

SEMESTER – I

PROFESSIONAL COMMUNICATION IN ENGLISH (HU 1101)

1. Grammar and comprehension - (a) Syntax - Use of Articles in Science (b) Tense (c) Passive Construction (d) Combination of sentences (e) Common Errors (f) Vocabulary.
2. Business correspondence (a) Drafting official and business letter (b) Circulars and official order instructions (c) Drafting minutes and agenda of the meeting (d) Formal report (e) Summarizing and abstracting (f) Expressing ideas within a restricted word limit (g) Paragraph writing (h) Technical description of things and processes. Listing reference material, use of charts, graph and table.
3. Advanced phonetics - phonology and morphology including supra segmental features stress and intonation. Developing fluency and accuracy in oral communications -Drilling and Testing of English sounds. I.C. Analysis, T.G. grammar
4. Group discussion - Use of persuasive strategies including some rhetorical devices (for emphasizing for instance being polite and firm handling questions and taking in criticism of self, turn taking strategies and effective intervention, use of body language). Enrichment of English Vocabulary - Borrowings, Words formation and its methods.

ENGINEERING CHEMISTRY – I (CH 1101)

Chemical Bonding and Molecular Architecture:

Valence Bond Theory, σ , π , δ and τ bond, Hybridization and shape of molecules, Molecular Orbital Theory, Homonuclear diatoms.

Bonding in coordination Compounds: Crystal Field Theory (CFT), basic concept, Crystal Field effect in tetrahedral (ML_4), and octahedral (ML_6), geometry, Pairing energies, weak and strong field case, Crystal Field Stabilization Energy (CFSE), High and low spin complexes. Introduction to Organometallic compounds and their industrial applications.

Spectroscopic techniques:

Basic concepts of IR, UV-Visible and NMR spectroscopy.

Chemical Dynamics:

Theory of Reaction Rate, Collision Theory and Transition State Theory. Rate expression for reversible, consecutive and parallel reaction. Theory of Catalysis and its application in chemical industries.

Chemical Equilibria:

Introduction of Chemical Equilibria, Law of mass action, Equilibrium and Thermodynamics, Le- Chatlier's Braun Principle.

Phase rule, Water system & Sulphur system, Eutectic system, NaCl- H_2O system.

Electrochemistry and corrosion of metals and its Prevention:

Galvanic cells, Electrode Potentials, Nernst equation, Galvanic series, Laws of dry corrosion (Parabolic law, linear law and logarithmic law), Wet corrosion (Electrochemical theory). Factors influencing Corrosion, Types of Corrosion, Drop corrosion, Crevice corrosion, Deposit corrosion, Water- line corrosion, Stray Current corrosion, Stress corrosion, Filiform corrosion Pitting and Erosion corrosion. Protective measures against corrosion by (i) modification of environment (ii) modification of the properties of the metal (iii) use of protective coatings and (iv) cathodic protection.

Surface Chemistry:

Adsorption and its Classification, Adsorption of Gases on Solids, Freundlich's adsorption isotherm, Langmuir's theory of adsorption, BET Equation, Adsorption from Solutions & Applications.

ENGINEERING PHYSICS – I (PH 1101)

- 1) **Thermal Physics:** Kinetic theory of gasses, Maxwellian distribution laws of velocity, Mean free path (elementary treatment only), transport phenomena
- 2) **Polarization of light:** Unpolarized light Production of plane polarized light by reflection, Brewster's law, Double refraction, Nicol prism, Retardation plates, Production of circularly and elliptically polarized light. Analysis of unpolarized and polarized lights. Polaroids, Electro-optic effect and acousto-optic effect.
- 3) **Dielectrics:** Introduction to dielectrics, dielectric polarization, Gauss law in dielectric. Dielectric loss. The three electric vectors D , E and P and their relations.
- 4) Current loop and Ampere's Law, magnetic shell, dia, para, and ferro magnetism (qualitative) permeability and susceptibility. Hysteresis and hysteresis loss(introduction), The three magnetic vectors B , M and H . Magnetic circuits, boundary condition for B and H at the boundary surface.
- 5) **Vector analysis:** Scalar and Vector fields. Gradient of a scalar field. Divergence and Curl of vector fields, line integral of a vector field. Gauss divergence theorem, Stokes's theorem. Laplacian and D'Alembertian.
- (6) **Maxwell's equations and electromagnetic waves:** Maxwell's equations in integral and differential form, generation of electromagnetic wave. Equation of e.m. wave for c in case of plane electromagnetic wave traveling in vacuum. Poynting theorem and Poynting vector, Propagation of electromagnetic wave in dielectric and conducting media. Continuity of normal component of D and the tangential component of E across the boundary between two dielectrics.
- 7) **X Ray:** Introduction, production, Characteristics and application of X-ray, X-ray diffraction, Bragg's law, Moseley's law.

MATHEMATICS – I (MA 1101)

SOLID GEOMETRY :- Basic ideas of equation of plane and straight line, intersection of planes, shortest distance, equation of sphere and equation of tangent plane, equation of cone, equation of Cylinder, Identification of conicoids and its rough sketches.

DIFFERENTIAL CALCULUS OF ONE VARIABLE:- Successive differentiation and Leibnitz's theorem, Expansion of functions into Taylor's and Maclaurin's series, Tangent and normal of a curve, point of inflexion, Concavity and convexity, Curvature and Asymptotes of Cartesian curves, Curve tracing.

DIFFERENTIAL CALCULUS OF TWO OR MORE VARIABLES:- Limit, continuity and differentiability, Partial derivative, Euler's theorem, Chain rule, differentiation of implicit functions, Total differentiation, Taylor's expansion, Jacobian, Maxima and minima of functions of two variables, Lagrange's method of undetermined multipliers.

INFINITE SERIES: - Convergence and Divergence of infinite series, General properties, Comparison test, Integral test, D'Alembert's Ratio test, Raabe's test Logarithmic -test, Cauchy's root test, Alternating series, Leibnitz's test, Absolutely convergent and conditionally convergent series, Power series.

ENGINEERING MECHANICS (ME 1101)

INTRODUCTION : Idealization of Mechanics, concept of Rigid Body, External Forces (Body forces & surface forces) Laws of Mechanics

VECTOR METHODS : Equality and Equivalence of vectors, free and bound vectors. Principle of transmissibility of forces, Moment of a force about a point and about a line. Couple and moment of couple. Couple moment as a free vector. Addition and subtraction of couples.

VARIOUS SYSTEMS OF FORCES : Statically Equivalent Force systems, Simplest Equivalent of a system of forces.

EQUILIBRIUM : Force analysis, Free Body Diagram, Equations of equilibrium and their applications to various system of forces. Plane, Trusses.

FRICTION : Friction on dry surfaces. Static, Kinetic and rolling friction. Applications to inclined planes. Wedge and blocks.

KINEMATICS AND KINETICS OF A PARTICLE : Rectilinear and curvilinear translations, Normal and tangential components of acceleration. Radial and transverse components of acceleration Projectile motion on a smooth vertical curve.

KINEMATICS AND KINETICS OF RIGID BODIES: Angular velocity and angular acceleration. Effective Forces on a rigid body. D'Alembert's Principle-Application to Highway tracks Instantaneous centre of zero velocity. Compound pendulum Centre of Percussions, Rotation of Rigid bodies Rolling motion & Plane motion of rigid bodies.

IMPULSE AND MOMENTUM : Linear impulse and linear momentum. Angular impulse and angular momentum. Impact of elastic bodies.

WORK, ENERGY AND POWER : Work done by forces and couples, Potential, Elastic and kinetic energy, Work-energy. Work-energy analysis, Conservation of energy, concept of Power and efficiency.

BASIC ELECTRICAL ENGINEERING (EE 1101)

DC Networks:

Ohm's Law, Kirchoff's Law, Node Voltage and Mesh Current methods, Delta-Star and Star-Delta conversion, Superposition Theorem, Thevenin's & Norton's Theorem, Maximum Power Transfer Theorem.

Single Phase AC Circuits:

Single phase emf generation, average value & rms value of AC waveforms, form factor & peak factor, Solution of R,L,C series & Parallel ckts, the 'j' operator, Complex representation of impedances, Phasor diagram, power factor, power in complex notation.

Three phase AC Ckts:

Three phase EMF generation, Delta & Star connection, Line & phase quantities, solution of three phase ckts, Balance supply voltage and balanced load, phasor diagram, measurement of power in three phase ckts., three phase four wire ckt.

Electromagnetics :-

Concept of magnetic circuits.

Transformers:

Construction & working , EMF equation, rating, phasor diagram on no load and full load, equivalent ckt, regulation and efficiency calculations, open and short ckt tests. Introduction to auto transformers & three phase transformers.

DC machines :

Construction, Types of DC machines, EMF & torque Equations, Characteristics of dc motors, Speed control, DC motor starters.

Induction motors:

Construction and principle of operation, torque-speed characteristics, starters for cage and wound rotor type induction motors, speed control of induction motors.

ENGINEERING GRAPHICS- I (ME 1202)

Learning drafting codes as per ISO and IS preparation and use of scales, Technical lettering - One plate

Conic Section & Curves: Ellipse, Parabola, Hyperbola, Involute, Cycloid, Spiral Curves- One plate

Projection of point and straight lines - One plate

Projection of planes- One plate

Projection of simple solids, cylinders, cones, parallelepiped & pyramids in different orientation and isometric projections, isometric scale -3 plate

Section of simple solids. –One plate

Simple cases of intersection of solids and development of plane and curved surfaces of solids -2 plates

Introduction, construction of nomograms, Histograms and frequency distribution.

–One plate

SEMESTER – II

PROGRAMMING LANGUAGE (IT 2101)

Fundamentals of Computer:

History of Computer, Generation of Computer, Classification of Computers

Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices

Binary & Allied number systems representation of signed and unsigned numbers.

BCD, ASCII. Binary Arithmetic & logic gates

Assembly language, high level language, compiler and assembler (basic concepts)

Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX, Algorithm & flow chart

C Fundamentals:

The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements

Operators & Expressions:

Arithmetic operators, relational and logical operators, type, conversion, increment and decrement operators, bit wise operators, assignment operators and expressions, precedence and order of evaluation. Input and Output: Standard input and output, formatted output -- printf, formatted input scanf.

Flow of Control:

Statement and blocks, if - else, switch, loops - while, for do while, break and continue, go to and labels

Fundamentals and Program Structures:

Basic of functions, function types, functions returning values, functions not returning values, auto, external, static and register variables, scope rules, recursion, function prototypes, C preprocessor, command line arguments.

Arrays and Pointers:

One dimensional arrays, pointers and functions, multidimensional arrays.

Structures Union and Files:

Basic of structures, structures and functions, arrays of structures, bit fields, formatted and unformatted files.

ENVIRONMENT AND ECOLOGY (CH 2102)
(EXCEPT CHEMICAL ENGG.)

1. Concept and scope of Environmental chemistry, components of environment, environmental segments and their importance.
2. Ecology: Ecosystem and its characteristics features, structure and function of Forest ecosystem, grassland ecosystem, desert ecosystem and aquatic ecosystem, ecological balance and consequences of imbalance.
3. Atmosphere: Atmospheric composition, energy balance, climate, weather, depletion of ozone layer, green house effect, acid rain, particles, ions and radicals in the atmosphere, chemical and photochemical reactions in the atmosphere.
4. Air pollution and control: Air pollutants, sources and effect of air pollutants, primary and secondary pollutants, photochemical smog, fly ash, inorganic and organic particulate matter. Air quality standards, sampling, monitoring and control measures for pollutants.
5. Water pollution and control: Aquatic environment, water pollution, sources and their effect, river, lake and ground water pollution, eutrophication, waste water treatment, water pollution control & sewage treatment.
6. Land pollution ; Lithosphere, composition of soil, acid base and ion exchange reactions in soil, soil erosion, landslides, desertification, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes), origin and effects, collection and disposal of solid wastes, recovery and conversion methods.
7. Noise pollution: Human acoustics, noise classification, noise and its sources, effects and measurement, noise pollution hazards, standards and noise pollution control.

ENGINEERING CHEMISTRY II (CH 2103)
(ONLY FOR CHEMICAL ENGG.)

Water treatment:

Introduction, Common impurities, Effect of water on rocks, minerals, Hardness of water, Units of hardness, Disadvantages of hard water, Scale and sludge formation in boilers, Caustic-embrittlement, Corrosion, Priming and foaming in boilers, Softening methods, Desalination of Brackish water.

High Polymers & its Classification:

Polymers, Reactions and mechanism of polymerization, Preparation of some commercially important polymers (fibers, elastomers, adhesives and plastics), Engineering uses of polymeric materials.

Fuels and combustion:

Classification of fuels, Calorific value and its determination by bomb calorimeter, Classification of coal, Analysis of coal, Proximate and ultimate analysis and their significance, Carbonization of coal. Petroleum cracking, Reforming, Synthetic petrol, Knocking in petrol and diesel engines, Natural gas, Water gas, Producer gas. Analysis of Flue gas by Orsat apparatus, Combustion calculations, Non- conventional sources of Energy, Fuel Cell, Solar Energy, Wind Energy & Bio-diesels.

Ceramic materials:

Materials used as ceramics, Requirements of good refractories, Manufacture of refractories, Classification, Properties of refractories and selection of special refractories, Composition of glass and cement, Setting & Hardening of cement.

Lubricants:

General characteristics of gels, greases and solid lubricants and reclamation of lubricants.

Environment and its control:

Introduction, Factors that cause air pollution, Common pollutants of air and their effect on the environment, Standards for common pollutants, Ozone depletion, Green- House effect, Smog, Commonly used antipollution measures, Causes of water pollution, BOD and COD. Methods used for making the polluted water reusable, Eutrophication.

Surface Coatings:

Organo- Coatings, Paints, Formulation of Paints, Analysis of Oil, Lacquers, Emulsion Paints & some special types of Paints, Varnishes, Enamels.

ENGINEERING PHYSICS – II (PH 2102)

- 1) Quantum theory of light: Photoelectric effect, Einstein's photoelectric equation. Milikan's experimental verification. Compton effect. Black body radiation, Planck's distribution formula.
- 2) The wave nature of matter: De broglie waves, Wave and group velocities, De broglie wave velocity. Davisson – Germer's experiment, Uncertainty principle (statement, illustration and simple application)
- 3) Quantum mechanics: Wave function, Probability and probability density, Schrodinger's wave equation (Time dependent and steady state form). Expectation values. Operators. Particle in a box. Single step potential barrier. Tunnel effect.
- 4) Relativistic Mechanics: Inertial and non-inertial frame. Michelson-Morley experiment and explanation of its negative result. Postulates of special theory of relativity. Length contraction, Time dilation and velocity addition. Mass energy equivalence. Variation of mass with velocity.
- 5) Band Theory of solids and semiconductors: Basic concept of free electron theory &

electron drift, Band picture of solids, Conductors, insulator and semiconductor, effect of doping, Intrinsic and extrinsic semiconductors, P-N junction and its application as a diode, Hall effect and its application.

- 6) Lasers: Introduction, Einstein's A and B's coefficients. Spontaneous and stimulated emissions. Population inversion. Temporal coherence, Measurement of temporal coherence length of a source using Michelson interferometer, Spatial coherence, measurement of spatial coherence using Young's interferometer. Ruby laser and He-Ne Laser, application of laser. Introduction to holography.

MATHEMATICS – II (MA 2102)

INTEGRAL CALCULUS: - Reduction Formulae for integrals, convergence of Improper Integrals, β (Beta) function and γ (Gamma) function, Differentiation under integral sign, Application of Integral as length, area, volume and surface area of revolution.

MULTIPLE INTEGRAL : - Double & triple integrals, evaluation of double integrals, change of order of integration, change of variables, evaluation of triple integrals, determination of volume and centre of gravity using double and triple integrals, Dirichlet's integral.

DIFFERENTIAL EQUATION:- Differential equation of First order and first degree. Linear differential equation of second order with constant and variable coefficients, complementary function and particular integral. Method of variation of parameters, Cauchy's and Legendre's linear equations, Simultaneous linear equations with constant coefficient.

MATRICES :- Rank of a Matrix,. Linear independence and dependence of vectors, consistency and solution of system of linear equation by Rank method. Eigen values and Eigen vector, Cayley - Hamilton's theorem, Diagonalization of a square matrix.

ENGINEERING THERMODYNAMICS (ME 2102)

SOURCES OF ENERGY:

Solar – fossil, nuclear- geothermal, wind, tidal and bio-mass energy. Basic principles of energy conversion – direct and indirect energy conversion method.

BASIC CONCEPT:

Dimensions and units, thermodynamic systems and their properties – zeroth law and temperature equilibrium concept.

FIRST LAW OF THERMODYNAMICS:

Concept of work and heat, first law applied to open and closed systems, internal energy and enthalpy flow, work, examples, gases, vapours, laws of perfect gas, specific heat at constant pressure and constant volume, P-V-T relations.

P-V-T surface for steam: properties of steam, use of steam tables, simple thermodynamic process involving gases and vapours.

Helmholtz and Gibbs's functions, Maxwell's relations

SECOND LAW OF THERMODYNAMICS:

Introduction, Kelvin – Planck and Clausius statements and their equivalence, reversibility and irreversibility, reversible cycle, Carnot cycle, corollaries of second law, Clausius inequality, entropy as a property, principles of increase of entropy, entropy calculation of entropy change in ideal gas processes, availability and 2nd law efficiency.

BASIC ELECTRONICS (EC 2101)

Introduction:

Introduction to semiconductor. Formation of P-N junction, energy band diagram, built-in-potential forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics, junction capacitance and varactor diode.

Simple diode circuits, load line, linear piecewise model; rectifiers: half wave, full wave, its PIV, DC voltage and current, ripple factor, efficiency Clipper and Clamper circuits. C-Filter, Zener Diode and regulatory circuit.

Introduction to Transistors:

Formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors, CE, CB, CC configuration, Ebers-Moll model of transistor; transistor characteristics: cut-off active and saturation mode, Early effect.

Types of Biasing and Bias stability: calculation of stability factor with variation of I_{co} Different operating modes; CE, CB, CC and their properties; small signal low frequency operation of transistors; equivalent circuits h parameters as a two port network.

Transistors as amplifier: expression of voltage gain, current gain, input impedance and output impedance, frequency response for CE amplifier with and without source impedance (qualitative)

Introduction to Field Effect Transistor:

Construction and characteristics of JFET (N channel only), Transfer characteristics; construction and characteristics of MOSFET (N channel only), depletion and enhancement type; CS, CG, CD configuration

Feed Back Amplifier:

Concept (Block diagram), properties, positive and negative feed back, loop gain, open loop gain, feed back factors; topologies of feed back amplifier; effect of feed back on gain, output impedance, input impedance, sensitivities (qualitative), bandwidth

stability; effect of positive feed back: instability and oscillation, condition of oscillation, Barkhausen criteria.

Operational Amplifier:

Introduction to operational amplifiers and its characteristics. Application of operational amplifier: concept of virtual ground, inverting and non-inverting mode of operation, voltage summing, difference, constant gain multiplier, voltage follower, comparator, integrator, differentiator.

Special Semiconductor devices:

Silicon Controlled Rectifier (SCR): constructional features, physical operation, characteristics, simple application (Saw tooth generator); concept of TRIAC, DIAC and UJT; insulated gate bipolar transistor (IGBT)

Cathode Ray Oscilloscope:

Construction features of cathode ray tube, concept of dual beam CRO; application of CRO for different electrical measurements: amplitude frequency and phase of sine wave, Lissajous figure.

ENGINEERING GRAPHICS- II (ME 2204)

Basic Concepts.

I.S. drawing conventions, Line symbols, Kinds of line, Rules of printing, Preferred scales.

Projections:

Oblique, Orthographic and perspective projections, Isometric drawing. Technical sketching.-2 Plates

Shape Description (External)

Multiplanar representation in first and third angle systems of projections, glass – box concept, sketching of orthographic views from pictorial views, precedence of lines.-One Plate.

Sketching of pictorial (isometric and oblique) views from multiplanar orthographic views. Reading exercises.-One Plate.

Shape Description (Internal):

Importance of sectioning, principles of sectioning, types of sections, cutting plane representation, section lines, conventional practices of showing internal details.-One Plate.

Size Description:

Dimensioning, tools of dimensioning, Location of dimensions, Principles and conventions of dimensioning. Dimensioning exercises.

Mechanical drawing: Nuts and bolts and its assembly.- One Plate.