

Level-1 Term-II (Common to all)

| Sl. No | Course Number | Course Name | Contact Hours per Week | Credit Hour |
|--------------|-------------------------------|---|------------------------|-------------|
| 1 | EEE 105 | Electrical Circuits II | 3.0 | 3.0 |
| 2 | EEE 106 | Electrical Circuits II Laboratory | 3.0 | 1.5 |
| 3 | PHY 165 | Electricity and Magnetism, Modern Physics and Mechanics | 3.0 | 3.0 |
| 4 | PHY 102 | Physics Sessional | 3.0 | 1.5 |
| 5 | CHEM 101 | Chemistry | 3.0 | 3.0 |
| 6 | CHEM 114 | Inorganic and Quantitative Analysis Laboratory | 3.0 | 1.5 |
| 7 | MATH 257 | Ordinary and Partial Differential Equations | 3.0 | 3.0 |
| 8 | HUM 127/ HUM277/ HUM137 | Sociology/ Fundamentals of Economics/ Professional Ethics | 3.0 | 3.0 |
| Total | | | 24.0 | 19.5 |

EEE 105 Electrical Circuits II

3 Credit Hours, 3 Contact Hours per Week

Circuits with non-sinusoidal excitations, power and power factor of ac circuits with multiple sources of different frequencies; Transients in AC circuits, Passive Filter Networks: basic types. Characteristic impedance and attenuation, ladder network, low pass, high pass filters, propagation coefficient and time delay in filter sections, practical composite filters. Resonance in AC circuits: Series and parallel resonance and Q factors. Magnetically coupled circuits. Analysis of three phase circuits: Three phase supply, balanced and unbalanced circuits, power calculation and measurements, Power factor improvement.

Basic Magnetic Circuits: Magnetic quantities and variables: Field, Flux, Flux Density, Magnetomotive Force, Magnetic Field Strength, permeability and B-H Curve, reluctance, magnetic field strength. Laws in magnetic circuits: Ohm's law and Ampere's circuital law. Magnetic circuits: Composite series magnetic circuit, parallel and series-parallel circuits. Comparison between electrical and magnetic quantities, Hysteresis and hysteresis loss. Magnetic materials.

EEE 106 Electrical Circuits II Laboratory

1.5 Credit Hours, 3 Contact Hours per Week

In this course students will perform simulation study and experiments to verify practically the theories and concepts learned in EEE 105.

PHY 165 Electricity and Magnetism, Modern Physics and Mechanics

3 Credit Hours, 3 Contact Hours per Week

Electricity and magnetism: Electric charge and Coulomb's Law, Electric field, Concept of electric flux and the gauss's Law - some applications of gauss's Law, Gauss's Law in vector form, Electric potential, Relation between electric field and electric potential, Capacitance and dielectrics, Gradient, Laplace's and Poisson's equations, Current, Current density, Resistivity, The magnetic field, Ampere's Law, Biot-savart Law and their applications, Laws of electromagnetic induction- Maxwell's equations.

Modern Physics: Galilean relativity and Einstein's special theory of relativity; Lorentz transformation equations, Length contraction, Time dilation and mass-energy relation, Photoelectric effect, Compton effect; de Broglie matter waves and its success in explaining Bohr's theory, Pauli's exclusion principle, Constituent of atomic nucleus, Nuclear binding energy, Different types of radioactivity, Radioactive decay Law; Nuclear reactions, Nuclear fission, Nuclear fusion, Atomic power plant.

Mechanics: Linear momentum of a particle, Linear momentum of a system of particles, Conservation of linear momentum, Some applications of the momentum principle; Angular momentum of a particle, Angular momentum of a system of particles, Kepler's Law of planetary motion, The Law of universal gravitation, The motion of planets and satellites, Introductory quantum mechanics; Wave function, Uncertainty principle, Postulates, Schrodinger time independent equation, Expectation value, Probability, Particle in a zero potential, Calculation of energy.

PHY 102 Physics Sessional

1.5 Credit Hours, 3 Contact Hours per Week

Laboratory experiments based on PHY 121.

CHEM 101 Chemistry I

3 Credit Hours, 3 Contact Hours per Week

Atomic Structure, quantum numbers, electronic configuration, periodic table. Properties and uses of noble gases. Different types of chemical bonds and their properties. Molecular structures of compounds. Selective organic reactions.

Different types of solutions and their compositions. Phase rule, phase diagram of monocomponent system. Properties of dilute solutions. Thermochemistry, chemical kinetics, chemical equilibria. Ionization of water and pH concept. Electrical properties of solution.

CHEM 114 Inorganic, Quantitative Analysis Sessional

1.5 Credit Hours, 3 Contact Hours per Week

Volumetric analysis: acid-base titration, oxidation-reduction titrations, determination of Fe, Cu and Ca volumetrically.

MATH 257 Ordinary and Partial Differential Equations

3 Credit Hours, 3 Contact Hours per Week

Ordinary Differential Equations: Degree and order of ordinary differential equations, formation of differential equations. Solution of first order differential equations by various methods. Solution of general linear equations of second and higher orders with constant coefficients. Solution of homogeneous linear equations. Solution of differential equations of the higher order when the dependent or independent variables are absent. Solution of differential equation by the method based on the factorization of the operators. Frobenius method.

Partial Differential Equations: Introduction. Linear and non-linear first order equations. Standard forms. Linear equations of higher order. Equations of the second order with variable coefficients. Wave equations. Particular solution with boundary and initial conditions.

HUM 127 Sociology

3 Credit Hours, 3 Contact Hours per Week

Introduction: Society, Science and Technology- an overview; Scientific Study of Society; Social Elements, Society, Community, Association and Institution; Mode of Production and Society Industrial Revolution, Development of Capitalism.

Culture and Socialization: Culture; Elements of Culture; Technology and Culture; Cultural Lag; Socialization and Personality; Family; Crime and Deviance; Social Control. Technology, Society and Development; Industrialization and Development; Development and Dependency Theory; Sustainable Development; Development and Foreign Borrowing; Technology Transfer and Globalization, Modernity and Environment; Problem and Prospects.

Pre-industrial, Industrial and Post-industrial Society: Common Features of Industrial Society; Development and Types of Social Inequality in Industrial Society; Poverty, Technology and Society; Social Stratification and Social Mobility; Rural and Urban Life, and their Evaluation.

Population and Society: Society and Population; Fertility. Mortality and Migration; Science, Technology and Human Migration; Theories of Population Growth-Demographic Transition Theory, Malthusian Population Theory; Optimum Population Theory; Population Policy.

HUM 277 Fundamentals of Economics

3 Credit Hours, 3 Contact Hours per Week

Introduction to economics. Economics and engineering. Different economic systems. Fundamental economic problems. Basic elements of demand, supply and product market. Theory of utility and preferences, consumer's surplus. Theory of production and cost. Theory of the firm and market structure. Optimization.

Introducing macroeconomics. National income accounting, the simple Keynesian analysis of national income, employment and inflation. Savings, investment and decision making. Fiscal policy and monetary policy- money and interest rate, income and spending.

Economics of development and planning.

HUM 137 Professional Ethics

3 Credit Hours, 3 Contact Hours per Week

Definition and scopes of Ethics. Different branches of Ethics. Social change and the emergence of new technologies. History and development of Engineering Ethics. Science and Technology- necessity and application. Study of Ethics in Engineering. Applied Ethics in engineering.

Human qualities of an engineer. Obligation of an engineer to the clients. Attitude of an engineer to other engineers. Measures to be taken in order to improve the quality of engineering profession.

Ethical Expectations: Employers and Employees; inter-professional relationship: Professional Organization- maintaining a commitment of Ethical standards. Desired characteristics of a professional code. Institutionalization of Ethical conduct.