

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.

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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 carburettor. Simple carburettor, complete carburettor, Calculation of air fuel ratio for Simple carburettor. 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)

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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)

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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)

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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.Graham 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)

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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)