

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -V

MED 501 M Theory of Machine -II

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

1. Static force Analysis: Force, couples Conditions of equilibrium free body diagrams. Analysis mechanisms, spur gears, worm gears.
2. Dynamic force Analysis: Inertia forces Analysis of a floating link, Rotation, Method of virtual work, Dynamic analysis of four link mechanism. Combined static and inertia force analysis of different mechanisms turning moment diagrams fluctuation of energy flywheels.
3. Balancing: Introduction, static balancing, Dynamic balancing, of several masses in different planes balancing of inline engines, V-engines radial engines balancing machines.
4. Governors: Introductions, Types of governors. Sensitiveness of a governe, hunting, isochronisms stability effort and power of governer, controlling force.
5. Gyroscope: Angular velocity, angular acceleration, Gyroscopic couples, Gyroscopic effect on naval ships stability of an automobile, stability of two wheel vehicle.

Practicals: Based on the above syllabus a minimum eight practicals are to be performed

REFERENCES:

1. Rattan S.S : Theory of Machines. Tata McGraw Hill Publishing co. (1994)
2. Rao J.S and Dukkupati R.V: Mechanism and Machine Theory,willey Eastern Ltd (1992)
3. Shigley J.E and Uicker J.J: Theory of Machines and Mechanism, McGraw Hill International Book Cop. (1980)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -V

MED 502 M Heat & Mass Transfer

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

1. Introduction: Modes of heat transfer, Conductions Convection and Radiations.
2. Conductions: Fourie's law, General Three dimensional heat conductions equations in cartesian cylindrical and spherical co-ordinates one dimensional steady conductions through plane wall, Cylinder and sphere heat sources systems in plane wall and cylinder. Heat transfer from fins of uniform cross section, two dimensional steady state conditions through plane wall. One dimensional unsteady state heat conductions
3. Convections: Free and force convection
 - 3.1: Forced convection Energy integral equation of the boundary layer on flat plane and integral solution for evaluations of heat transfer from a find frictions and heat transfer. Similarity conditions in heat transfer processes, dimensional analysis.
 - 3.2: Free convection for a vertical flat plane Grashoff number impirical number relations and their use fundamentals of boiling heat transfer.
4. Radiations Thermal relations monochromatic and total emissive power basic laws of radiation Radiations shape factors Black grey surfaces Heat Transfer in presence in of re-radiating surfaces.
5. Heat Exchangers Basic type of heat exchangers fouling factors, LMTD .Effectiveness NTU methods of design.
6. dimensional diffusion in gases with one component stationary, Convective mass trnsfer Forced diffusion from a flat Plate, Simultaneous heat and mass transfer.

Practicals: Based on the above syllabus a minimum eight practicals are to be performed

REFERENCES:

1. S.P. Sukhatme Heat transfer. Universities press (India) 1996.
2. J.P. Holman Heat transfer Tata McGraw Hill Book Co. (1992)
3. Eckert and drake Heat and Mass transfer, McGraw Hill (1960)
4. Domkundwar Aror: A Course in HMT Dalpatrai Co.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -V

MED 503 M Hydraulic Machines

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

1. Introduction: two dimensional flows past bodies Acrofoil lift and Drag.
2. Pumps: Classifications principles of working of different types of pumps pump parameters similarity and model analysis specific speed.
 - 2.1 Centrifugal pumps : Theoretical heat Euler's equations types of impellers flow through blade passage velocity analysis ,energy transfer effect of turbulence and friction H-Q Characteristics diffusion action in volute and diffuser passage losses in centrifugal pumps different efficiency operation of pumps Cavitations in pumps pumps for special applications axial thrust pumps.
 - 2.2 Axial flow Pumps: Construction details, velocity analysis aerofoil theory flow in diffuser characteristics cavitations testing of pumps.
3. Turbines: Different types of turbines constructional details working principles parameter specific speed classifications degree of reactions. Recent development in turbines important hydropower plants in the country.
 - 3.1 Pelton wheels: Simplified theory velocity triangles various loses efficiency best-speed errors simplified theory
 - 3.2 Reaction Turbines : Generalized theory francis velocity triangles variation of velocity along the width of passage Corection for finite number of blades axial flow turbines aerofoil theory flow through spiral casiring speed rising guide apparatus draft tube Cavitation.
 - 3.3 Testing of Turbines: Standard test operating characteristics regulation of turbines

Practicals: Based on the above syllabus a minimum eight practicals are to be performed

REFERENCES:

1. Vasandani V.P: Theory of Hydraulic Machines Khanna publishers (1975)
2. Ramamathan S: Hydraulic Fluid Mechanics and fluid machines Dhanpatt Rai and sons.(1996)
3. Lal Jagdish: Hydraulic Machines Metropolian Books pvt Ltd. (1973)
4. Subramanyam: Theory and applications of fluid mechanics (including hydraulic machines) Tata McGraw Hill Publishing company ltd. (1993)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -V

MED 504 M Mechanical Technology-II

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

1. Machine Tools: Introduction, classification primary cutting motion, feed and auxiliary motions gearing diagrams Transmissions ratio of drives.
2. Lathe gearing diagram –mechanisms operations tools and too angles setting if machines for various jobs special attachments.
3. Capstan and Turret – Mechanism Tool holders, attachments, Types of tools tool lay out process layouts.
4. Shaper, planer Slotter –principles processes gearing diagrams mechanisms cutting parameters work holding Method tools.
5. Drilling and Boring Machines –Types gearing diagrams mechanisms attachments, accessories, tools.
6. Milling –Types gearing diagrams of column and knee type milling machines operations up and down milling holding of tool and works, cutters and angles Attachments mechanisms.
7. Grinding –Importance of finishing process ,types of machines and operation gearing diagrams mechanism attachments and accessories wheel designation mounting and balancing introduction to microfinishing process such as honning ,lapping superfinishing
8. Broaching –purpose, processes classification and attachments, Tools.
9. Introductions to jigs and fixtures principles of location and clamping types of jigs, Field applications, types of fixtures and their uses.

Practicals: Based on the above syllabus a minimum eight practicals are to be performed

REFERENCES:

1. R.K.Jain, Production Technology, Khanna publishers (1993)
2. H.S.Bawa work-shop Technology Vol-II Tata McGraw Hill (1995)
3. S.K.Hajrachowdhary: Work-shop Technology Vol-II Media promoters &publication pvt Ltd. (1992)
4. B.D.Arora Work-shop Technology Vol-II Satya Prakashan (1988)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -V

MED 505 M Thermodynamics-II

	Lecture	Tutorial	Practical
Teaching Hours	3	1	0
Examination Scheme	100	25	Continuous Evaluations 00
Marks			Examination 00

1. Availability and Energy: Basic Concept available and un available energy in a cycle and in a process Helmholtz and gibb's functions energy second law analysis of boilers turbines heat exchangers etc.
2. Thermodynamic relations and Equilibrium: The Maxwell relations clausis –clapeyron equation joule-Thomson Co-efficient relationships involving specific heats.
3. Real Gases: Equations of state for real gases viral co-efficient Vander wall's equations parameters reduced pressure temperature and volume.
4. Reactive mixtures (Combustion) Combustion Equation Stochrometric air excess air fuel ratio by volume and by weight enthalpy of formation Enthalpy and internal energy of combustion adiabatic flame temperature equilibrium constants Fugacity and activity.
5. Vapour Power cycles: Simple steam power cycles Rankine cycles efficiency actual vapour cycle process Comparison of ranking and Carnot cycles
6. Gas Power cycles: Carnot cycles, stiarlingcycle, Ericsson. Air standard cycles. Otto cycles Diesel cycles, Duel cycles, Brayton cycles, Air-standard cycles, for jet propussion.
7. Refrigeration Cycles: Simple vapour compression cycle multistage vapour compression cycle absorption refrigeration cycles.

REFERENCES:

1. Saad M.A: Thermodynamics for engineers, Prentice Hall (1969)
2. Haung F.F: Engineering Thermodynamics Mac million publishing co. inc. (1976)
3. Holman J.P: Thermodynamics Tata McGraw Hill Book Co. (1976)
4. Obert E.F: Concept of thermodynamics, Tata McGraw Hill (1960)
5. Zeemansky M.W &van Ness, H.C Basic Engg. Thermodynamics Tata McGraw Hill Book Co. (1966)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -V

MED 506 M Elements of Mechatronics

	Lecture	Tutorial	Practical
Teaching Hours	3	1	0
Examination Scheme	100	25	Continuous Evaluations 00
Marks			Examination 00

1. Introduction to Mechatronics definition industrial applications, building blocks of Mechatronics
2. Sensor and Transducers classification, Resistive (potentiometer strain gauge, thermistor, Sensitive, thermometers) Inductive (LVDT etc.) Piezoelectric, optical (LED Photo – detectors) optical encoders etc. Ultrasonic transducers (flow measurements Distance measurements etc.) noise in measurements.
3. Motion Control: Drives and Actuators (Hydraulic Pneumatics Electric etc.) and their control motion converters (fixed ratio type invariant motion profile type variators etc.)
4. Elements of electronic devices semiconductor theory junction diode and transistor characteristics signal amplifiers operational amplifiers signal conditioning signals.
5. Introduction to Digital circuits Boolean Function- AND, OR, NOT, NAND, NOR Exclusive –OR and equivalence gates, combinational Circuits Concept of sequential circuits.
6. Electronic system Design: Block diagram approach to analog –to-digital and digital-to-analog converters timer and counters units, Microprocessor basics.

REFERENCES:

1. D.A.Bradley, D.Dawson, N.C Burd &A.J.Loader Mechatronics Electronics and products and process Chapman &Hall (1991)
2. John pipenger Tykers Industrial hydraulic Mc- GrawHill (1973)
3. E.W.Reeds, L.S.Lasman, Fluid power with MP control an introduction, prentice Hall (1967)
4. A.K.Sawney, Electric and Electronics Measurement and Instrumentation.
5. K. Mehta Elements of Electronics (1995)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -VI

MED 601 M Machine Design-I

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

1. Introduction: The Design process, morphology of design. Designing methods, concurrent engineering -
2. Design Analysis: Types of loads and stresses .factor of safety type of failure, theories of failure fatigue failure analysis Soderbergs: and goodmani methods estimation of life of a components wear failure introduction to creep failure.
3. Selection of Material: Factors affecting material selection .ferrous-non-ferrous metals and alloys plastics for machine parts.
4. Design of machine Components: parts subjected to tension, compression, shear, bending & torsion such as tie rods, push rods. Levers, etc. Parts subjected to combined loads- such as over hang, rams, handles, etc. Design of helical compression and extension spring, leaf spring.
5. Design of joints and connections: Pin joints and cottor joints, riveted connections, welded joints.
6. Design of screw and threaded fastness: Types of screw threads, Indian standard proportions, design of power screw. Threaded fastness types of bolts and connections, stresses and preloading of bolts flanged connections, gaskets, bolts of uniform strength eccentrically loaded bolted connection.
7. Design of shafts: Types of shaft, ASME code for design of shafts, critical speed, design of keys and splines.
8. Design of simple Machines: Design of simple rigid and flexible couplings, screw jack, screw press. Toggle jack, bearing puller. I.C Engine connecting rod. I.C Engine valve gear.
9. Thick and thin cylinders, shrink fitted, and pressfitted connections.
- 10 Manufacturing consideration: standardization, limits, fits, and tolerance as per I.S. Specification factors to be considered in design of casting, forging and welded components.

Practicals: Based on the above syllabus each student has to prepare assembly /details drawing and has to submit the design reports atleast four design and set of design problems.

REFERENCES:

1. V.B.Bhandari Design of Machine Elements, Tata McGraw Hill Publishing Co. (1994)
2. Josheph shightly: Mechanical Engineering Design, Tata McGraw Hill Book Co. (1989)
3. R.C.Patel Machine Design Vol-I &II C. Jamnada &Co. (1992)
4. Various Indian standards and Design data Book.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -VI

MED 602 M.I.C Engine & Automotive Engineering

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

1. Introduction to I.C. Engines.
2. Air standard cycles ideal air standard cycles, Fuel air cycles, Characteristics of fuel air mixtures variation of specific heats. Actual cycles, Actual Process taking place in engines.
3. Combustion in S.I Engines and C.I Engines: Stage of combustion in S.I Engines, Detonation control of detonation. Stage of combustion in C.I Engines. Delay period. Factors influencing delay period. Diesel knocks. Control of diesel knocks.
4. Carburetion and Fuel injection: Requirements of good carburator. Simple carburator, complete carburator, Calculation of air fuel ratio for Simple carburator. Electronic fuel injection in S.I Engines.
5. Requirements of diesel injection systems types of injection systems. Fuel pumps.
6. Various systems of I.C Engines. Lubrication systems, cooling systems etc.
7. Testing and Performance: Variable Speed test of S.I Engines. Constant speed load tests of C.I Engines more testes.
8. Engine Emission: Pollutants and their ill effects pollutants from Gasoline and diesel in their control.
9. Modern Developments: Alternate Fuel Engines, Alcohol hydrogen etc.
10. Lay-out transmission systems automotive vehicle: Types and its components and braking and suspension systems of automotive Vehicle: Various types, steering systems type function.
Electrical systems of automotive vehicle, chasis, Wheels, Types of tyres.

Practicals: Based on the above syllabus a minimum eight practicals are to be performed

REFERENCES:

1. Ganeshan V.: Internal Combustion Engines, Tata McGraw Hill Company (1992)
2. Mathur M.L and Sharma R.P: A course in Internal Combustion Engines. Dhanpat Rai and Sons. (1980)
3. Newton and Steed; Automobile Engineering, ELBS Publishing (1978)
4. Narang G.B.S: Automobile Engineering, Dhanpat Rai and Sons.(1988)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -VI

MED 603 M Refrigeration and Air-Conditioning

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

1. Gas Cycle Refrigeration: Air refrigeration Systems Colleman Air cycles, Boot strap systems, air Craft refrigeration Systems, actual cycle ramming Compression and turbine efficiency.
2. Vapour Compression Refrigeration: Analysis of vapour compression cycle losses and efficiency of components heat balance, Compound Compression with intercooler. Multivaporation Cascading.
3. Absorption Refrigeration: Desirable Properties of refrigerant and solvents. Thermodynamics analysis of absorption systems. Basic Cycle.
4. Psychrometry and Psychrometric Charts: Preparation of Psychrometric charts. Choice of coordinators temperature. Enthalpy deviation. Psychrometric Measurements. Mixing process bypass Factor apparatus dew point. Sensible heat factor. Adiabatic humidification. Efficiency of humidification. Hot water and cold water humidification. Enthalpy potential.
5. Load Calculation: Calculation of summer and winter loads. Heat gram through walls. Roofs, floors, windows and Doors.
6. Air conditioning systems and Equipments humidifiers, dehumidifiers, air cleaning impurities in air and air cleaners. Air washers, duets pressure drop in duets.

Practicals: Based on the above syllabus a minimum eight practicals are to be performed

REFERENCES:

1. Arora S.C and Domkundwar; A course in Refrigeration and Air-conditioning, Dhanpat Rai and Sons.(1997)
2. Thrakeld J.L.: Thermal Environmental Engineering, Prentice Hall.(1982)
3. Stocker W.F: Refrigeration and Air-conditioning McGraw Hill (1986)
4. Dossat R.J: Principles of Refrigeration, John Willey and Sons.(1988)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -VI

MED 604 M Industrial Engineering

	Lecture	Tutorial	Practical
Teaching Hours	3	1	0
Examination Scheme	100	25	Continuous Evaluations 00
Marks			Examination 00

1. Productivity : Production and Productivity factors affecting productivity management techniques for increasing Productivity improvement human aspects, measurements of Productivity
2. Production Planning &Control: History and Function, sales for casting, product life cycles, sales for casting techniques such as a Judgmental. delphi and user's expectations techniques, time series analysis regression and correlation methods exponential smoothing techniques etc.
3. Inventory Control: Inventory costs and Inventory management systems .ABC analysis, EOQ models, -EOQ-with Storage discount for production runs safety stocks. Case study.
4. Work Study; Process charts, flow string diagrams, travel, gang, multiple, activity and SIMO Charts. Principles of motion Economy therbligs .micromotion and memomotion studies. Time study elements rating, normal time, allowness, number of observation Standard Calculation.
5. Work-Sampling: Methods fro work sampling, control charts, Estimation of utilization, delays and standard time, bias.
6. Production Study and PMTS: Checking validity of time standard. Verification of fatigue, contingent and personal needs allowness PMTS.
7. Job design and Human Factors Engineering: job design and objectives. Job specialization job enlargement, job enrichment, job rotation, Design of work-place tools and material machinery and control Environment Fatigue man-machine Systems.
8. Cost and Investment analysis : Break even analysis , make or buy decision, Depreciation ,annual cost method, present value method, rate of return method, payable period method.
9. Value Analysis: Value and its type, cost control, and cost reduction, value Engineering, value control, procedure and applications value of analysis.

REFERENCES:

1. S.K.Hajrachowdhary Nirjhar Roy: Production Management –An Integrated Approach to Industrial Engineering, Media promoters and publishers.(19900
2. Dr.S.H.Shah: Work study and Ergonomics Dhanpat Rai & Sons.(1992)
3. N.D. Vohra: Quantitive Techniques in management Tata McGraw Hill Company Co. Ltd. (1992)
4. T.R.Banga, N.K.Agrawal, S.C.Sharma, Industrial Engineering and Management .Khanna Publishers (1995)
5. Introduction to work-study ILO (1977)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -VI

MED 605 M Tribology and Machine Dynamics

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

1. Introduction to Tribology and surface topography.
2. Concept of friction and wear and measurement techniques
3. Properties of testing and lubricants.
4. Regimes of lubrication applications of lubrication mechanism in bearing design.
Basic concept of hydrodynamic lubrication theory.
5. Hydrostatic and Boundary lubrication.
6. Fundamentals of vibrations: Introduction, Definition, SHM, beats phenomenon, Complex method of representing harmonic vibrations.
7. Undamped free vibration of single degree of freedom systems: Introduction, derivation of differential equations and its solution, equivalent stiffness of spring combinations, Newton method and energy method for problem solution.
8. Damped free vibration of single degree of freedom systems: Different type of dampings, free vibrations with viscous damping, over damped critically damped under-damped systems.
9. Forced vibration of single degree of freedom systems: Forced vibration with constant harmonic excitation, with rotating and reciprocating unbalance, due to the support, vibration isolation and transmissibility, measuring instrumentation displacement, velocity acceleration, frequency instrument.
- 10 Whirling and critical speed of shafts, introduction to multi-degree of freedom systems.
11. Cam Dynamics: Force in rigid systems, follower response by phase –plane method, jumped and cross over, Johnson numerical method.

Practicals: Based on the above syllabus a minimum eight practicals are to be performed

REFERENCES:

1. R.D.Arnel, P.B.Davies, J.Holling and T.L.Whomes: Tribology –principles and design of Applications springer.
2. B.C.Majumdar : Introduction to Tribology of Bearings, A.H.Wheeler and co.Pvt.ltd.(1986)
3. A Cameion: Basic Lubricants theory, wiley eastern Ltd. (1987)
4. C.K.Grover: Mechanical Vibrations, Nemchand & Brothers (1995)
5. S.Grahman Kelly: Mechanical Vibrations, McGraw Hill international Books Co. Ltd.(1995)
6. J.E.Shighly: Theory of Machines and Mechanism, Tata- McGraw Hill Book Ltd. (1992)

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

B.E- III

Mechanical

Semester -VI

MED 606 M Computer Aided Engineering Analysis

	Lecture	Tutorial	Practical
Teaching Hours	3	1	0
Examination Scheme	100	25	Continuous Evaluations 00
Marks			Examination 00

1. Introduction to Computer Aided Engineering: Types of problems encounter in Mechanical Engineering Classification of problems based on method of solution.
2. Solution of systems of Algebraic Equations: Gauss Elimination ,Matrix inversion, Gauss seidel, L-U decomposition, Newton Raphson methods and their application to mechanical engineering Problems
3. Curve Fitting: Least squares regression analysis, Newton and language interpolating polynomials
4. Numerical Differentiation and Integration: Newton-cotes, Gauss quadrature integration techniques.
5. Solution of ordinary Differential Equations: Euler's methods, Runga-kutta Method, Boundary value and value Problems, Applications of this method to mechanical engineering Problems, Taylor Series. Predictor –Corrector method.
6. Finite Difference method: Methods to derive finite difference equations, Elliptical and parabolic equations, boundary conditioning, explicit and implicit method. Application mechanical engineering Problems.
7. Finite Elements method: Methods of deriving finite elements equations. Types of elements and Interpolation function. Formation and Assembly of global Matrices .Treatment of Boundary conditions. Application of finite elements method mechanical engineering Problems.
8. Software: Introduction to some software used in CAE, Solving simple problems using computer.

REFERENCES:

1. Jain S.R.K. Lyenger & R.K.Jain: Numerical Methods for Scientific and engineering Computation Willey Eastern Ltd. (1995)
2. Chapra and R.P.Canale: Numerical Methods for Engineers McGraw Hill international Edition. (1989)
3. Larry J.Segerlind: Applied finite element Analysis, John willey & Sons.(1984)
4. John.H.Mathews Numerical Methods, Prentice Hall of India.(1994)