.

8. Fuels and Lubricants: Definition and Classification of fuels, Composition and Calorific value of Different fuels, Proximate and ultimate analysis of fuel.Types of lubricants, Requirements of lubricants, Properties of lubricant fuel, Flash point, fire point , viscosity, vapour pressure ,cloud point , pour point etc.

Text Book:

1. Van wylen G.J. and Sonntag R.E, " Fundamentals of classical Thermodynamics" Wiley Eastern Ltd. New-Delhi, 2nd Edition S.I.Version.
2. Nag P.K. "Engineering Thermodynamics" ,Tata –Mc-Graw Hill Publishing Company Ltd. ,New-Delhi.

REFERENCES:

1. Saad ,M.A. "Engineering Thermodynamics" Prentice hall, New Delhi ,1969.
2. Holman J.P . "Thermodynamics" Tata –Mc-Graw Hill Book Co.N.Y.1974.
3. Zeemansky ,M.W. and van Ness ,H.C. " Basic Engineering Thermodynamics" john Willey & Sons. , Inc. N.Y.1985.
4. Sharma S.P, "Fuels and Combustion"
5. Sears F.W, "Thermodynamics" , Mc-Graw Hill ,N.Y-1960.
6. Obert, E.F: "Concept of Thermodynamics" Mc-Graw Hill, N.Y-1960.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- II

Mechanical

Semester -IV

MED 406 MP Fluid Mechanics

	Lecture	**Tutorial**	**Practical**
Teaching Hours	3	1	2
Examination Scheme Marks	100	25	Internal Evaluations : 20 End. Sem. Examination : 30

1. **Fluid Properties :** Definition of fluid, Viscosity, Kinematic Viscosity, Rheological Diagrams, Fluid as continuum, Bulk module of elasticity, Compressibility, Classification of fluids.

2. **Fluid Statics :** Pressure at a point, force on plane areas, Horizontal, inclined and vertical, center of pressure, forces on curved surfaces, Buogant forces, stability of floating and submerged Bodies ,Relative Equilibrum, Under linear Acceleration and constant Rotation .

3. **Dimensional Analysis :** Dimension, Different systems, Dimensional , Homogenity, Theorem, Dimensional Grouping ,Non-Dimensional Numbers, Geometrical , kinematic and Dynamic Similarity.

4. **Fluid Kinematics:** Velocity field, Stedy, Insteady flows- one, two, three dimensional flows, Stream lines and stream tubes, Path lines and streak lines. Enter and lagrangian methods, substantial derivative and acceleration, Translation, Rotation and deformation, verticity and rotational and irrotational flows.

   Circulation, stocks and theorem, virotational flow, velocity potential. Equation of continuity in differential form, plane two Dimensional flows, equation of stream line Discharge in terms of stream function, Stream function and velocity potential function, Laplace equation in terms of stream function and velocity potential ,Boundary condition ,flow nets. Differential and integral approach applied to conservation of mass, momentum and Energy principles, Control volume, Analysis.

5. **Fluid Dynamics:** Newton's law of motion, Reynolds Transport theorem, Eulers Equation, Bernoulli's Equation, Derives from Eulers Equation, Flow through passages, orifice, nozzle, Venturi etc. Navior Stocks requirement application of requirement of continuity and momentum to simple flows, pipe- bends, and sudden Expansion.

6. **Laminar Flow:** concepts of laminar and turbulent flows, Laminar Flows, Through Round pipes, Laminar flow between parallel plates, both moving and stationary, Measurement of Stationary.

7. **Turbulent Flow:** Through pipes, concepts of eddy viscosity, prantles, mixing length theory, Laminar sublayer Smooth and Rough pipes, Nickwardes Experiments, Moody's Chart.

8. **Boundary layer Theory :** Concept of boundary layer , boundary layer over flat plates and tubes Boundary layer parameters , Boundary layer thickness, momentum thickness, Displacement Thickness ,von-karman momentum Integral Equation Boundary layer separation and control ,concept of Drag, Streamlined and bluff bodies.

9. Pipe Systems: Losses fittings, power transmission through pipes, pipes connected in series and parallel, branched pipes, Total energy and Hydraulic Gradiant lines.

REFERENCES:

1. Sharma I.H. : Mechanics of fluid.

2**.** White I.M**:** Fluid mechanics, Tata-McGraw Hill, New Delhi.

3. Sehadri C.V. and patankar S.V.: Elements of Fluid Mechanics ,Prentice Hall , New Delhi.

Text Book:

1. Strecter V.L. and Wylie B.E: Fluid Mechanics Tata-McGraw Hill, New Delhi.

2. Kumar K.L.: Engineering Fluid Mechanics, Eurasia Publication house (p) Ltd. New Delhi.