

1st Semester Computer science and engineering

MA 1x01 MATHEMATICS- I L-T-P : 3-1-0 Credit : 4

- 1. ALGEBRA OF MATRICES :** Elementary transformation, inverse by row transformation, canonical reduction, rank, solution of simultaneous equations, characteristic equation, Eigen values – & Eigen vectors, Caley's Hamilton theorem, similarity transformation, reduction to diagonal matrices. **Lecture : 8**
- 2. DIFFERENTIAL CALCULUS :** Higher order derivatives (successive differentiation) and Leibnitz theorem, indeterminate form, Tangent and normal, review of maxima & minima ,concavity and convexity of a curve point of inflexion, curvature and radius of curvature , pedal equation asymptotes (for Cartesian curve only) Taylor's and Maclaurin's series, partial derivatives, Euler's theorem on homogeneous function , harmonic function , Taylor's expansion of several variables, maxima and minima of several variable, Lagrange's method for undetermined multipliers. **Lecture : 20**
- 3. DIFFERENTIAL EQUATION :** First order equation, separable, homogeneous , exact ,linear and Bernoulli's form ,second and higher order equation with constant coefficients, Euler's equation: methods of their solution . dependent and independent of solution, Wronskian's system of first order equation **Lecture : 8**
- 4. INTEGRAL CALCULUS - I :** Convergence of improper integral – comparison test. Abel's test, beta & gamma functions (definition & related problems) , error function , differentiation under integral sign – Leibnitz rule.

Lecture : 8

Text Books :

1. Advance engineering mathematics by H.K.Dass, S.Chand & Company Ltd.
2. Higher engineering mathematics by B.S. Grewal, Khanna Publishers
3. Differential calculus by Das & Mukherjee –U.N. Dhar & sons
4. Integral calculus by Das & Mukherjee – U.N. Dhar & sons

CE 1x02 ENVIRONMENTAL SCIENCE L-T-P : 3-0-3 Credit : 5

Theory :

- 1. Sustaining Resources :** Environmental Quality : Water & Air Pollution. Effects and control of air and Water pollution; Introduction to solid waste and its management. Pollution of groundwater. Surface water and soils. Noise pollution; Renewable and Nonrenewable energy source.
- 2. Toxicological Chemistry** and effects and risks of it on human health **Lecture : 6**
- 3. Environmental Chemical Analysis** **Lecture : 6**
- 4. Humans and Sustainability,** Ecology and Sustaining Biodiversity **Lecture : 7**
- 5. Policy and legislation** for environmental protection. Current Environmental issues.

6. Policy and legislation for environmental protection, Current Environmental Issues.

Text Books :

1. Introduction to Environmental Engineering and Science, G.M. Masters. Pearson Education
2. Environmental Science. Miller, Thomson Press .
3. Environmental Science, Wright, Pearson Education.
4. Principles of Environmental SCIENCE, W.P. Cunningham, Tata McGraw Hill.
5. Environmental Chemistry, Sawyer and McCarty, McGraw Hill
6. Environmental Chemistry, Manahan Stanley E. Lewis Publishers.

Practical :

1. Case Analysis based on theory.
2. Determination of simple environmental parameters in laboratory.
3. Paper Presentation on current environmental issues.

CH 1x01 ENGINEERING CHEMISTRY L-T-P : 3-0-3 Credit : 5

1. WATER TREATMENT : Introduction, characteristics imparted by impurities in water, hardness of water, unit of hardness. Estimation of hardness of water. Disadvantage of hard water, scale and sludge formation in boilers. Caustic embrittlement, Boiler corrosion, Priming and Foaming, Softening methods (soda lime process). Numerical problems. **Lecture : 7**

2. COLLIGATIVE PROPERTIES : Osmosis, Osmotic pressure, Determination of osmotic pressure, Isotonic Soln., Hypertonic solution, Hypotonic solution Lowering of Vapour Pressure, Determination of molecular weight, Elevation in B.P., Depression in F.P. and their uses in the determination of molecular weight, Abnormal behavior. Numerical problems. **Lecture : 7**

3. ELECTRO POTENTIAL AND CELLS : Single electrode potential – definition, sign convention. Construction of Galvanic cell – Classification – Primary, Secondary and Concentration cell. E.M.F. of a cell, definition of Galvanic cell, notation and convention of Galvanic cell. Measurement of single electrode potential and standard electrode potential by Nernst equation. Numerical problems. **Lecture : 7**

4. FUELS : Definition, Classification,

ANALYSIS OF COAL : Proximate and ultimate analysis of coal.

SYNTHESIS OF PETROL : Bergius process and Fischer Tropsch process.

CALORIFIC VALUE : Definition, Gross and net calorific value, Determination of calorific value of solid/liquid fuel using Bomb calorimeter.

COMBUSTION CALCULATION : Analysis of flue gas by Orsat's apparatus. Numerical problems. **Lecture-7**

5. HIGH POLYMERS : Definition, Classification – Natural and synthetic polymers with examples.

POLYMERIZATION : Definition, Types of polymerizations, addition and condensation with examples,

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Mechanism of Polymerization - Free radical mechanism (ethylene as an example), Glass transition temperature, Compounding of resins synthesis – Property and application of Teflon, PMMPA

and Phenol Formaldehyde Resin. **Lecture : 7**

6. CORROSION SCIENCE : Corrosion – Definition, Chemical corrosion and electro chemical theory of corrosion. Types of corrosion – Differential aeration corrosion, Pitting corrosion, Water line corrosion, Stress corrosion. Factors affecting the rate of corrosion. Protective measures against corrosion by (i) Modification of environment (ii) Modification of metals (iii) Use of protective coatings. **Lecture : 7**

CH 1X01 CHEMISTRY LABORATORY

1. To determine the mol. wt. of a non-volatile substance *urea) by Lands Berger's method/Cottrells' method.
2. To determine the apparent molecular weight of a non-volatile substance (boric acid) in benzene and to determine its degree of association.
3. To determine the velocity constant of hydrolysis of methyl acetate catalysed by HCl
4. To determine the velocity constant of inversion of cane sugar by acids.
5. To determine the total order of reaction between oxalic acid and chromic acid.
6. To determine electrode potential (E_0) of Ag/Ag^+ or Cu/Cu^{2+} or Zn/Zn^{2+}
7. To study concentration cells and hence to determine the value of $2.303RTF=k$
8. To estimate Hardness of Water
9. To determine pH of Solution
10. Quantitative Analysis of different ions in inorganic salt mixtures.
11. Test of Adulteration in fat, butter, sugar, turmeric powder, chili powder and pepper.
12. Determination of Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD) of value of sewage volumetrically.
13. Organic Preparation: Preparation of Aspirin.
14. Test of different organic substances and their functional groups.
15. Analysis of flue gas by Orsat apparatus.
16. To determine the viscosity of a liquid or solution.

Text Books :

1. Chemistry in engineering and technology ; vol-I and II, by J. C. Kuriacose and J. Rajram; Pub.: TMH
2. Engineering chemistry; by Jain and Jain; Pub: Dhanpat Rai Publication
3. A text book of engineering chemistry by Shashi Chawla; Pub.: Dhanpat Rai & Co.
4. Engineering chemistry by B. K. Sharma; Pub.: Krishna Prakashan Media (P) Ltd. 5. Essentials of experimental engineering chemistry by Shashi Chawla, Pub.: Dhanpat Rai and Co.

CE 1x01 ENGINEERING MECHANICS L-T-P : 3-0-3 Credit : 5

Theory :

1. Statics : Force System : Moment of a force about a point and an axis; Equivalent force and moment, Wrench

2. Equilibrium : Free body diagram; equations of equilibrium; problems in two and three dimension; plane frames and trusses . **Lecture : 6**

3. Friction : Laws of Coulomb friction, impending motion problems involving large and small contact surfaces ;square threaded screw; principle of virtual work and stability.

Lecture : 8

4. Dynamics : Kinematics and kinetics of particles dynamics in rectangular coordinates cylindrical coordinates and in terms of path variables. **Lecture : 6**

5. Properties of areas : Center of mass; Moments of inertia; kinematics of rigid bodies; Chasle's Theorem, concept of fixed vector; velocity and acceleration of particles in different frames of references. General plane motion;

Euler's equation of motion. **Lecture : 8**

6. Work & Energy and impulse and Momentum methods for particles and rigid bodies : Conservation of momentum, coefficient of restitution, moment of momentum equation.

Lecture : 7

(vector approach to mechanics will be followed for all the topics)

Text Book :

1. Engineering Mechanics by Shames, Pearson's Education .

2. Mechanics for Engineers. Beer, F.P. and Johnston. Tata McGraw Hill. New Delhi

3. Engineering mechanics. Meriam Wiley pub.

Reference Books :

1. Engineering Mechanics. Timoshenko. McGraw Hill Inc.

Practical :

1. Practical based on mechanical advantage of different machines. 2. Moment of inertia.

3. Problem solving based on theory classes.

ME 1x01 ELEMENTS OF MECHANICAL ENGINEERING L-T-P : 3-0-2

Credit : 4

1 ENERGY RESOURCES : Renewable or non-conventional sources of energy, their origin forms – solar, wind, biogas and biomass energy, their merits & demerits, major applications. – Brief description. **Lecture : 4**

Non-renewable or conventional sources of energy, the fossil fuel, coal, petroleum and natural gas. **Lecture : 2**

2. REVIEW OF BASIC CONCEPTS OF THERMODYNAMICS : Thermodynamics system, properties, state, processes and cycles, Heat, work and internal energy.

3. STEAM GENERATORS : Types of boilers, water-tube and fire-tube boilers – their merits and demerits, boiler mountings and accessories – simple description.

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- 4. PRIME MOVERS:** Simple steam turbine, gas-turbine, IC engines (SI and CI), their brief description and principles of working. **Lecture : 8**
- 5. POWER PLANT :** Principles of working of thermal, hydel and nuclear power plants, work output and efficiency.
- 6. BASIC CONCEPT OF REF. AND AIR CONDITIONING :** Principles of working of vapour compression, vapour absorption and air refrigeration; Principles of air conditioning systems. **Lecture : 6**
- 7. ENGINEERING MATERIALS AND THEIR PROPERTIES :** Ferrous and non-ferrous metals : Mechanical properties e.g. strength, hardness, resilience etc. **Lecture : 4**
- 8. HEAT TREATMENT OF STEEL :** Annealing, tempering, quenching, case-hardening etc. **Lecture : 2**

Text Book :

- (1) Basic Mechanical Engineering by TJ Prabhu, V. Jaiganesh by Scitech.

ME 1x03 WORKSHOp L-T-P : 0-0-6 Credit : 4

- 1. Black smithy shop :** Introduction, Study & use of smithy forging tools, anvil, swage block, chisels, punches, hammers, sledge hammer, study of air blower M/c & sheering M/c Job making – (i) Eye Nail & Ring **Lecture : 7**
- 2. Carpentry shop :** Introduction, study & use of various tools like cutting tools, planning tools, striking tools, drilling and boring tools, holding tools etc., Study of wood turning lather machine, Job making – (i) Half lap joint (ii) dovetail joint (iii) file handle **Lecture : 7**
- 3. Fitting shop :** Introduction, study & use of different tools, cutting tools, marking tools, drill bit, die & tap & types of files Job making – (i) Matching gauge (ii) Chipping & filing. **Lecture : 7**
- 4. Foundry shop :** Introduction, studJob making – (i) Stuffing gland box (ii) Vee block. **Lecture : 7**

Text Book/Reference Book :

1. Workshop technology by Hazra Chaudhary
2. Workshop technology by Raghubansi
3. Manual on workshop Practice by Kannaiah
4. Workshop manual by Kannaiah