



ANNA UNIVERSITY
Chennai-25.
Syllabus for

B.E.(Full Time) Automobile Engineering

CM125 Chemistry I **3 0 0 100**

1. CHEMICAL THERMODYNAMICS 9

Definition of free energy and spontaneity - Maxwell relations - Gibbs-Helmholtz equation - Van't Hoff equations - Stoichiometry and energy balances in Chemical reactions.

2. DYNAMICS OF CHEMICAL PROCESSES 10

Basic concepts - composite reactions (opposing, parallel and consecutive reactions) - Collision theory - Thermodynamic formulation of reaction rates - unimolecular reactions - Chain reactions (Stationary and non-stationary) - Enzyme Kinetics - Michaelis - Menten Equation.

3. ELECTRODICS 8

Types of electrodes and cells - Nernst Equation - emf measurement and its applications - Principles of chemical and electrochemical corrosion - corrosion control (Sacrificial anode and impressed current methods).

4. WATER 8

Water quality parameters - Definition and expression - Estimation of hardness (EDTA method) - Alkalinity (Titrimetry) - Water softening (zeolite) - Demineralisation (Ion-exchangers) and desalination (RO) - Domestic water treatment.

5. POLYMERS 10

Monomer - Functionality - Degree of polymerisation - Classification based on source and applications - Addition, Condensation and copolymerisation - Mechanism of free-radical polymerisation - Thermoplastics and thermosetting plastics - Processing of plastics - Injection moulding, blow moulding and extrusion processes.

Total No of periods: 45

Text Books:

1. Alkins P.W., " *Physical Chemistry* ", ELBS, IV Edition, 1998, London.

References:

1. Balasubramanian M.R., Krishnamoorthy S. and Murugesan V., " *Engineering Chemistry* ", Allied Publisher Limited., Chennai, 1993.
2. Karunanidhi M., Ayyaswamy N., Ramachandran T and Venkatraman H., " *Applied Chemistry* ", Anuradha Agencies, Kumbakonam , 1994.
3. Sadasivam V., " *Modern Engineering Chemistry - A Simplified Approach* ", Kamakya Publications, Chennai , 1999.
4. Kuriakose, J.C. and Rajaram J., " *Chemistry in Engineering and Technology* ", Vol. I and II, Tata McGraw-Hill Publications Co.Ltd, New Delhi ,1996.
5. Jain P.C. and Monica J., " *Engineering Chemistry* ", Dhanpat Rai Publications Co.,(P) Ltd., New Delhi, 1998.

1. BASICS 5

Introduction - Units and Dimensions - Laws of Mechanics - Vectors - Vectorial representation of forces and moments - Vector operations.

2. STATICS OF PARTICLES 8

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.

3. EQUILIBRIUM OF RIGID BODIES 7

Free body diagram - Types of supports and their reactions - requirements of stable equilibrium - Equilibrium of Rigid bodies in two dimensions - Equilibrium of rigid bodies in three dimensions.

4. PROPERTIES OF SURFACES AND SOLIDS 12

Determination of Areas and Volumes - First moment of area and the centroid - second and product moments of plane area - Parallel axis theorems and perpendicular axis theorems - Polar moment of inertia - Principal moments of inertia of plane areas - Principal axes of inertia - Mass moment of inertia - relation to area moments of inertia.

5. FRICTION 4

Frictional Force - Laws of Coloumb friction - Simple Contact friction - Rolling Resistance - Belt Friction.

6. DYNAMICS OF PARTICLES 16

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.

7. ELEMENTS OF RIGID BODY DYNAMICS 8

Translation and Rotation of Rigid Bodies - Velocity and acceleration - General Plane motion - Moment of Momentum Equations - Rotation of rigid Body - Work energy equation.

Total No of periods: 60

Text Books:

1. *Beer and Johnson, " Vector Mechanics for Engineers ", Vol. 1 " Statics " and Vol. 2 " Dynamics ", McGraw Hill International Edition, 1995.*
2. *Merriam, " Engineering Mechanics ", Vol.1 " Statics " and Vol.2 " Dynamics 2/e ", Wiley International, 1988.*

References:

1. *Rajasekaran S. and Sankara Subramanian, G., " Engineering Mechanics - Statics and Dynamics ".*
2. *Irving, H., Shames, " Engineering Mechanics - Statics and Dynamics ", Thrid Edition, Prentice-Hall of India Pvt.Ltd., 1993.*
3. *Mokoshi, V.S., " Engineering Mechanics ", Vol.1 " Statics " and Vol.2 " Dynamics ", Tata McGraw Hill Books, 1996.*
4. *Timoshenko and Young, " Engineering Mechanics ", 4/e, McGraw Hill, 1995.*
5. *McLean, " Engineering Mechancis ", 3/e, SCHAUM Series, 1995.*

(Revised Syllabus For B.E. / B.Tech. Programmes - Effective From June 2002)

1. MATRICES	9
Characteristic equation - Eigen values and eigen vectors of a real matrix. Some properties of eigen values, Cayley-Hamilton theorem, Orthogonal reduction of a symmetric matrix to diagonal form - Orthogonal matrices - Reduction of quadratic form to canonical form by orthogonal transformation.	
2. THREE DIMENSIONAL ANALYTICAL GEOMETRY	9
Direction cosines and ratios - Angle between two lines - Equation of a plane - Equation of a straight line - Coplaner lines - Shortest distance between skew lines - Sphere - Tangent plane - Plane section of a sphere - orthogonal spheres.	
3. GEOMETRICAL APPLICATIONS OF DIFFERENTIAL CALCULUS	9
Curvature - cartesian and polar coordinates - Circle of curvature - Involutives and Evolutes - Envelopes - properties of envelopes - Evolute as envelope of normals.	
4. FUNCTIONS OF SEVERAL VARIABLES	9
Functions of two variables - Partial derivatives - Total differential - Differentiation of implicit functions - Taylor's expansion - Maxima and Minima - Constrained Maxima and Minima by Lagrangean Multiplier method - Jacobians - differentiation under integral sign.	
5. ORDINARY DIFFERENTIAL EQUATIONS	9
Simultaneous first order linear equations with constant coefficients - Linear equations of second order with constant and variable coefficients - Homogeneous equation of Euler type - equations reducible to homogeneous form - Method of reduction of order - Method of variation of parameters.	
6. TUTORIAL	15

Total No of periods: 60

Text Books:

1. Kreyszig, E., " *Advanced Engineering Mathematics* " (8th Edition), John Wiley and Sons (Asia) Pte Ltd., Singapore, 2001
2. Veerarajan, T., " *Engineering Mathematics* ", Tata McGraw Hill Publishing Co., NewDelhi, 1999.

References:

1. Grewal, B.S., " *Higher Engineering Mathematics* " (35th Edition), Khanna Publishers, Delhi , 2000.
2. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., " *Engineering Mathematics* ", Volume I (4th Revised Edition), S. Chand & Co., New Delhi, 2000.
3. Narayanan, S., Manicavachagom Pillay, T.K., Ramanaiah, G., " *Advanced Mathematics for Engineering Students* ", Volume I (2nd Edition), S. Viswanathan (Printers & Publishers), 1992.
4. Venkataraman, M.K. " *Engineering Mathematics - First year* " National Publishing Company, Chennai (2nd Edition), 2000.

1. PROPERTIES OF MATTER	9
Elasticity - stress-strain diagram-factors affecting elasticity - Twisting couple on a wire-Shafts-Torsion pendulum-Depression of a cantilever- Young's modulus by cantilever-Uniform and Non Uniform bending-I shape girders-Production and measurement of high vacuum-Rotary pump-Diffusion pump-Pirani Gauge-Penning gauge-Viscosity-Oswald Viscometer-Comparision of viscosities.	
2. ACOUSTICS	9
Acoustics of buildings-Absorption coefficient-Intensity-Loudness-Reverberation time-Sabine's formula-Noise pollution-Noise control in a machine-Ultrasonics-production-Magnetostriction and Piezoelectric methods-Applications of ultrasonics in Engineering and Medicine.	
3. HEAT AND THERMODYNAMICS	9
Thermal conductivity-Forbe's and Lee's Disc methods-Radial flow of heat-Thermal conductivity of rubber and glass-Thermal insulation in buildings-Laws of thermodynamics-Carnot's cycle as heat engine and refrigerator-Carnot's theorem-Ideal Otto and Diesel engines-Concept of entropy-Entropy Temperature diagram of carnot's cycle.	
4. OPTICS	9
Photometry-Lummer Brodhum photometer-Flicker Photometer-Antireflection coating-Air wedge-Testing of flat surfaces-Michelson's Interferometer and its applications-Photoelasticity and its applications-Sextant-Metallurgical microscope-Scanning electron microscope.	
5. LASER AND FIBRE OPTICS	9
Principle of lasers-laser characteristics-Ruby-NdYAG, He-Ne, CO ₂ and semiconductor lasers-propagation of light through optical fibers-types of optical fibre-Applications of optical fibres as optical waveguides and sensors.	

Total No of periods: 45

Text Books:

1. Arumugam.M., " Engineering Physics ", Anuradha Publications, 1998.

References:

- 1. Resnik R. and Halliday D., " Physics ", Wiley Eastern, 1986.*
- 2. Nelkon M. and Parker.P., " Advanced Level Physics ", Arnold-Heinemann, 1986.*
- 3. Vasudeva A.S., " Modern Engineering Physics ", S. Chand and Co., 1998..*
- 4. Gaur, R.K., and Gupta, S.L., " Engineering Physics ", Dhanpat Rai and Sons, 1988.*
- 5. Mathur, D.S, " Elements of properties of Matter ", S.Chand & Co., 1989.*

30

1. Preparation of standard solutions.
2. Estimation of hardness of water by EDTA method
3. Estimation of different types and amounts of alkalinity in water - Indicator method
4. Determination of dissolved oxygen - Winkler's method.
5. Estimation of iron in water - Spectrophotometric method.
6. Estimation of sodium in water - Flame Photometric method
7. Determination of molecular weight of polymers-Viscometric method.
8. Determination of total dissolved solids in water.
9. Corrosion experiments:
 - * Corrosion rate measurements
 - * Inhibition efficiency.
10. Electrochemistry experiments:
 - * Determination of emf.
 - * Single electrode potential
 - * Potentiometric and conductometric titration

Total No of periods: 30

1. FUNDAMENTALS OF COMPUTERS AND OPERATING SYSTEMS 4

Evolution of Computers - Organization of Modern Digital Computers-Single user Operating System-
Multitasking OS-GUI

2. OFFICE AUTOMATION 11

- a) Word Processing
- b) Data Base Management System
- c) Spread Sheet Package
- d) Presentation Software

3. PRACTICALS 45

Total No of periods: 60

Text Books:

1. Ghosh Dastidar, Chattopadhyay and Sarkar, " Computers and Computation - A Beginner's Guide ",
Prentice Hall of India, 1999.

References:

1. Nelson, Microsoft Office 97, Tata McGraw Hill, 1999.
2. Taxali, " PC Software for Windows Made Simple ", Tata McGraw Hill, 1999.

GE133 Workshop Practice

0 0 4 100

1. SHEET METAL 10

Tools and Equipments - Fabrication of tray, cone, etc., with sheet metal

2. WELDING 10

Tools and Equipments - Arc Welding of butt joint, Tap Joint, Tee fillet etc., Demonstration of gas welding.

3. FITTING 10

Tools and Equipments- Practice in Chipping, Filing, Drilling - making Vee joints, square and dove tail joints.

4. CARPENTRY 10

Tools and Equipments-Planning Practice-making halving joint and dove tail joint models.

5. FOUNDRY 10

Tools and Equipments Preparation of moulds of simple objects like flange, gear V- grooved pulley etc.

6. SMITHY 10

Tools and Equipments - Demonstration for making simple parts like keys, bolts etc.

Total No of periods: 60

References:

1. Venkatachalapathy V.S., " *First Year Engineering Workshop Practice* ", Raamalinga Publications, Madurai, 1999.
2. Kanaiah P.and Narayana K.C., " *Manual on Workshop Practice Scitech Publications* ", Chennai, 1999.

1. PRACTICALS

30

1. Young's modulus by non uniform bending.
2. Rigidity modulus and moment of inertia using Torsion Pendulum
3. Viscosity of a liquid by Poiseuille's method.
4. Wavelength determination using grating by Spectrometer.
5. Particle size determination by Laser
6. Thermal conductivity by Lees' disc.
7. Thickness of wire by Air wedge.
8. Thermo emf measurement by potentiometer.

Total No of periods: 30

1. PHASE RULE 10

Phase rule - Phase diagram - Binary system - Solid solutions - Freezing mixtures, Iron, Carbon phase diagram - Heat treatment - Annealing, normalizing and tempering, Alloys - Effect of alloying elements - Heat resistant alloys - Fuse alloys and bearing alloys - Powder metallurgy - Principle of processes.

2. FUELS AND COMBUSTION 8

Classification - Calorific value - Varieties of coal - Analysis - Coke manufacture - Characteristics - Refining of petroleum, Gasoline. Diesel, Detonation - Octane number, cetane number, Cracking - Synthetic petrol, Gaseous fuels - Production and their uses.

3. ENVIRONMENTAL POLLUTION 8

Causes of pollution - Domestic, Industrial and agricultural wastes, Assessment of pollution, DO, BOD and COD. Treatment - primary and secondary - sludge disposal. Air Pollution - Environmental impact - Acid rain - Green house effect - Global warming, Ozone depletion - Smog - Control measures - Soil pollution - Noise pollution.

4. SPECIALITY MATERIALS 12

Classification, production and characterisation of abrasives, Refractories, Explosives, Rocket fuels, Refrigerants, Lubricants - Engineering applications.

5. BATTERIES 7

Dry cells, acid, alkaline, Ni-Cd batteries - Fuel cells - UPS.

6. PRACTICALS 30

1. Viscosity determination by Redwood viscometer.
2. Viscosity determination by Saybolt viscometer.
3. Flash and fire point by Cleveland open cup tester.
4. Flash and fire point by Martin Pensky method.
5. ASTM distillation.
6. Drop point of grease.
7. Consistency of lubricating grease by cone penetrometer.
8. Aniline point.
9. Diesel Index
10. Calorific value by Bomb Calorimeter.
11. Vapour pressure by Reid method.
12. Oxidation potential of metals.
13. Orsat apparatus
14. Calorific value of Gaseous fuels.
15. Carbon residue test.

Total No of periods: 75

References:

1. *Sharma B.K., " Industrial Chemistry ", Geol Publication House, 1991.*
2. *Van Vleck K., " Elements of Material Science ", 6th Edn., Wesley Publishing Co., New York, 1989.*
3. *Karunanidhi M., Ayyaswamy N., Ramachandran T. and Venkatraman H., " Applied Chemistry ", Anuradha Agencies, Kumbakonam, 1994.*
4. *Jain P.C. and Monica Jain, " Engineering Chemistry ", Dhanpat Rai Pub. Co. (P.) Ltd., New Delhi, 1998.*
5. *Gopalan R., Venkappaya D., Nagarajan S., " Engineering Chemistry ", Vikas Publishing House Pvt.Ltd., 1999.*

1. ELECTRONIC COMPONENTS AND DEVICES 10

Resistors, Capacitors, Inductors and Transformers - properties, types and applications, Junction Diodes - characteristics and typical applications, Zener diode, Junction and Field Effect Transistors - structures, characteristics and typical applications - Other Devices - UJT, SCR, LED, Photodetectors.

2. ANALOG CIRCUITS 10

Rectifier and Power - Supply Circuits using diodes, Operational Amplifiers (Ideal) - properties and typical circuits, single-stage amplifiers using BJTs and FETs - Basic definitions and characteristics - Multistage Amplifier Principles.

3. DIGITAL CIRCUITS 10

Basics of Boolean Logic - Logic Gates, Flip-Flops, Shift-Registers, Counters, Decoders/Drivers, Timer, Display Devices, A/D and D/A Convertors.

4. MEASUREMENTS AND INSTRUMENTS 7

Definitions of Accuracy, Precision, Sensitivity, Resolution, Linearity, Range, Measurement of Electrical Quantities - Voltmeter, Ammeter, Watt-meter, CRO, Measurement of Non-electrical Quantities - Typical Transducers, their characteristics and applications - Bridge-circuits, DMM, Scanners and Plotters.

5. MICROPROCESSORS AND APPLICATIONS 8

Architecture of 8-bit processors, Address Modes Instruction set, Assembly-language programming, Peripherals and Interfacing - some applications.

Total No of periods: 45

References:

1. *Millman J., and Grabel, S., " Integrated Electronics ", Tata McGraw Hill, 1995.*
2. *Horowitz P. and Hill W., " The Art of Electronics ", McGraw Hill, 1995.*
3. *Malvino, A.P., Leach, D.P., " Digital Principles and Applications ", Tata McGraw Hill, 1990.*
4. *Sawhney A.K., " A course in Electrical and Electronic Measurements and Instruments ", Dhanpat Rai & Sons, 1988.*
5. *Helfrick A.D., and Cooper, W.D., " Modern Electronic Instrumentation and Measurement Techniques ", Prentice Hall, 1990.*
6. *Goankar R.S., " Microprocessor Architecture, Programming and Applications ", Wiley Eastern, 1992.*

1. BASIC CONCEPTS AND DC CIRCUITS 9

Mechanical, Electrical and Thermal units and conversion factors - Ohm's law - electrical resistance - series / parallel resistive circuits - star/delta transformations - Kirchoff's law - node and mesh analysis - Thevenin's and Norton's theorem.

2. ELECTROMAGNETISM 9

Magnetic flux - MMF - flux density and intensity - B H curves - simple and composite magnetic circuits - statically induced EMF - self and mutual inductances - coupling coefficient - stored energy - force on a conductor - magnetic pull - force between parallel conductors.

3. A.C.CIRCUITS 9

RMS and average value of periodic waves - form factor - phase and phase difference - simple RC.RL and RLC circuits - series and parallel resonance - power and power factor - introduction to three phase systems - power measurement in 3 phase system.

4. D.C. MACHINES 8

Construction details of DC machines - principle of operation of DC generator - EMF equation - characteristics of DC generators - principle of DC motor - Back EMF - Voltage and torque equation - characteristics of shunt, series and compound motors - speed control of DC motors.

5. A.C. MACHINES 10

Principle of ideal transformer - construction and type - EMF equation - tests on transformer - equivalent circuit - voltage regulation - construction of synchronous machines - principle of alternator - EMF equation - starting of synchronous motor - torque equation - V-curves - induction motor - construction and basic principle of operation - slip - starting and running torques - speed control of induction motor.

Total No of periods: 45

References:

1. Theraja, B.L., " *A Text Books of Electrical Technology* ", S.S.Chand and Co., New Delhi, 1998.
2. Hughes E., " *Electrical Technology* ", Longmans Greend and Co. Ltd., London, 1979.
3. Edminister J.A., " *Theory and Problems on Electric circuits* ", McGraw Hill International Edition, 1994.
4. Kosow, I.L., " *Electrical Machinery and Transformers* ", 4th Edition, Prentice Hall of India, 1991.
5. Nagrath I.J. and Kothari D.P., " *Theory and Problems of Basic Electrical Engineering* ", Prentice Hall of India, 1998.

(Revised Syllabus For B.E. / B.Tech. Programmes - Effective From June 2002)

- 1. MULTIPLE INTEGRALS 9**
Double integration in Cartesian and polar coordinates - Change of order of integration - Area as a double integral - Triple integration in Cartesian coordinates - Change of variables - Gamma and Beta functions.
- 2. VECTOR CALCULUS 9**
Curvilinear coordinates - Gradient, Divergence, Curl - Line, surface & volume integrals - Statements of Green's, Gauss divergence and Stokes' theorems - Verification and applications.
- 3. ANALYTIC FUNCTIONS 9**
Cauchy Riemann equations - Properties of analytic functions - Determination of harmonic conjugate - Milne-Thomson's method - Conformal mappings : Mappings $w = z + a$, az , $1/z$, z^2 and bilinear transformation.
- 4. COMPLEX INTEGRATION 9**
Cauchy's theorem - Statement and application of Cauchy's integral formulae - Taylor's and Laurent's expansions - Singularities - Classification - Residues - Cauchy's residue theorem - Contour integration - Circular and semi Circular contours (excluding poles on real axis).
- 5. STATISTICS 9**
Moments - Coefficient of correlation - Lines of regression - Tests based on Normal and t distributions, for means and difference of means - Chi Square test for goodness of fit.

Total No of periods: 45

Text Books:

1. Kreyszig, E., " *Advanced Engineering Mathematics* " (8th Edition), John Wiley and Sons, (Asia) Pte Ltd., Singapore, 2000.
2. Grewal, B.S., " *Higher Engineering Mathematics* " (36th Edition), Khanna Publishers, Delhi 2001

References:

1. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., " *Engineering Mathematics* ", Volumes I & II (4th Revised Edition), S. Chand & Co., New Delhi, 2001.
2. Narayanan, S., Manicavachagom Pillay, T.K., Ramanaiah, G., " *Advanced Mathematics for Engineering Students* ", Volumes I & II (2nd Edition), S. Viswanathan (Printers & Publishers, Pvt, Ltd.), 1992.
3. Venkataraman, M.K. " *Engineering Mathematics III - A* ", National Publishing Company, Chennai, (13th Edition), 1998.

1. ENGINEERING MATERIALS 9

Materials - Structure property relationship - Selection of materials for engineering - Advance modern materials - Crystal structure - Miller indices - density - Packing factor - Space lattices - X-ray diffraction - Imperfections dislocation - Crystal growing techniques.

2. MECHANICAL PROPERTIES 10

Tensile - Compression - Hardness - Impact - fatigue - Creep and stress rupture - Comparative study of metals, ceramic, plastic and composite materials - Alloy - solid solution - Ferrous and Nonferrous system, Phase changes Time - Temp. Transformation.

3. CERAMICS AND COMPOSITES 7

Modern ceramic materials - cermets - cutting tools - glass ceramics - fibres - Composites - FRP - CRFP materials - Engineering application.

4. ELECTRONIC MATERIALS 10

Conducting materials - semiconducting - elemental - Compound semiconductors - properties - Effect of temperature - Band gap energy - Hall effect - Different types of magnetic materials and their properties - Ferrites and insulators - Classification and their application - Optical materials LED/LCD. Photo conducting material - Optical properties and principles of testing.

5. NON-DESTRUCTIVE TESTING 9

Liquid penetrant - magnetic particle and Eddy current method - X-ray radiography - Fluoroscopy - Gamma ray - radiography - Ultrasonic scanning method - flaw detector - Thermography.

Total No of periods: 45

References:

1. Arumugam M., " *Materials Science* ", Anuradha Technical Book Publishers, Kumbakonam, 1997.
2. Van Vlack L.H., " *Material Science for Engineers* ", Addison Wesley, 1985.
3. Raghavan V., " *Materials Science and Engineering* ", Prentice Hall of India, New Delhi, 1993.
4. Pillai S.O., " *Solid State Physics* ", New Age Inc., 1998.

1. PRINCIPLES OF GRAPHICS 16

Two dimensional geometrical construction - Conic sections, involutes and cycloids - Representation of three dimensional objects - Principles of projections - standard codes of principles.

2. ORTHOGRAPHIC PROJECTIONS 28

Projections of points, straight line and planes - ' Auxiliary projections ' - Projection and sectioning of solids - Intersection of surfaces - Development of surfaces.

3. PICTORIAL PROJECTIONS 8

Isometric projections - ' Perspectives ' - Free hand sketching.

4. COMPUTER GRAPHICS 8

Hardware - Display technology - Software - Introduction to drafting software.

Total No of periods: 60

Text Books:

1. Narayanan, K.L., and Kannaiah, P., " Engineering Graphics ", Tata McGraw-Hill Publishers Co., Ltd., 1992.

References:

1. William M. Neumann and Robert F. Sproul, " Principles of Computer Graphics ", McGraw Hill, 1989.
2. Warren J. Luzzadder and John M. Duff, " Fundamentals of Engineering Drawing ", Prentice-Hall of India Private Ltd., Eastern Economy Edition, 1995.
3. Natarajan K.V., " A Text Book of Engineering Drawing ", Private Publication, Madras, 1990.
4. Mathur, M.L. and Vaishwanar, R.S., " Engineering Drawing and Graphics ", Jain Brothers, New Delhi, 1993.

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| 1. MULTIUSER OPERATING SYSTEM | 4 |
| Unix: Introduction - Basic Commands - Vi editor - filters - Input/output redirection - piping - transfer of data between devices - shell scripts. | |
| 2. FUNDAMENTALS OF NETWORKING | 3 |
| Working on a networked environment - Accessing different machines from one node - concept of E-mail - Uses of Internet. | |
| 3. HIGH LEVEL LANGUAGE PROGRAMMING | 8 |
| C Language: Introduction - Operator - Expressions - Variables - Input/output statements - control statements - function arrays - pointer - structures - unions - file handling - case studies. | |
| 4. TUTORIAL | 45 |

Total No of periods: 60

Text Books and References:

1. *Stephan J. Kochen & Patrick H. Wood, " Exploring the UNIX System ", Techmedia, 1999.*
2. *Maurice J. Bach, " The design of UNIX Operating Systems ", Prentice Hall of India, 1999.*
3. *Ramos, " Computer Networking Concepts ", Prentice Hall International, 1999.*
4. *Balagurusamy, " Programming in ANSI C ", Tata McGraw Hill, 1999.*
5. *Kernighan and Ritchie, " The C Programming Language ", Prentice Hall of India, 1999.*
6. *Gottfried, " Programming with C ", Tata McGraw Hill, 1999.*
7. *Kutti, " C and UNIX Programming: A Conceptual Perspective ", Tata McGraw Hill, 1999.*
8. *Eric Nagler, " Learning C++ ", M/s. Jaico Publishing Co., 1998-99.*

1. BASIC CONCEPT 8

Classification of fluids - Properties - Types of them. Centre-pressure - Plane and curved surfaces - Buoyancy and stability of Floating bodies.

2. FLUID DYNAMICS 10

Laws of kinematics of fluid flow. Lagrangian and Eulerian method. Stream function and potential functions. Continuity, momentum and energy equations. Bernoulli's equation and its applications. Pressure measurements pitot static tube, venturimeter, orifice plate Application of momentum equations.

3. DIMENSIONAL ANALYSIS 8

Buckingham's Theorem, Non-dimensional numbers, Similarities of flow. Model Studies.

4. LAMINAR AND TURBULENT FLOWS 10

Flow relation between shear stress and pressure gradient. Flow between parallel plates. Flow through pipes. Characteristics of turbulent flow. Flow through pipes. Energy losses in pipes. Flow around unversed bodies.

5. FLUID MACHINERY 9

Principles of operations of centrifugal and axial pumps, Turbo blowers and turbines. Principles and working of gear, vane and reciprocating pumps.

Total No of periods: 45

References:

1. *Shames, I.H., " Mechanics of Fluids ", Kogakusha, Tokyo, 1998.*
2. *Rathakrishnan, E., " Introduction to Fluid Mechanics ", Prentice-Hall, India, 1999.*
3. *Yuan S.W., " Foundation of Fluid Mechanics ", Prentice-Hall, 1987.*
4. *Milne Thomson, L.M., " Theoretical Hydrodynamics ", McMillan, 1985.*
5. *Kumar, K.L., " Fluid Mechanics ", Eurasia Publishing House, 1990.*

1. ENGINEERING THERMODYNAMICS 12

Systems, Zeroth Law, First Law - Heat and work transfer in flow and non-flow processes, Second law, Kelvin-Planck statement - Clausius statement - concept of entropy - Clausius inequality - entropy change in non-flow processes.

2. GAS LAWS, AIR CYCLES AND COMPRESSORS 12

Properties of gases and vapours - Otto, Diesel, Dual combustion and Brayton combustion cycles - Air standard efficiency - Cycle comparisons - Mean effective pressure - Engine performance parameters - reciprocating compressors - Multistage - Minimum work - Effect of clearance - Volumetric efficiency.

3. STEAM AND ONE DIMENSIONAL FLUID FLOW 12

Steady flow energy equation - Continuity and energy equation - Properties of steam - Rankine cycle - Isentropic flow of ideal gases through nozzles - Simple jet propulsion system - Thrust rocket motor - Specific impulse.

4. REFRIGERATION AND AIR CONDITIONING 12

Principles of refrigeration, Air conditioning - Heat pumps - Vapour compression - Vapour absorption types - Coefficient of performance, Properties of refrigerants.

5. HEAT TRANSFER 12

Conduction in parallel, radial and composite wall - Convective heat transfer with laminar and turbulent flows - Overall heat transfer coefficient - Flow through heat exchangers, Fundamentals of radiative heat transfer.

Total No of periods: 60

Text Books:

1. Nag. P.K., " *Engineering Thermodynamics* ", Tata McGraw Hills Co., Ltd., Seventh Edn., 1993

References:

1. Mayhew, A. and Rogers, B., " *Engineering Thermodynamics* ", Longman Green & Co. Ltd., London, E.L.B.S. Edition, 1990.
2. Van Wylen, G.J. and Sonntag, R.E., " *Fundamentals of Classical Thermodynamics (S.I.Version)* ", Second Edition, 1986.
3. Bacon, D.H., " *Engineering Thermodynamics* ", Butterworth & Co., London, 1989.
4. Saad, M.A., " *Thermodynamics for Engineers* ", Prentice-Hall of India Pvt. Ltd., 1989.
5. Reynolds, " *Thermodynamics* ", Int. Student Edn., McGraw Hill Book Co., Ltd., 1990

1. INTRODUCTION	12
Internal forces - Stresses and strains - Elasticity - Hooke's law - Poisson's ratio - Elastic constants and their relationship - Stress-strain diagrams for ductile materials - Definition of creep, fatigue and stress relaxation - Statically determinate and indeterminate problems.	
2. BENDING OF BEAMS	12
Beams - Loads - Shear force and bending moment diagrams for simply supported and cantilever beams - Pure bending - Bending stresses in straight beams - Shear stresses in bending of rectangular and I section beams - Beams of uniform strength.	
3. TORSION AND COLUMNS	12
Torsion of circular shafts - Shear stresses and twist in solid and hollow shafts - Closely coiled helical springs - Definition of columns - Types of columns - Equivalent length - Slenderness ratio - Rankin's formula.	
4. BIAXIAL STRESSES	12
Analysis of biaxial stresses - Mohr's circle - Principle stresses and maximum shear stress - Deductions from Mohr's circle - Stresses in thin walled pressure vessels - Combined bending and torsion.	
5. DEFLECTION OF BEAMS	12
Differential equation of the elastic axis - Double integration and area moment methods - Strain energy in tension, compression, shear, bending and torsion - Castigliano's theorems.	

Total No of periods: 60

References:

1. *Timoshenko.S. and Young D.H., " Elements of Strength of Materials ", Vol. I and Vol. II, T.Van Nostrand Co., Inc., Princeton, N.J., 1988.*
2. *Malhotra, D.R. and Gupta, H.C., " The Strength of Materials ", Satya Prakasan Tech. India Publications, New Delhi, 1987.*
3. *Kazimi. S.M.A., " Solid Mechanics ", Tata McGraw Hill, 1976.*
4. *Dym. C.L. and Shames I.H., " Solid Mechanics ", McGraw Hill, Kogakusha, Tokyo, 1973.*
5. *Khurmi R.S., " Strength of Materials ", S.C. Chand and Co., 1998.*

(Revised Syllabus For B.E. / B.Tech. Programmes - Effective From June 2002)

- 1. PARTIAL DIFFERENTIAL EQUATIONS 9**
 Formation - Solutions of standard types of first order equations - Lagrange's Linear equation - Linear partial differential equations of second and higher order with constant coefficients.
- 2. FOURIER SERIES 8**
 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. LAPLACE TRANSFORMS 9**
 Transforms of simple functions - Basic operational properties - Transforms of derivatives and integrals - Initial and final value theorems - Inverse transforms - Convolution theorem - Periodic functions - Applications of Laplace transforms for solving linear ordinary differential equations upto second order with constant coefficients and simultaneous equations of first order with constant coefficients.
- 5. FOURIER TRANSFORMS 10**
 Statement of Fourier integral theorem - Fourier transform pairs - Fourier Sine and Cosine transforms - Properties - Transforms of simple functions - Convolution theorem - Parseval's identity.

Total No of periods: 45

Text Books:

1. Kreyszig, E., " *Advanced Engineering Mathematics* " (8th Edition), John Wiley and Sons, (Asia) Pte Ltd., Singapore, 2000.
2. Grewal, B.S., " *Higher Engineering Mathematics* " (35th Edition), Khanna Publishers, Delhi 2000.

References:

1. Kandasamy, P., Thilagavathy, K., and Gunavathy, K., " *Engineering Mathematics* ", Volumes II & III (4th Revised Edition), S. Chand & Co., New Delhi, 2001.
2. Narayanan, S., Manicavachagom Pillay, T.K., Ramanaiah, G., " *Advanced Mathematics for Engineering Students* ", Volumes II & III (2nd Edition), S. Viswanathan (Printers & Publishers, Pvt, Ltd.) 1992.
3. Venkataraman, M.K. " *Engineering Mathematics* " Volumes III - A & B, 13th Edition National Publishing Company, Chennai, 1998.
4. Shanmugam, T.N. : <http://www.annauniv.edu/shan/trans.htm>

1. INTRODUCTION AND CASTING 8

Classification and comparison of manufacturing processes - criteria for selection of a process. Casting - Sand casting - types - procedure to make sand moulds - cores - moulding tools - pouring of metals - principles of die casting - centrifugal casting, investment casting, shell moulding and Carbondioxide process.

2. WELDING 7

Classification of welding processes - principles and equipment used in the following processes - Gas welding - Arc welding - Resistance welding - Thermit welding - soldering - Brazing.

3. CONVENTIONAL MACHINING 10

General principles (with schematic diagrams only) of working, types and commonly performed operations in the following machines - Lathe, Shaper, Planer, Milling machine, Drilling machine, grinding machine, gear cutting - Basic of CNC machine.

4. UNCONVENTIONAL MACHINING PROCESSES 10

Need for unconventional machining processes - Principles and applications of the following processes - abrasive jet machining, ultrasonic machining, Electric discharge machining, electrochemical machining, chemical machining, LASER beam machining, Electron beam machining, Plasma Arc machining.

5. METAL FORMING AND POWDER METALLURGY 10

Basic concepts and classification of forming processes - Principles - Equipment used and application of following processes - forging, rolling, extrusion, wire drawing, spinning - Powder metallurgy steps involved, applications.

Total No of periods: 45

Text Books:

1. *Hajra Choudury, " Elements of Workshop Technology ", Vol. I and Vol. II, Asia Publishing House, 1996.*

References:

1. *Jain R.K. and Gupta S.C., " Production Technology ", Khanna Publishers, 1997.*
2. *" H.M.T. Production Technology-Hand book ", Tata McGraw Hill, 1990.*

1. ENGINE CONSTRUCTION AND OPERATION 10

Constructional details of 4 stroke petrol engine - Working principle - Otto cycle - Actual indicator diagram - Two stroke engine construction and operation - Comparison of four stroke and two stroke engine operation - Firing order and its significance.

2. SI ENGINE FUEL SYSTEM 16

Carburettor working principle - Requirements of an automotive carburettor - Starting, idling, acceleration and normal circuits of a carburettors - Compensation - Maximum power devices - Constant choke and constant vacuum carburettors - Fuel feed systems - Mechanical and electrical pumps - Petrol injection.

3. COOLING AND LUBRICATION SYSTEM 12

Need for cooling system - Types of cooling system - Liquid cooled system: Thermosyphon system, Forced circulation system, pressure cooling system - Lubrication system. Mist lubrication system, wet sump any dry sump lubrication - Properties of lubricants, properties of coolant.

4. COMBUSTION AND COMBUSTION CHAMBERS 12

Combustion in SI engine - Stages of combustion - Flame propagation - Rate of pressure rise - Abnormal combustion - knock - Effect of engine variables on knock - Combustion chambers - Different types - Factors controlling combustion chamber design.

5. TWO STROKE ENGINES 10

Types of two stroke engines - Terminologies and definitions - Theoretical scavenging methods. Scavenging pumps - Types of scavenging.

Total No of periods: 60

Text Books:

1. *Ganesan V., " Internal Combustion Engines ", Tata McGraw Hill Publishing Co., New York, 1994.*

References:

1. *Heldt P.M., " High Speed Combustion Engines ", Oxford IBH Publishing Co., Calcutta, 1975.*
2. *Obert E.F., " Internal Combustion Engines Analysis and Practice ", International Text Books Co., Scranton, Pennsylvania, 1988.*
3. *William H. Crouse, " Automotive Engines ", McGraw Hill Publishers, 1985.*
4. *Ellinger H.E., " Automotive Engines ", Prentice Hall Publishers, 1992.*

1. INTRODUCTION 5

Types of chassis layout with reference to power plant locations and drive, Vehicle frames. various types of frames. Constructional details, Materials. Testing of vehicle frames. Unitised frame body construction: Loads acting on vehicle frame.

2. FRONT AXLE AND STEERING SYSTEM 10

Types of front axles. Construction details. Materials. Front wheel geometry viz. Castor, Camber, King pin inclination, Toe-in Conditions for true rolling motion of wheels during steering. Steering geometry. Ackerman and Davis steering system. Constructional details of steering linkages. Different types of steering gear boxes. Steering linkages and layouts. Power and power assisted steering - Steering of crawler tractors.

3. DRIVE LINE 8

Effect of driving thrust and torque reactions. Hotch kiss drive, torque tube drive and radius rods. Propeller shaft. Universal joints. Constant velocity universal joints. Front wheel drive.

4. FINAL DRIVE AND DIFFERENTIAL 9

Different types of final drive. Worm and worm wheel, straight bevel gear, Spiral bevel gear and hypoid gear final drives. Double reduction and twin speed final drives. Differential principles. Construction details of differential unit. Non-slip differential. Differential locks - Differential housings.

5. REAR AXLES 8

Construction of rear axles. Types of loads acting on rear axles. Full floating. Three quarter floating and semifloating rear axles. Rear axle housing. Construction of different types of axle housings. Multi axled vehicles. Construction details of multi drive axle vehicles.

6. SUSPENSION SYSTEM 10

Need of suspension system - Types of suspension - Suspension springs - Constructional details and characteristics of leaf, coil and torsion bar springs - Independent suspension - Rubber suspension - Pneumatic suspension - Shock absorbers.

7. BRAKING SYSTEM 10

Classification of brakes - Drum brakes and Disc brakes. Constructional details - theory of braking, Mechanical hydraulic and pneumatic brakes - Servo braker. power and power assisted brakes - Different types of retarders like eddy current and hydraulic retarder-Anti lock braking systems.

Total No of periods: 60

Text Books:

1. Heldt P.M., "Automotive chassis ", Chilton Co., New York, 1990.

References:

1. Steed W., "Mechanics of Road vehicles ", Illiffe Books Ltd., London, 1960.
2. Newton Steeds & Garrot, "Motor vehicles ", Butterworths, London, 1983.
3. Judge A.W., "Mechanism of the car ", Chapman and Halls Ltd., London, 1986.
4. Giles.J.G., "Steering, Suspension and tyres ", Illiffe Book Co., London, 1988.
5. Crouse W.H., "Automotive Chassis and Body ", McGraw Hill. Newyork. 1971.

1. MECHANISMS	9
Machine Structure - Kinematic link, pair and chain - constrained motion - slider crank and crank rocker mechanisms - inversions - applications - Kinematic analysis and synthesis of simple mechanisms - Determination of velocity and acceleration in Degrees of freedom - Grueblers criteria	
2. FRICTION	9
Friction in screw and nut - Pivot and collar - Thrust bearing - Plate and disc clutches - Belt (flat and V) and rope drives - Ratio of tensions - Effect of centrifugal and initial tension - Condition for maximum power transmission - Open and crossed belt drive - Jockey pulley - Creep in belts.	
3. GEARING AND CAMS	9
Gear profile and geometry - Nomenclature of spur and helical gears - Law of gearing - Interference - Requirement of minimum number of teeth in gears - Gear trains - Simple and compound gear trains - Determination of speed and torque in epicyclic gear trains - Cam profile - Different types of followers.	
4. BALANCING	9
Static and dynamic balancing - Single and several masses in different planes - Primary and secondary balancing of reciprocating masses - Single and multi cylinder engines - Inline, V and W arrangements of engines.	
5. VIBRATION	9
Free, forced and damped vibrations of single degree of freedom systems - Force transmitted to supports - Vibration isolation - Vibration absorption - Torsional vibration of shaft - Single and multi rotor systems - Geared shafts - Critical speed of shaft.	
6. TUTORIAL	15

Total No of periods: 60

Text Books:

1. Ballaney, P.L., " *Theory of Machines* ", Khanna Publishers, New Delhi, 1998.
2. Singh, V.P., " *Theory of Machines* ", Khanna Publishers, New Delhi, 1998.

References:

1. Rao, J.S. and Duggipati, R.V., " *Mechanism and Machine Theory* ", Second Edition, Wiley Eastern Ltd., 1992.
2. Malhotra, D.R. and Gupta, H.C., " *The Theory of Machines* ", Satya Prakashan, Tech. India Publications, 1988.
3. Gosh, A., and Mallick, A.K., " *Theory of Machines and Mechanisms* ", Affiliated East West Press, 1989.
4. Shigley, J.E. and Uicker(K), J.J., " *Theory of Machines and Mechanisms* ", McGraw Hill 1980.
5. Burton Paul, " *Kinematic and Dynamic of Planer Machinery* ", Prentice Hall, 1979.

1. INTRODUCTION TO COMPUTERS 6

Input-Output, Memory, Languages, Software, Hardware - DOS - Introduction, Features, Commands, Unix - Introduction, Features, Commands.

2. INTRODUCTION TO AUTO CAD 9

Getting into Auto CAD. Drawing Editor, Menus, Co-ordinator systems, Creating a drawing, Line input methods, Angle measures, Circle - 5 methods, Unity commands.

3. ORGANISING A DRAWING AREA 9

Limits, Zoom all, Drawing Aids, Grid, Shape, Ortho, Function keys, Entity creation, Arc, Point, Polygon, Donut, Trace, Ellipse.

4. EDITING COMMANDS 6

Erase, Object selection methods, U, Oops, Redo, Move, Copy, Mirror, Rotate, Scale, Array.

5. DRAFTING 30

Two-Dimensional geometrical construction curves-Projection of points-Projection of solids-Three dimensional views of simple solids.

Total No of periods: 60

Text Books:

1. " *Mastering AutoCAD* ", Version 12, IDG Publication, 1995.

References:

1. *Auto Desk Training Centre Referecne Manuals.*

2. " *Engineering Drawing and Design* ", Autocad workbook *Introductor's Guide*, Delmar Publishers, 1991.