VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- II

Mechanical

Semester -III

MED 301 MP Theory of Machine -I

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

SYLLABUS:

1. **Mechanism & Machines:** Introduction to Mechanism & Machines.rigid and resistance body, link, Kinematic pair Types of motion, degrees of freedom, classification of Kinematic pairs, Kinematic Chain, Linkage, Mechanis, Kinematic Inversion of slider crank Chain, Double Slider,- crank Chain Problems.

2. **Velocity Analysis:** Vetor, Displacement of rigid body Relative Displacement, defination of velocity, Angular velocity, Rotation of Rigid Body, Translation and Rotation of Rigid Body, Relative velocity Method, Instanteneous axes of the motion, properties of Instanteneous center, the Aronhold-kennedy theorem of three centers, velocity Analysis by Instanteneous centers The Line of center method, The link –to - link method, velocity Analysis by Components, velocity Diagrams.

3. **Acceleration Analysis:** Definition of Acceleration, Radial and transverse Components of Acceleration, The Coriolis component of Acceleration, Examples of Acceleration Analysis, Acceleration Diagrams, Computer aided Kinematic Analysis of Mechanism like Slider Crank Mechanism, Four-Bar Mechanism etc.

4. **Belts, Ropes, Chains:** Introduction, Belt and Ropes Drives, Open and Crossed belt Drives, Slips, materials for Belts and Rope, Law of Belting, length of belt, Ratio of friction, Driving, Tensions power transmitted, Centrifugal Effect of Belts, Maximum power Transmitted by Belt, initial tension, Creep, Chains, Chains length, Angular speed Ratio, Classification of Chains.

5. **Gears & Gear Trains:** Introduction, Classification of Gears, Gear Terminology, Law of Gearing, Velocity of Sliding, Forms of teeth, Cyclodial Profile Teeth, Both of Contact, Arc of the contact, Numbers of pairs teeth in contact, Interference in involutes gears, Minimum Number of teeth, Interference between Rack and Pinion, Under cutting, Comparison of Cyclodial and involutes tooth forms, Introduction to Helical, Spiral, Worm, Worm Gear, and Bevel Gears.

6. **Cams:** Introduction, Types of Cams, Types of Followers Cam Terminology, Displacement Diagrams, Motion of the Followers, Graphical Construction of the Profile.

REFERENCES:

1. Shigley, J.E and Uicker, J.J: Theory of Machines and Mechanisms, McGraw-Hill International Book Co. 1980.

2. Rattan S.S.: Theory of Machines Tata McGraw-Hill Publishing Co. Ltd. New Delhi, 1994.

3. Rao J.S. and Dukkipati R.V: Mechanisms and theory Machines theory, willey Eastern Ltd. 1992.

4. Mabie H.H and Ocvirk, F.W: Kinematic and Dynamics of Machinery,3rd Edition ,John wiley and sons. Inc.1978.

5. Green, W.G: Theory of Machines, 2nd Edition, Blackie, London, 1992.

6. Hollowenko, A.R: Dynamics of Machinery, John wiley and sons. Inc. New York, 1955.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- II

Mechanical

Semester -III

MED 302 MP Machine Drawing

	Lecture	**Tutorial**	**Practical**
Teaching Hours	1	0	4
Examination Scheme Marks	100	00	Continuous Evaluations 20 Examination 30

SYLLABUS:

1. Screw Thread and Screwed Fastenings.

2. Riveted Joints, Pin Joints, Key and Cutter Joints,

3. Welded Joints,

4. Shaft Couplings,

5. Shaft Bearings, Brackets and Hangers,

6. Pulleys

7. Pipe Joints,

8. Engine Parts: Stuffing Box, Cross Head, Connecting Roads, Cranks, Eccentric etc.

Term –Work: Each Student shall submit a set of Drawing Sheets and Sketch Book Based on the above Syllabus.

REFERENCES:

1. K.R.Gopala Krishna: Machine Drawing, Subhash Publishers, 1995.
2. N.D.Bhatt: Machine Drawing, Charatar Publishing, House, 1995.
3. Sidheswar: Machine Drawing, Tata McGraw-Hill, 1996.
4. R.K.Dhawan: Machine Drawing S.Chand & Company Ltd. 1996
5. G.R.Nagpal : Machine Drawing, Khann Publishers,1994.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- II

Mechanical

Semester -III

MED 304 MP Mechanical Technology-I

	Lecture	**Tutorial**	**Practical**
Teaching Hours	3	0	4
Examination Scheme Marks	100	00	Continuous Evaluations 40 Examination 60

1. Casting:

Introduction, Casting Terms: Patterns Allowness, Types of patterns, Moulding 7 Materials Properties and Testing Cores, Types, Chaplets, Co2 Moulding Gating and Risearing System, Definition Elements, Pouring time and Choke area Calculations, Spure Ingates, Gating Rations, Trapping of slag, Riser Designing Cain's Method, Modules, NRL Method, Numericals of riser Design Feeding Distance,Melting, Cupola, Charge Calculations Cleaning of casting, Defects in casting, Product Design, Special Casting Process, Shell Moulding, Die Casting Investment precision Casting. Permenant Moulding, Centrifugal Casting,

2. Metal Working:

True stress, True strain, Plastic Deformation, Hot Working, Hot Working Temperature Cold Working. Rolling, Principles, Equipments, Angle of bite, Calculation for Slip,.

Forging, Principles, Flow stresses, Strain, Extrusion, Principles, Hot & Cold Extrusion, wire Drawing , Principle, Tube Drawing , Sheet Metal Working, Definition of various operation, like shearing, Blanking piercing, Trimming, Shaving etc.

3. Gas Welding:

Principles Types of gases used, Types of flames, Welding Techniques, Edge Preparation. Equipments, Torch, Regulators, Welding Filler roads, Gas Cutting**,** Principles of Torch, Precautions and safety.

4. Electric Arc Welding:

Principles, A.C./D.C Welding Edge Preparation Equipment, A.C./D.C Machine, Welding Electrodes, Types Designations and Selection, Manual Metal Arc Welding, Carbon Arc Welding, Inert Gas Shielded Arc Welding, TIG & MIG, Submerged Arc Welding, Atomic Hydrogen Arc Welding, Plasma Arc Welding, Stud Arc Welding, Arc Cutting.

5. Resistance:

Principles, Heat Balance, Electrodes, Spot Welding, Seam Welding, Projection Welding, Upset Welding, Flash Welding.

6. Fusion Welding Processes:

Thermit Welding, Electro Slag Welding, Electron Beam and Laser Beam Welding. Forge Welding, Friction Welding, Diffusion Welding, and Explosion Welding,

REFERENCES:

1. Manufacturing Technology, P.N.Rao, and TMH.Edition.
2. Principles of Metal casting, Heine and Roshenthal.
3. Foundry Technology, Raghuvanshi.
4. Work-shop Technology, Hajra Choudhary

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B.E- II

Mechanical

Semester -III

MED 305 MP Mechanical Measurements

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

1. Basic Concepts: Concept, Definitions of terms, Calibration, standards, and Units, Generalized Block diagrams of Measuring Systems, Input Output, Configuration of measuring systems.

2 Errors in Measurements: Types of errors, Gross errors, Systematicv errors, Random Errors, Central Value, Histogram, Deviation, Standard and Deviation and Varience, Normal Distribution Curve, Probables error.

3. Pressure Measurements: Types of Measurement Devices, Manometers, Dead Weight Tester, and Bourdon Tube pressure Gauge, Diaphrams and Bellows, Law Pressure Measurement. The McLead Gauge, Pirani Thermal Conductivity Gauge, Knudsen Gauge, Ionization Gauge, Selection of pressure measuring Devices, for specific Applications Calibration of pressure measuring Devices.

4. Temperature Measurements: Temperature Scales, Ideal gas Thermometer, Temperature Measuring Devices, Bi-Metallic Strip, Electrical Resistance Thermometer, Thermistors and Thermocouples, Laws of thermocouple and their Application, Construction and calibration of Thermocouples, Radiation Pyrometers, Total Radiation Pyrometers, Temperature Measurements in high Speed flow.

5. Flow Measurements: Flow Measurements by drag effects, Rotameter, Hotewire Anemometers, Magnetic flow meters Flow visualization, Techniques, Shadowgraph, Interferometer, Laser Doppler Anemometers, Pitot tube, Constructional Features, Calibration Obstruct ional meters, orifice, and venturi Nozzle and their Calibration.

6. Force, Torque, and Speed Measurements: Basic Methods of force Measurement, Scales and Balances, Elasting sensing Elements, Measurement of Torque of on Rotating shaft, stress and strain, Strain Measurement, measurement of strain gauge outputs, Electric resistance strain gauge, Rosettes, speedometer, stroboscope, power absorbing and power transmitting dynamometers, proney brake and eddy current dynamometers,

Ballast circuits, Whetstone bridge, gauge factor, temperature compensation.

7. Miscellaneous Measurements

Measurement of motion and vibration, Principle of seismic instrument, gas analyzer, introduction to air pollution sampling and measurement, Unit of pollution measurement, Air pollution standard, Gas sampling technique, combustion product measurement.

References:

1 Holman J. P., “Experimental methods for engineers”, Mcgraw Hill Book Co. New Delhi, 1988.

2 A. K. Shawnay, “A Course in mechanical measurements and instrumentation”, Dhanpat Rai & Sons, Delhi.

3 B. E. Jones, “Instrumentation, Measurement and Feedback”, Mcgraw hills Co. Ltd., New Delhi.

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B.E- II

Mechanical

Semester -III

MED 306 MP Industrial Organisation Maintenance & Safety

	Lecture	**Tutorial**	**Practical**
Teaching Hours	3	0	0
Examination Scheme Marks	100	00	Continuous Evaluations 00 Examination 00

1. Industrial Organisation: Basic Concept of Industrial Organisation, objectives of business, forms of business organisation, Industrialisation in India, Industrial finance, principal of scientific management.

2. Factory Organisation & Management: Nature & Scope of factory management plant location, Factory building, L ay out Automation.

3. Maintenance: Types of maintenance & their applications organisation of maintenance department, Industrial maintenance documentations & computer application, methods of costing depreciation etc.

4. Industrial safety: General safety rules, safe guards, factory acts, procedure for handing & repairing accident cases, first aid treatment, function of safety personnel. General safety precautions.

REFERENCES:

1. S.A. Sharlekar, C. Mallikharjuna & Rao, A text book on industrial organisation & management, (Himalaya publishing house – B' bay) . 1994.
2. G. Aswathappa, "Factory Organisation & Management", (Himalaya Publishing House – B' bay) 1990.
3. H.P. Garg, "Industrial Maintenance" (S. chand. & co.Ltd. Delhi) 1990.
4. Anthony Kelly, "Maintenance planning & control", 1984.

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"

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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.

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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.