2nd Year 2nd Semester

Sl. No	Course Code	Course Title	Hours/Week		Credit
			Theory	Practical/ Sessional	
1	EEE 2201	Electronic II	3		3
2	EEE 2202	Electronic II Sessional		3	1.5
3	EEE 4223	Energy Conversion II	3		3
4	EEE 2204	Energy Conversion II Sessional		3	1.5
5	EEE 2205	Engineering Electromagnetics	3		3
6	EEE 2208	Electrical Services Design		3	1.5
7	MATH 2201	Statistics & Probability	3		3
8	GED 2201	Professional Ethics and Moral Thoughts	3		3
			15	**9**	**19.5**

Core Courses

EEE 2201 Electronic II
Contact hours/week: 3, Credit: 3

Ideal operational amplifier and op-amp circuits: Op-amp applications: inverting amplifier, non-inverting amplifier, summing amplifier, differential amplifier, logarithmic amplifier, operational trans-conductance amplifiers exponential amplifier, differentiator, integrator, voltage to current converter, voltage follower, and other applications. Non-ideality of op-amp: Non-ideal op-amp characteristics and its effects.
Integrated circuit biasing and active loads: BJT current sources, FET current sources, small signal analysis of active loads, design applications: an NMOS current source; differential and multistage amplifiers: BJT differential amplifier, FET differential amplifier, differential amplifier with active load, BiCMOS circuits, gain stage and simple output stage, BJT operational amplifier circuit, Frequency response of amplifiers: Poles, zeros and Bode plots, amplifier transfer function, techniques of determining 3 dB frequencies of amplifier circuits, frequency response of single-stage and cascade amplifiers, frequency response of differential amplifiers;
Trans-conductance (series-series) amplifiers, trans-resistance (shunt-shunt) amplifiers, loop gain, stability of feedback circuit, frequency compensation; Applications and Design of Integrated Circuits: Active filter, Oscillators, Schmitt trigger Circuits, Non-sinusoidal oscillators and timing circuits, integrated power amplifier, voltage regulator, Design application: An active Bandpass filter. 555 Timer IC and its Applications.

EEE 2202 Electronics II Sessional
Contact hours/week: 3, Credit: 1.5

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 2201

EEE 2203 Energy Conversion II
Contact hours/week: 3, Credit: 3

Three phase induction motor: rotating magnetic field, reversal of rotating magnetic field, synchronous speed, torque in induction motor, induction motor construction: squirrel cage, wound rotor; slip and its effect on rotor frequency and voltage, equivalent circuit of an induction motor, air gap power, mechanical power and developed torque, torque speed characteristic, losses, efficiency and power factor, classification, motor performance as a function of machine parameters, shaping torque speed characteristic and classes of induction motor, per unit values of motor parameters, determination of induction motor parameters by tests, methods of braking, speed control Induction generator: operation, characteristics, voltage build up, applications in wind turbine.
Synchronous generator: construction, armature (stator) and rotating field (exciter), excitation system with brushes and brushless excitation system, cooling, generated voltage equation of distributed short pitched armature winding, armature winding connections and harmonic cancellation in distributed short pitched winding, equivalent circuit, synchronous impedance, generated voltage and terminal voltage, phasor diagram, voltage regulation with different power factor type loads, determination of synchronous impedance by tests, phasor diagram, salient pole generator d-q axes parameters, equivalent circuit, generator equations, determination of d-q axes parameters by tests, equation of developed power and torque of synchronous machines (salient and non-salient pole motor and generator). Parallel operation of generators: requirement of parallel operation, conditions, synchronizing, effect of synchronizing current, hunting and oscillation, synchroscope, phase sequence indicator, load distribution of alternators in parallel, droop setting, frequency control, voltage control, house diagrams.
Synchronous Motors: construction, operation, starting, effect of variation of load at normal excitation, effect of variation of excitations, V curves, inverted V curves and compounding curves, power factor adjustment, synchronous capacitor and power factor correction.

EEE 2204 Energy Conversion II Sessional
Contact hours/week: 3, Credit: 1.5

In this course students will perform experiments to verify practically the theories and concepts learned in EEE 2203

EEE 2205 Engineering Electromagnetics
Contact hours/week: 3, Credit: 3

Static electric field: Postulates of electrostatics, Coulomb's law for discrete and continuously distributed charges, Gauss's law and its application, electric potential due to charge distribution, conductors and dielectrics in static electric field, flux density- boundary conditions; capacitance- electrostatic energy and forces, energy in terms of field equations, capacitance calculation of different geometries; boundary value problems- Poisson's and Laplace's equations in different co-ordinate systems.
Steady electric current: Ohm's law, continuity equation, Joule's law, resistance calculation.
Static Magnetic field: Postulates of magnetostatics, Biot-Savart's law, Ampere's law and applications, vector magnetic potential, magnetic dipole, magnetization, magnetic field intensity and relative permeability, boundary conditions for magnetic field, magnetic energy, magnetic forces, torque and inductance of different geometries.
Time varying fields and Maxwell's equations: Faraday's law of electromagnetic induction, Maxwell's equations - differential and integral forms, boundary conditions, potential functions; time harmonic fields and Poynting theorem.
Plane electromagnetic wave: plane wave in loss less media-Doppler effect, transverse electromagnetic wave, polarization of plane wave; plane wave in lossy media- low-loss dielectrics, good conductors; group velocity, instantaneous and average power densities, normal and oblique incidence of plane waves at plane boundaries for different polarization.

EEE 2208 Electrical Services Design
Contact hours/week: 3, Credit: 1.5

Familiarization with CAD tools for building services design. Introduction to building regulations, codes and standards: BNBC, NFPA etc. Terminology and definitions: fuses, circuit breakers, distribution boxes, cables, bus-bars and conduits. Familiarization with symbols and legends used for electrical services design. Classification of wiring. Design for illumination and lighting: lux, lumen, choice of luminaries for various applications- domestic building, office building and industry. Wattage rating of common electrical equipment. Designing electrical distribution system for low and high rise domestic, office and academic buildings, for multipurpose buildings. Size selection of conductors and breakers, bus-bar trunking (BBT) system for various applications. Single line diagram (SLD) of atypical 11kV/0.415kV, 500kVA sub-station and a 200kVA pole mounted transformer. Earthing requirements, various earthing methods. Earthing and lightning protection system design. Familiarization with indoor and underground telephone and fiber optic cables, UTP and CAT5/32 data cables. Designing routing layout and installation of intercom, PABX, telephone, public address (PA)systems, cable TV distribution, LAN and wireless data systems for a building. Safety regulations, design of security systems including CCTV, burglar alarm. Concept of fire prevention and its importance. Fire detection (smoke, heat etc.) and alarm system (with voice evacuation), firefighting system (sprinkler system, hose). Installation of air-conditioning, heating, lifts and elevators.

General Science Courses

MATH 2201 Statistics and Probability
Contact hours/week: 3, Credit: 3

Introduction, Sets and Frequency distribution; Mean, Median, Mode and other measures of central tendency; Standard deviation and other measures of dispersion; Moments skewness and kurtosis; Elementary probability, Application of statistical methods to engineering problems: Random variables;
Discrete and continuous probability distributions; discontinuous probability distributions (Binomial, Poisson and negative binomial); Characteristics of Distributions functions of random variables and derived distributions; expectation and moments of random variables; point estimation of distribution parameters: methods of moments and maximum likelihood, Bayesian Analysis; confidence intervals; hypothesis tests; nonparametric statistical tests; simple and multiple linear regression and model selection; Analysis of variance, Correlation, Estimation theory.

General Education Courses

GED 2201 Professional Ethics and Moral Thoughts
Contact hours/week: 3, Credit: 3

Ethics: Meaning, Definition of ethics, need of Ethics, Ethical Dilemma, why people act Unethically, Different branch of ethics, General Ethics, Framework for general ethics.
Professional Ethics: Definition of Profession and Professional Ethics. Objectives of Professional Ethics, Code of Professional Ethics. History and Development of Engineering ethics, 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 standard. Desired characteristics of a professional code. Institutionalization of Ethical conduct.