SYLLABUS

Summary of Course Plan

Sl. No.	Year/ Semester	Theory		Sessional		Total Credit
		No. of Course	Credit	No. of Course	Credit	
1	1st/1st*	5	16	3	4.50	20.50
2	1st/2nd	5	18	3	3.75	21.75
3	2nd/1st	5	18	3	3.00	21.00
4	2nd/2nd	5	17	4	3.00	20.00
5	3rd/1st	5	16	5	4.50	20.50
6	3rd/2nd	5	17	4	4.50	21.50
7	4th/1st	5	15	5	3.00	18.00
8	4th/2nd	5	15	4	5.25	20.25
Total =		**40**	**132**	**31**	**31.50**	**163.50**

*1st year 1st semester courses are exempted because of the candidate's 3-year/4-year Diploma in Engineering backgrounds after 10 years' of schooling.

Summary of Courses for B. Sc. Engineering

1st Year 1st Semester (Exempted)

Sl. No.	Course No.	Course Title	Contact hrs/week	Credits
01	Math-1201	Engineering Mathematics-I	3	3.00
02	Hum-1201	Functional English & Sociology	4	4.00
03	Ph-1201	Physics-I	3	3.00
04	Ph-1202	Physics-I Sessional	3	1.50
05	Ch-1201	Chemistry-I	3	3.00
06	Ch-1202	Chemistry-I Sessional	3	1.50
07	EEE-1101	Basic Electrical & Electronic Engineering	3	3.00
08	EEE-1102	Basic Electrical & Electronic Engineering Sessional	3	1.50
		Total =	**25**	**20.50**

Contact Hours: 16 (T) + 09 (S) = 25 No. of Theory Courses: 5
Total Credits: 20.50 No. of Lab./Sessional Courses: 3

1st Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hrs/week	Credits
01	Math-1203	Engineering Mathematics-II	4	4.00
02	Hum-1203	English & Economics	3	3.00
03	Ph-1203	Physics-II	4	4.00
04	Ph-1204	Physics-II Sessional	3	1.50
05	Ch-1203	Chemistry-II	4	4.00
06	Ch-1204	Chemistry-II Sessional	3	1.50
07	EEE-1103	Electrical Circuit-I	3	3.00
08	EEE-1104	Electrical Circuit-I Sessional	3/2	0.75
		Total =	**25 ½**	**21.75**

Contact Hours: 18 (T) + 7 ½ (S) = 25 ½ No. of Theory Courses: 5
Total Credits: 21.75 No. of Lab./Sessional Courses: 3

2nd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hrs/week	Credits
01	Math-2201	Engineering Mathematics-III	3	3.00
02	Ph-2201	Physics-III	4	4.00
03	Ph-2202	Physics-III Sessional	3	1.50
04	CSE-2113	Computer Programming	3	3.00
05	CSE-2114	Computer Programming Sessional	3/2	0.75
06	EEE-2301	Electrical Machines-I	4	4.00
07	EEE-2302	Electrical Machines-I Sessional	3/2	0.75
08	EEE-2901	Transmission and Distribution of Electrical Power	4	4.00
09	Hum-2202	English Language Sessional	3/2	0.75
		Total =	**24**	**21.75**

Contact Hours: 18 (T) + 6 (S) = 24 No. of Theory Courses: 5
Total Credits: 21.75 No. of Lab./Sessional Courses: 3

2nd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hrs/week	Credits
01	Math-2203	Engineering Mathematics-IV	4	4.00
02	CE-2107	Mechanics of Solids	3	3.00
03	CE-2108	Mechanics of Solids Sessional	3/2	0.75
04	ME-2101	Thermofluid Mechanics	3	3.00
05	ME-2102	Thermofluid Mechanics Sessional	3/2	0.75
06	EEE-2303	Electrical Machines-II	4	4.00
07	EEE-2304	Electrical Machines-II Sessional	3/2	0.75
08	EEE-2501	Electronics-I	3	3.00
09	EEE-2502	Electronics-I Sessional	3/2	0.75
		Total =	**23**	**20.00**

Contact Hours: 17 (T) + 6 (S) = 23 No. of Theory Courses: 5
Total Credits: 20.00 No. of Lab./Sessional Courses: 4

3rd Year 1st Semester

Sl. No.	Course No.	Course Title	Contact hrs/week	Credits
01	Math-3201	Engineering Mathematics-V	4	4.00
02	EEE-3501	Electronics-II	3	3.00
03	EEE-3502	Electronics-II Sessional	3/2	0.75
04	EEE-3601	Digital Electronics	3	3.00
05	EEE-3602	Digital Electronics Sessional	3/2	0.75
06	EEE-3701	Measurement & Instrumentation	3	3.00
07	EEE-3702	Measurement & Instrumentation Sessional	3/2	0.75
08*	EEE-3801	Technical Presentation and Speech	3	3.00
09	EEE-3802	Technical Presentation and Speech Sessional	3/2	0.75
10*	EEE-3803	Professional Practices and Business Communication	3	3.00
11	EEE-3804	Professional Practices and Business Communication Sessional	3/2	0.75
12	EEE-3002	Software Development	3	1.50
		Total =	**25**	**20.50**

Contact Hours: 16 (T) + 9 (S) = 25 No. of Theory Courses: 5
Total Credits: 20.50 No. of Lab./Sessional Courses: 5
* Any one of the above courses

3rd Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hrs/week	Credits
01	Math-3203	Engineering Mathematics-VI	4	4.00
02*	Hum-3201	Industrial Management	3	3.00
03*	Hum-3203	Socioeconomic and Environmental Aspects of Engineering Projects	3	3.00
04	EEE-3101	Electrical Circuits-II	4	4.00
05	EEE-3503	Electronics-III	3	3.00
06	EEE-3504	Electronics-III Sessional	3/2	0.75
07	EEE-3603	Microprocessor & Interfacing	3	3.00
08	EEE-3604	Microprocessor & Interfacing Sessional	3/2	0.75
09	EEE-3004	Electrical & Electronic Design	3	1.50
10	CSE-3112	Programming Techniques & Numerical Analysis	3	1.50
		Total	**26**	**21.50**

Contact Hours: 17 (T) + 09 (S) = 26 No. of Theory Courses: 5
Total Credits: 21.50 No. of Lab./Sessional Courses: 4
* Any one of the above courses

4th Year 1st Semester

Sl. No	Course No.	Course Title	Contact hrs/week	Credits
01	EEE-4201	Telecommunication-I	3	3.00
02	EEE-4202	Telecommunication-I Sessional	3/2	0.75
03	EEE-4401	Electromagnetic Field	3	3.00
04	EEE-4501	Industrial Electronics	3	3.00
05	EEE-4502	Industrial Electronics Sessional	3/2	0.75
06	EEE-4701	Control System	3	3.00
07	EEE-4702	Control System Sessional	3/2	0.75
08	EEE-4901	Power System Analysis	3	3.00
09	EEE-4902	Power System Analysis Sessional	3/2	0.75
10	EEE-4000	Project & Thesis	3	1.50*
		Total	**24**	**18.00**

Contact Hours: 15 (T) + 09 (S) = 24 No. of Theory Courses: 5
Total Credits: 18 No. of Lab./Sessional Courses: 5

* Credit transferred to 2nd semester

4th Year 2nd Semester

Sl. No.	Course No.	Course Title	Contact hrs/week	Credits
01	EEE-4203	Telecommunication-II	3	3.00
02	EEE-4204	Telecommunication-II Sessional	3/2	0.75
03	EEE-4703	Material Science	3	3.00
04	EEE-4903	Power Station	3	3.00
05	EEE-4000	Project & Thesis	3	3.00*
Two elective theory subjects with two corresponding sessional subjects from the following:				
06	EEE-4101	Advanced Electrical Circuits	3	3.00
07	EEE-4102	Advanced Electrical Circuits Sessional	3/2	0.75
08	EEE-4205	Radar & Satellite Communication	3	3.00
09	EEE-4206	Radar & Satellite Communication Sessional	3/2	0.75
10	EEE-4403	Microwave Engineering	3	3.00
11	EEE-4404	Microwave Engineering Sessional	3/2	0.75
16	EEE-4705	VLSI Circuits	3	3.00
17	EEE-4706	VLSI Circuits Sessional	3/2	0.75
18	EEE-4905	Switch Gear & Protection	3	3.00
19	EEE-4906	Switch Gear & Protection Sessional	3/2	0.75
20	EEE-4907	High Voltage Engineering	3	3.00
21	EEE-4908	High Voltage Engineering Sessional	3/2	0.75
		Total	22 ½	20.25*

Contact hours: 15 (T) + 7 ½ (S) = 22 ½ No. of Theory Courses: 5
Total Credits: 20.25 No. of Lab./Sessional Courses: 4

* 1.5 credit transferred from 1st semester

Detail Syllabus

1st Year 1st Semester (Exempted) Courses

Math-1201: Engineering Mathematics-I
3 hours/week Credit: 3

Algebra: Permutation & Combination, Binominal theorem for positive, negative and fractional index, exponential series & logarithmic series, determinant, solution of simultaneous equations with the help of determinant.

Differential Calculus: Function and limit, differential co-efficient from first principle, differentiation of functions, successive differentiation, Maclaurin's and Taylor's theorem, Tangent and Normal, Maxima and Minima.

Integral Calculus: Fundamental integral, Indefinite integral, Integration by substitution, Integration by parts, Integration by partial fraction, Definite integral, Application of integration for finding area, volume & work done.

Hum-1201: Functional English & Sociology
4 hours/week Credit: 4

Functional English: English grammar: use right form of verbs, construction of sentences, change of sentences, joining pair of sentences, using appropriate preposition, translation and re-translation, letter writing, Free compositions on selected topics.

Sociology: Scope, some basic concepts, social evolution and techniques of production, culture and civilization, social structure of Bangladesh, population and world resources, oriental and occidental societies, industrial revolution, family urbanization and industrialization, urban ecology, co-operative and socialist movement, rural sociology.

Ph-1201: Physics-I
3 hours/week Credit: 3

General Physics: Units and measurements, Vector and scalar quantities, Force and motion, Newton's law of motion, Gravity and gravitation, Simple harmonic motion, Work, Power & Energy, Hydrostatics, Density & Specific gravity.

Sound: Concepts and nature of sound, velocity of sound, resonance, ultrasonic.

Thermometry: Heat capacity of materials, specific heat, latent heat, effect of heat, heat transfer.

Light: Behaviour and nature of light, colour, reflection of light through plain and spherical surfaces, optical instruments

Ph-1202: Physics-I Sessional
3 hours/week Credit: 1.5

Laboratory experiments based on Ph-1201

Ch-1201: Chemistry-I
3 hours/week Credit: 3

Valency and chemical equation, different types of chemical reactions, catalysis and catalysts, acid, base and salt, properties of gases, laws of chemical combinations, Dalton's atomic theory, Avogadro's hypothesis, chemical equivalent, atomic weight and molecular weight, introduction to atomic structure, electronic theory of Valency and chemical bonds, electrolysis, P^H value of water, acidimetry and alkalimetry,

Acids, nitric acid, sulphuric acid, halogen oxides and hydroxides, gases, carbonates, water, metals, introduction to organic chemistry, ethane, methane, butane, oil, polymer, plastic, thermoplastic.

Ch-1202: Chemistry-I Sessional
3 hours/week Credit: 1.5

Laboratory experiments based on Ch-1201

EEE-1101: Basic Electrical & Electronic Engineering
3 hours/week Credit: 3

Electrical Engineering: Units, DC sources, resistance and conductance, Ohm's law, power and energy. Series and parallel circuits, Kirchhoff's laws. Mesh and nodal analysis. Y-delta transformation. Circuit theorems. Electric field, capacitors. Magnetic circuits, inductance. R-C and R-L circuits with DC excitation.

Alternating current: AC quantities, sinusoidal waveforms, effective and average value of an alternating wave, phasor. AC circuit analysis: RL, RC, RLC series and parallel circuits with sinusoidal excitation, impedance, admittance. Power and power factors: real and reactive power, power measurement, power triangle, power factor correction. Network theorems. Dependent sources, Balanced polyphase circuit.

Single phase transformer operation, Performance and testing, D.C. Machine, Principle of operation, Classifications, Starting and speed control; Induction motors.

Electronic Engineering: Tube/Semiconductor classification and applications; Simple amplifiers and oscillators, Special electron tubes and Semi-conductor devices with applications.

EEE-1102: Basic Electrical & Electronic Engineering Sessional
3 hours/week Credit: 1.5

Laboratory experiments based on EEE-1101

1st Year 2nd Semester Courses

Math-1203: Engineering Mathematics-II
4 hours/week Credit: 4

Set Theory: Operations, Venn Diagrams, Equivalence relations, and Mapping.

Algebra: Partial fractions, Determinant.

Differential Calculus: Function, Limit, Continuity, Differentiability, Derivative: its geometrical interpretation, rules of differentiation. Successive differentiation: n-th derivative of standard functions, Leibnitz's theorem.

Expansion of Functions: Rolle's theorem, Mean value theorem, Taylor's theorem in finite and infinite forms, Maclaurin's theorem in finite and infinite forms, Lagrange's form of remainders. Cauchy's form of remainders.

Indeterminate form, Partial differentiation, Euler's theorem, Tangent and normal, Subtangent and subnormal, Maxima and minima of functions of single variables, Curvature, Asymptotes.

Integral Calculus: Integration by parts, Standard Integrals, Integration by the method of successive reduction, Definite integrals, Improper integrals, Beta function, Gamma function, Multiple integrals, Area, Volume of solids of revolution.

Hum-1203: English & Economics
3 hours/week Credit: 3

English:

American and British English differences, Phonetic and Spoken English, Basics of English Grammar and its Structures, Basic Sentence Pattern, Error Analysis and Correction, Nominal and Verb Phrases, Verb Modifiers (ADVL of Time, Place and Manner etc.), Report Writing skill, Conversational practice, Vocabulary and its Contextual usage, Appropriate

use of Preposition, Communicative Grammar practice, Dialogue Writing, Clauses, Notion and Function, Letter Writing as a separate skill (Business Correspondence and Tenders), Free Writing and Reading comprehension.

Economics:

Introduction: Definition, Scope of economics, Importance and Uses of economics. Engineering Economics, Importance of economics for engineers.

Basic Economic Concepts: Wants, Wealth, goods, Value, Price, Utility, Production, Income, Consumption, Savings, Investment, Exchange, Distribution, Firm and Industry, Equilibrium, Micro Economics, Macro Economics, Open Market Economy, Controlled Economy.

Nature of Economic Problems and Its Solution: Nature of Economic Problems in Human Life, Different Levels of Activities in Solving Economic Problems. (Production-Exchange-Distribution-Consumption), Price Mechanism.

Utility: Meaning of Total utility and Marginal Utility, Law of Diminishing Marginal Utility, Limitation of the Law of Diminishing Marginal Utility. Consumer's Surplus, Importance of the Concept of Consumer's Surplus.

Demand Analysis: Meaning of Demand, The law of Demand, Exception to the Law of Demand, Demand Schedule, Demand Curve, Types of Demand, Contraction and Extension of Demand, Increase and Decrease of Demand, Causes in Demand.

Elasticity of Demand: Meaning of Elasticity of Demand, Types of Elasticity of Demand, Measurement of Elasticity of Demand, Determinants of Elasticity of Demand.

Theory of Production and Cost: Theory of production, Its contents, Importance of the theory of production, Law of variable proportions, Concepts of Costs, Accounting Cost and economic cots. Short run and long run costs.

National Income, Growth, Fluctuation: Basic Concepts, Gross National Product (GNP), Net National Product (NNP), Methods of measuring National Income, Meaning of Economic growth, Stabilizing the economy, function of Commercial and Central Bank.

Bangladesh Economy: Basic Economic problems of Bangladesh, Economic Development, Natural Resources, Agriculture, Water, Power, Irrigation and Flood Control, Large Scale Industry, Banking System, Economic Planning, Budget.

Ph-1203: Physics-II
4 hours/week Credit: 4

Thermal Physics: Kinetic theory of gases, Kinetic calculation of pressure, temperature and energy, Ratio of specific heats, mean free path, Equation of state, Van der Waal's equation of state, Critical constants, Van der Waal's constant, Thermal conductivity of solids, Rectilinear, Cylindrical and Spherical flow of heat, Heat flow through compound walls.

First law of Thermodynamics and its application, Isothermal, Adiabatic, Isochoric and Isobaric processes, Work done by expanding gases, Adiabatic gas equation, Reversible and irreversible processes, Second law of thermodynamics, The Carnot Cycle, Entropy, Entropy of perfect gas.

Waves and Oscillations: Wave motion, Types of wave motion, Expression for plane progressive wave and its energy calculation, Interference of sound waves, Beats, Formation of standing waves, Doppler effect, Oscillations, The simple Harmonic waves equation and its Solution. Application of simple harmonic motion, Composition of simple harmonic motion-Lissajou's figure, Damped harmonic motion and its solution, Forced oscillation and resonance. Architectural acoustics, Reverberation, Sabine's reverberation formula.

Properties of Matter: Gravitation, Kepler's Laws of motion, Gravitational Potential and field due to (a) A Spherical shell (b) Solid Sphere (c) Hollow Sphere, Escape velocity, Velocity of Satellite, Elasticity, Elastic constants, Relation between elastic constants, Bending Moment, Cantilever, Surface tension, Cohesive and adhesive forces, Molecular theory of surface tension, Surface energy, Excess pressure of curved surface, Capillarity, Determination of surface tension of water by capillary tube method.

Electricity and Magnetism: Charge and matter, Gauss's law, Applications of Gauss's Law, Electric potential, Electric potential due to a point charge and dipole, Capacitance and dielectrics. The magnetic field, Amperes law, **B** near a long wire and Solenoid, Biot-Savart Law - Examples, Faraday's law, Inductance, Lenz's law, Magnetic properties of matter, Dia-magnetism, Para-magnetism, Ferro-Magnetism, Three magnetic vectors, Hysteresis.

Ph-1204: Physics-II Sessional
3 hours/week Credit: 1.5

Laboratory experiments based on Ph-1203

Ch-1203: Chemistry-II
4 hours/week Credit: 4

Inorganic Chemistry: Quantum numbers, relationship among them, different rules/principles dealing with electron distribution in atom, redox reaction and its balancing, chemical bond: formation, conditions and properties of ionic, covalent, coordinate and metallic bond; Van der Waals force, hydrogen bond, polar bond, Fajan's rules, Lewis structure and formal charge calculation, theory of covalent bonding: Valence bond theory, hybridization, valence shell electron pair repulsion (VSEPR) model, and molecular shape, noble gases: their isolation, properties and uses, water treatment and heavy water.

Physical Chemistry: Thermochemistry: Enthalpy of reaction, formation and combustion, laws of thermochemistry, Kirchoff's equations, Chemical equilibrium: Law of mass action, Kp and Kc, Le Chatelier's principle and its applications,

Chemical Kinetics: rate, order, molecularity of chemical reaction, rate expressions; Solution: its concentration units, Henry's law, Colligative properties: Raoult's law, depression of freezing point, elevation of boiling point, Osmosis: semipermeable membrane, reverse osmosis, laws of osmotic pressure, Distribution law: its derivation, applications, effect of association and dissociation on it, Colloids: definition, classification and preparation, Electrochemistry: Electrolytes, conductance, pH and buffer solutions.

Ch-1204: Chemistry-II Sessional
3 hours/week Credit: 1.5

Laboratory experiments based on Ch-1203

EEE-1103: Electrical Circuit-I
3 hours/week Credit: 3

Sinusoidal Single Phase Circuit Analysis: Series and parallel circuits, Series and parallel resonance, Q of a circuit, Wave trap, Maximum power transfer, Network theorems.

Balanced Polyphase Circuits: Two and four phase system, Three phase four wire system, Three phase three wire system, n-phase star and mesh, Balanced wye and delta loads, Three origin vector diagram of a balanced three phase system, Power measurement (both active and reactive) in balanced systems, Copper required to transmit power under fixed conditions.

Unbalanced Polyphase Circuits: Unbalanced wye and delta loads, Network solutions, Phase-sequence effects, Methods of checking voltage phase sequence, Power measurements (both active and reactive) in unbalanced three phase systems.

Coupled Circuits: Conductively coupled circuits, Mutual impedance, Coefficient of coupling, Mutual inductance, Air-core transformer, Air-core autotransformer.

Transients: Transient of RL, RC and RLC circuits.

Electric Wave Filters: Basic principles, Characteristic impedances of T and π sections, Physical operation of symmetrical T and π sections, Transmission constant of a filter section, Fundamental filter equation, Constant *k*, *m*-derived half and full section, Conventional filter design and operation.

EEE-1104: Electrical Circuit-I Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-1103

2nd Year 1st Semester Courses

Math-2201: Engineering Mathematics-III
3 hours/week Credit: 3

Co-ordinate Geometry: 2-Dimensional Co-ordinate Geometry, Change of axes, Transformation of co-ordinates. Pair of straight lines, Circle, System of circles. General equation of second degree.

3-Dimensional Co-ordinate Geometry, System of co-ordinates, Distance of two points. Section formula, Projection, Direction cosines. Equations of planes and lines.

Vector Analysis: Scalars and Vectors, equality of vectors, Addition and subtraction of vectors, Multiplication of vectors by scalars, Position vector of a point, Resolution of vectors, Scalar and vector product of two vectors and their geometrical interpretation. Triple products and multiple products, Application to geometry and mechanics, Linear dependence and independence of vectors, Differentiation and integration of vectors together with elementary applications, Definition line, Surface and volume integral. Gradient, divergence and curl of point functions, various formulae, Green's theorem, Gauss's theorem, Stoke's theorem and their applications.

Ph-2201: Physics-III
4 hours/week Credit: 4

Optics: Huygen's principle, Young's Experiment, Coherent sources, Interference, Analytical treatment of interference, theory of interference fringes, Fresnel's biprism, Interference from thin films, Colors of thin films, Theory of Newton's rings.

Diffraction of light, Fresnel and Fraunhofer diffraction, Fraunhofer diffraction by single and double slit, Plane diffraction Grating, Resolving and dispersive power of a Grating.

Polarization – by Reflection, Refraction, Double refraction, Brewster's law, Malus law, Nicole prism, Elliptical and circular polarization, optical activity and optics of crystals.

Basic idea of Laser, Different types of emission, 3 & 4 level laser, Application of Laser.

Solid State Physics: Crystal structure, Miller indices, different types of crystal lattice, Packing fraction, Electrons in solids, Energy bands in solids,

X-rays, Production and its application, Continuous and characteristic X- rays, Moseley,s law, Crystal diffraction and Brags law.

Modern Physics: Atomic Structure, Atom Models, Electron orbits, Atomic spectra, Energy levels and spectra, Particle properties of wave, Photo-electric effect, Compton effect.

Wave mechanics, De Brogle Waves, Uncertainty Principle, Schrodinger's equation and its solution for one electron atom.

Atomic nucleus, Nuclear binding energy, Nuclear force, Nuclear fusion, Nuclear fission, Pair production, Radioactive decay and transformations. Law of radioactive disintegration, Half-life, Mean life, Law of radioactive successive disintegration.

Special theory of relativity, Lorentz transformation, Time dilation, Length contraction, Relativity of mass, Mass-Energy relation.

Ph-2202: Physics-III Sessional
3 hours/week Credit: 1.5

Laboratory experiments based on Ph-2201

EEE-2301: Electrical Machines-I
4 hours/week Credit: 4

D. C. Generator: Principles, Construction, Classification, Armature windings, Voltage build up, Armature reactions and Commutation, Performance and testing, Compounding of d.c. generator, Generator characteristics, Voltage regulation, Losses and efficiency, Parallel operation.

D. C. Motor: Operation, Types, Back e.m.f, Torque equations, Motor characteristics, Speed-Torque characteristics, Speed regulation, Losses and efficiency, Methods of speed control, Methods of braking, Starters, Amplidyne and Metadyne.

Single Phase Transformer: Principles, Types, Equivalent circuits, Performance and testing, Regulation, Losses and efficiency, Parallel operation, Auto-transformer, Instrument transformers.

Poly Phase Transformer: Polyphase transformer construction, Polyphase transformer connections, Harmonics in polyphase transformer, transformer cooling.

Polyphase Induction Motor: Principle of operation, Constructional details, Classifications, Equivalent circuits, Starting torque and maximum torque, Speed-torque relations, Losses and efficiency, Circle diagram, Starters, Methods of speed control, Methods of braking and plugging, Induction generator.

EEE-2302: Electrical Machines-I Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-2301

CSE-2113: Computer Programming
3 hours/week Credit: 3

Elements of computing systems and programming languages. Number systems. Principles of programming, flowcharts, algorithm. variables constants, operators, expression, data types, control statements, input/output statements, subroutine, functions.

Structured programming concepts, variables, constants, operations, expressions, data types, control statements, procedures, functions, recursion, arrays, strings, pointer, arrays, records. I/O system in C, graphics, dynamic memory allocation. Object Oriented Programming (OOP): Objects, Polymorphism, inheritance, classes, function and operator overloading, virtual functions, C++ streams, OOP with C++.

CSE-2114: Computer Programming Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on CSE-2111

EEE-2901: Transmission & Distribution of Electrical Power
4 hours/week Credit: 4

Inductance of Transmission Lines: Flux linkages, Inductance due to internal flux, Inductance of single phase two-wire line; Flux linkage of one conductor in a group, Inductance of composite conductor lines, G.M.D. Examples, 3-phase line with equilateral and with unsymmetrical spacing, Parallel circuit 3-phase lines, Use of table.

Capacitance of Transmission Lines: Electric field, Potential difference between points due to a charge, Capacitance of a two-wire line, Group of charged conductors. Capacitance of 3-phase line with equilateral and with unsymmetrical spacing, Effect of earth, Parallel circuits lines.

Resistance and Skin Effects: Resistance and temperature, Skin effects influence on resistance, Use of table. Current and voltage relation on a transmission line; Representation of line- short, medium and long transmission lines; T and π representation, Exact solution, Equivalent circuit of a long line; Generalized Line Constants; General line equation in terms of ABCD constants, Relation between constants, Charts of line constants, Constants of combined networks, Measurements of line constants.

Circle Diagrams: Receiving and sending end power circle diagrams, Power transmitted, Maximum power, Universal power circle diagrams. Voltage and power factor control in transmission systems; Tap changing transformers, On-load tap changing; Induction regulators, Moving coil regulators, Boosting transformer; Power factor control: Static condenser in series or parallel, Synchronous condensers, Ferranti effect.

Mechanical Characteristics: Transmission line Sag and Stress analysis, Wind and Ice loading, Supports at different elevations, Conditions at erection; Effect of temperature changes.

Insulator for Overhead Lines: Types of insulators and their constructions and performance, Potential distribution in a string of insulators, String efficiency, Methods of equalizing potential distribution, Special types of insulators, Testing of insulators, Corona.

Insulated Cables: Cables versus overhead lines, Insulating materials, Electrostatic stress grading, Three-core cables, Dielectric losses and heating, Modern development on oil filled and gas filled cables; Measurement of capacitances, Cable testing.

Distribution system: Radial, Ring mains and interconnections.

2nd Year 2nd Semester Courses

Math-2203: Engineering Mathematics-IV
4 hours/week Credit: 4

Matrix: Definitions, Addition, Multiplication of matrices, Transpose of matrix and Inverse matrix.

Differential Equation: Definition, Formation of differential equations, Solution of first order differential equations by various methods, Solution of differential equation of first order and higher degrees. Solution of general linear equations of second and higher orders with constant co-efficient, Solution of Euler's homogeneous linear equations, Solution of differential equations in series by the method of Frobenius. Bessel's functions, Legendre's Polynomials and their properties.

Partial Differential Equation: Elimination of arbitrary constant and arbitrary function, Solution of differential equation by the method based on the factorization of the operator. Solution of the linear and non-linear partial differential equations by various methods, Homogeneous P.D.E. of higher order with constant co-efficient, Non homogeneous linear equations with constant co-efficient, Non-homogeneous linear P.D. E. with variable co-efficient.

CE-2107: Mechanics of Solids
3 hours/week Credit: 3

Introduction, Analysis of forces, Stress and strain, Mechanical properties of materials, Allowable stresses, Stresses in the pressure vessels, Torsional stresses in circular shafts and circular beams.

Shear force and bending moment diagrams for statically determinate structures, Stresses in beams, Deflection, Combined Stresses, Column, Welded and riveted joints, Stress-strain characteristics of guys and cables, Cable and guy Structures.

CE-2108: Mechanics of Solids Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on CE-2107

ME-2101: Thermofluid Mechanics
3 hours/week Credit: 3

Fundamental concepts and definition of Thermodynamics. Equation of state, Properties and laws of perfect gases. Non-flow and Flow processes. Ideal gas cycles. Law of Thermodynamics and their corollaries. Internal combustion engines : Petrol engine. Diesel engine and gas turbines. Properties of pure substance, Thermodynamics of steam generation, boilers, vapour power cycles: Carnot cycle, Rankine cycle and Reheat cycle. Steam turbines, Basic refrigeration cycle.

Fundamental concepts of Fluid Mechanics. Fluid properties and statics, the basic hydrostatic equation, manometers. Continuity equation for a control volume, momentum and energy equations. Laminar and turbulent flows, Flow through pipes, Flow measurement devices. Turbomachineries: Pelton wheel, Francis turbine, Kaplan turbine, Centrifugal and Reciprocating pumps, Fans.

ME-2102: Thermofluid Mechanics Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on ME-2101

EEE-2303: Electrical Machines-II
4 hours/week Credit: 4

Single Phase Induction Motor: Principle, Construction and types, Performance, Double revolving field theory, Cross field theory, Equivalent circuits.

Special Machines: Universal motor, Repulsion motor, Reluctance motor, Electrostatic motor, Permanent magnet motor, Hysteresis motor, Stepper motor and Power modulators; Power rectifiers and Frequency multipliers, Brush less DC motor.

Synchronous Generators: Alternators, General outline of synchronous generators, Types of alternator, Salient pole and nonsalient pole, Armature and field cores, Winding, Insulation, Cooling. Air-gap flux and voltage expressions, Armature Windings, Alternator regulation, Determination of machine parameters from tests, Phasor diagrams, armature reaction, Concept of direct and quadrature axis reactances, Losses and efficiency, Blondel's two reaction analysis, Transient conditions in alternators, concept of interconnected system of alternators, Conditions, Methods and problems of parallel operation and load sharing of synchronous generators.

Synchronous Motors: General Constructional feature, Theory of operation, Motor terminal characteristics, Mathematical analysis, phasor diagrams, V-curves, Motor tests, Losses, Efficiency and starting.

Generalized Energy Conversion Process: General principles of Electromechanical energy conversion, Energy storage, Transformation and conversion, Methods of formulation of motion equations and co-ordinate transformation, Interpretation of generalized machines from field concepts.

EEE-2304: Electrical Machines-II Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-2303

EEE-2501: Electronics-I
3 hours/week Credit: 3

Introduction to Semiconductors: P- and N-type Semiconductors, P-N junction under forward and reverse bias. Diodes and It's Applications: Graphical analysis of diode circuits, Equivalent circuits, Rectifiers and smoothing filters, Regulated power supplies. Characteristics of Different types of Diodes: Zener, Tunnel..

Bipolar Junction Transistors (BJTs): Principal of Operation, I-V Characteristics, Transistor Circuits Configurations (CE, CB, CC), BJT Biasing and Thermal Stabilization, AC Load Line. BJTs at Low Frequencies: Hybrid model, h-parameters, Small Signal Analysis of BJT amplifiers, BJTs at High Frequency response.

Field Effect Transistors (FET): Principle of operation and characteristic equations of JFET, MOSFET-depletion and enhancement type, N- and P-channels, CMOS, Biasing arrangements, FETs as voltage controlled switches and resistors.

EEE-2502: Electronics-I Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-2501

3rd Year 1st Semester Courses

Math-3201: Engineering Mathematics-V
4 hours/week Credit: 4

Complex Variable: Complex number system, General functions of a complex variable, Limits and continuity of a function of complex variable and related theorem, Complex differentiation and the Cauchy-Riemann equations, Complex integration and Cauchy's theorem, Cauchy's integral formulae and related theorems, Infinite series, Tajlor's and Laurent series, Residue, The residue theorem, Contour integration.

Infinite Series: Sequence and series, convergence of series, Uniform convergence, Absolute convergence, Divergence.

Fourier Series, Fourier Transform.

Laplace's Equation: Introduction, Laplace's equation in Cartesian, Cylindrical and Spherical coordinate systems. Two-dimensional Steady Flow of Heat, Circular Harmonics, Cylindrical Harmonics, and Spherical Harmonics, Potential of a ring, Potential about a spherical surface, General properties of Harmonic functions, Wave equation, Particular solution with boundary and initial conditions.

EEE-3501: Electronics-II
3 hours/week Credit: 3

Frequency Responses of FET: Low and high frequency models of FETs, Basic FET amplifiers, Introduction to BJT and MOSFET integrated circuits.

Voltage and Power Amplifiers: Untuned voltage (Class-A, Class-B, Class-AB and Push-Pull circuits), Tuned voltage (RF, IF) and Power Amplifiers (Class-B and Class-C).

Operational Amplifiers (Op-Amps): Introduction to op-amps, inverting and non inverting amplifier, phase inverter, scale changer, integrating and differentiating circuits, adder or summing amplifier, Astable and Monostable multivibrators, Schmitt

trigger circuit. Ac performance of Op-amps: bandwidth, slew rate, noise and frequency compensation. 555 timer: operation and applications.

Active filters: Different types of filters and specifications, transfer functions, realization of first and second order low, high and bandpass filters using Op-Amps.

Modulation: AM and FM modulator and demodulator circuits.

EEE-3502: Electronics-II Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-3501

EEE-3601: Digital Electronics
3 hours/week Credit: 3

Digital Circuits: Number systems, Logic Systems, Logic gates - OR, AND, NOT, INHIBIT, Exclusive OR gates, Demorgan's Laws, Boolean algebra. Simplification of Boolean functions: Kernaugh map method, tabular method of simplification; Implementation of logic circuit using various gates, universal gates.

Digital IC Logic families: Brief description of TTL, DTL, RTL, ECL, I^2L, MOS, and CMOS logic and their characteristics, principles of operation and applications.

Combinational Digital systems: Standard gates assembly, Binary adders, Arithmetic function, Digital Comparator, Parity Checker / Generator, Decoder / Demultiplexer, Data Selector & Multiplexer, Encoder.

Sequential Digital systems: Introduction to sequential circuits, analysis and synthesis of synchronous & asynchronous sequential circuits.One-bit memory, SR, JK, Master & slave, T & D type flip- flops & their characteristic table & equations; triggering of flip-flops; flip-flop excitation table.

Modular Sequential Logic Circuit Design: Classification, operation of registers & their applications. Classifications of counters, Synchronous & asynchronous sequential counter design & analysis, ring counter, ripple counter & counter with parallel load.

Large Scale Integration Systems: MOS Integration , MOS Shift Register, Ratioless Shift Register – MOS, Read Only Memory (ROM), Two-dimensional addressing of a ROM, ROM applications, EPROM, PLA; Random Access Memory (RAM), Read/Write ; Cell-Charge Coupled Device $(CCD)_2$CCD Structure, CCD Memory organization; Integrated Injection Logic (I^2L) Circuits, D/A & A/D converters ; Digital IC Subsystems & systems: Microprocessor & Microcomputers.

EEE-3602: Digital Electronics Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-3601

EEE-3701: Measurement and Instrumentation
3 hours/week Credit: 3

Introduction: Methods of measurement, Error in measurements and their statistical analysis.

Measurements of resistance, Inductance and capacitance: Different methods of measuring low, medium and high resistances. Measurement of insulation and earth resistances, Cable faults and localization of cable faults, A.C. Bridge methods, Methods of measuring self and mutual inductance, Methods of measuring capacitance, Error correction of different methods.

Galvanometers: D' Arsonval Galvanometer, Ballistic galvanometer, Flux meter.

Magnetic Measurements: Measurement of flux density, Measurement and separation of iron losses.

High voltage measurements and testing.

Measuring Instruments: Classification of measuring instruments, Ammeter, Voltmeter, Wattmeter, AVO meter, Energy meter, Ampere-hour meter and Maximum demand meter for measuring AC and DC quantities. Speed, Frequency and phase differences measurement. Illumination measurement.

Electronic measuring instruments: Oscilloscope, DMM, VTVM.

Computer based instrumentation: PC-based data acquisition, filtering by moving average, Instrumentation for process control, data conditioning.

Measurement of non-electrical quantities: Measurement of pressure, temperature, displacement, velocity, acceleration, flow, force, optical, weight, level detector, shaft encoder, Strain gauge and their applications.

EEE-3702: Measurement and Instrumentation Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-3701

EEE-3801: Technical Presentation and Speech

3 hours/week Credit: 3

Preparation of term paper on any topic approved by the department and submission and presentation of the same.

EEE-3802: Technical Presentation and Speech Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-3801

EEE-3803: Professional Practices and Business Communication
3 hours/week Credit: 3

Project cycle, project proposal, contractual provisions, techniques of specification writing, evaluation of bids, project management.

Layout of business correspondence, voluntary offers and inquiries, responding to inquiries, estimates and quotations, orders, acknowledgement and acceptance of orders, fulfillment of orders, complains and their adjustment, memorandum, qualities of effective correspondence, report writing, visual communication, public speaking and oral presentation, industrial & labour relations, introduction to human engineering, professional ethics in engineering, role of information system in modern business organization.

EEE-3804: Professional Practices and Business Communication Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-3803

EEE-3002: Software Development
3 hours/week Credit: 1.5

Application of Database Management System (DBMS) packages using dBase/FoxPro/Oracle.

Computer application in solving Electrical & Electronic Engineering problems by using Fortran, PSpice.

Developing application software using C / C++ / Java / Visual FoxPro / Visual C++/ Visual BASIC.

3rd Year 2nd Semester Courses

Math-3203: Engineering Mathematics-VI
4 hours/week Credit: 4

Numerical Analysis: Solution of Algebraic equations, Graphical method, Iterative method, Newton's method, Gauss reduction formulae for linear interpolation: Forward and backward difference table, Newton's formula for forward, backward and divided difference, Lagrange's interpolation formula.

Curve Fitting: Method of least square.

Numerical Differentiation: Use of Newton's interpolation formula Douglas-Avakian method, Graphical differentiation maxima-minima, Raphson's methods.

Numerical Integrations: Trapezoidal rule, Simpson's rule, Use of Lagrange's interpolation formula, Graphical integration. Solution of differential equation; Adam's method for 1st order equation, Picard's method, Runge's method, Kutta's method, Finite difference method.

Statistics: Frequency distribution Mean, Median, Mode and other measure of central tendency. Standard deviation and other measures of dispersion, Moments, Skewness and Kurtosis. Elementary probability theory and discontinuous probability distributions, e.g. binomial, Poisson and negative binomials, Continuous probability distributions, Elementary Sampling theory, Estimation, Hypothesis testing, Correlation & Regression analysis.

Hum-3201: Industrial Management
3 hours/week Credit: 3

Industrial Management: Definition, Its nature and significance, Development of management, Scientific management, Process & Principles of management, Management Practices in large scale industries in Bangladesh. Administration, Management and Organization, Authority and responsibility, Specialization and Division of Labor.

Organization Structures: Principles of organization, Line organization, Line and staff organization & functional organization, Organization chart, Policies, Decision-making.

Planning: Types of planning, Financial structure, General objectives and policies, Capital investment, Shares, Loans and working capital relation between original planning and production planning & control, Elements of cost of production, Depreciation, various methods, Amortization- Obsolescence, Allocation of overhead cost, Fixed, variable and Semi-variable costs.

Personnel Management: Selection, Recruitment, and Training, Job evaluation, Appraisal, Promotion, transfer, Supervisory personnel merit rating, Wages systems, Incentives, Supplementary wage and salary administration, Morals

and motivation, Working conditions, Accident prevention, Time & motion study, Safety instructions and health measure- Industrial relation.

Plant Layout: Layout of physical facilities, transportation, Storage, Materials handling, Maintenance and repairs. Production-control in intermittent and continuous manufacturing industry-Objectives and functions of production control -Supplementary Planning-Scheduling-Dispatching Assembly line control. Forecasting, Co-ordination in sales and manufacturing economics, Cost reduction and cost control. Purchasing policy, Inventory control, Wastage elimination, Economic lot. Sales organization and promotion. Measures of performance, Measurement and analytical problems of productivity, Cost of management and industrial re-organization.

Budgetary Control: Definition and importance, Types of budget, Construction of budget.

Hum-3203: Socioeconomic and Environmental Aspects of Engineering Projects
3 hours/week Credit: 3

Economic and social structure, development and economic growth, socio-economic indicators, population, prosperity and poverty, employment of workforce, population of displacement, rehabilitation strategy, productivity, landloss, land use, and land ownership patterns, fisheries and aquaculture, deforestation and afforestation, communication, commerce, industries and other economic benefits, water supply, sanitation, health and nutrition, inequalities in distribution of benefits and losses, socio-economic survey, case studies.

EEE-3101: Electrical Circuits-II
4 hours/week Credit: 4

Characteristics of a linear system: physical and mathematical viewpoint of linear system, properties of linear differential equations; classical methods of transient and steady-state solutions of differential and Integro-differential equations; Lumped element electrical systems: Network elements, Magnetic coupling, Dual networks, Network Theorems; Analogous systems: Linear mechanical elements, D' Alembert's principle, force-voltage analogy, force-current analogy, Mechanical coupling, Circuit analysis by Fourier methods: Effective values and power of non-sinusoidal waves, Fourier series expansion of periodic functions, Exponential form of Fourier series, Fourier integrals and Fourier transforms.

Laplace Transformation, Shifting Theorem, gate function, Laplace transform of periodic functions, Differentiation and Integration Theorems, Application of Laplace transformation, The inverse laplace transformation and their application to linear circuits, Impulse function, Convolution and superposition integral, Heaviside's expansion theorem and their applications, sampled-data systems, Introduction to Z-transform.

EEE-3503: Electronics-III
3 hours/week Credit: 3

Feedback Amplifiers: Types of feedback, feedback concept, effect of feedback on transistor and FET gain, loop gain, amplifier characteristics. Negative feedback amplifiers and their applications, Stability and Nyquist criterion.

Sinusoidal Oscillators: Conditions of self-oscillation, Phase shift and Resonant circuit oscillators, Colpitts and Hartley oscillators, Wien Bridge and Crystal oscillators.

Radio & TV Engineering: TRF and super heterodyne Transmitter and Receiver, TV Transmitter & Receiver, Scanning, Introduction of Color TV, CCTV, CATV.

Radio Engineering: Properties and Propagation of radio wave, Radio Transmitter & Receiver, TRF and super heterodyne Transmitter & Receiver, AM and FM Transmitter & Receiver.

Biomedical Electronics: Biomedical potentials: resting and action potentials. Electronic conduction system of heart, Electrocardiogram (ECG): introduction to X-ray, Ultra Sound , Computed Tomography (CT) Scan, MRI.

EEE-3504: Electronics-III Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-3503

EEE-3603: Microprocessor & Interfacing
3 hours/week Credit: 3

Introduction to different types of microprocessors: 8 bit, 16 bit, 32 bit & their architectures & pin diagram , Pentium microprocessors & Co- processors, RISC & CISC processors. Instruction sets & assembly language programming.

Microprocessor peripherals & their interfacing: Typical microprocessor interfacing –memory interface , Programmed I/P, Interrupt I/O, DMA controlled I/O. D/A & A/D converters .

Standard for bus architectures & ports: ISA, EISA, MCA, PCI, VESA, Accelerated Graphics Port (AGP), Universal Serial Bus (USB), RS-232C, RS-423A, RS-449 & RS-366, IEEE-488 BUS & Bus system in a Multiprocessor System. Introduction to operating system & Memory arrangement. Introduction embedded systems.

EEE-3604: Microprocessor & Interfacing Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-3603

EEE-3004: Electrical & Electronic Design
3 hours/week Credit: 1.5

General Design Principles of Electrical Apparatus: Electric and magnetic circuits, Design and specification of Chokes, Transformers, Starters, Field regulators etc. Elements of design of rotating machines, Design and interpretation of electrical system layouts.

General Design Aspect of Electronic Devices: Filters, Amplifiers, Oscillators, Audio transformers, Power supply from both mains and batteries, Typical design problems.

CSE-3112: Programming Techniques & Numerical Analysis
3 hours/week Credit: 1.5

Organization of Computing Systems: Block diagram, Processors, Mother board, Memories, I/O devices, Peripheral cards, etc.; Principles of programming; Flow chart; The FORTRAN Language; Introduction to BASIC and PASCAL Languages; Numerical methods and computational algorithms; Application of computers in solving electrical & electronic engineering problems.

4th Year 1st Semester Courses

EEE-4201: Telecommunication-I
3 hours/week Credit: 3

Communication system, Analog and Digital Message

Signal, Classification of Signal, Signal representation by orthogonal signal set, Signal transmission through a linear system, Signal distortion over a communication channel, Signal energy and energy spectral density, Signal power and power spectral density.

Introduction to telephony – Telephone transmitter, Receiver and Subset, Manual and Automatic switching, trunking diagram, Traffic Engineering, AM-SC, SSB, DSB, QAM, VSB, Sampling theorem, Analog pulse Modulation – PAM, PWM and PPM, Multiplexing & Demultiplexing – FDM, TDM, Quantization of Analog signal, PCM, DPCM, DM, ADM, Behavior of Analog system in noise, Space & time division switch, Information theory, Channel capacity.

EEE-4202: Telecommunication-I Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-4201

EEE-4401: Electromagnetic Fields
3 hours/week Credit: 3

Electrostatics: Coulomb's law, Force, Electric field intensity, Electrical flux density, Gauss's Theorem with application, Electrostatic potential, Boundary conditions, Methods of images, Laplace's and Poisson's equations, Energy of an Electrostatic System, Conductor and Dielectrics.

Magnetostatics: Concept of magnetic field, Ampere's law, Biot-Savart's law, Vector magnetic potential, Energy of magneto-static system, Mechanical forces and Torques in electric and magnetic fields, Curvilinear co-ordinates, Rectangular, Cylindrical and Spherical co-ordinates, Solution to static field problems.

Graphical field mapping with applications, Solution to Laplace's equation, Rectangular, cylindrical and spherical harmonics with applications.

Maxwell's Equations: Their derivations, Continuity of charges, Concept of displacement current, Boundary conditions for time-varying systems, Potentials used with time-varying charges and currents. Retarded potentials, Maxwell's equation in different co-ordinate systems.

Relation between Circuit Theory and Field Theory: Circuit concepts and the derivations from the field equations, High frequency circuit concepts, Circuits relation on resistance, Skin effect and circuit impedance. Concept of good and perfect conductors and dielectrics, Current distribution in various types of conductors, Depth of Penetration, Internal impedance, Power loss, Calculation of inductance and capacitance.

Propagation and Reflection of electro-magnetic waves in unbounded media: Plane wave propagation, Polarization, Power flow and Poynting's theorem. Transmission line analogy, Reflection from conductor and conductor-dielectric boundaries, Dispersion in dielectrics, Liquids and solids, Plane wave propagation through the ionosphere, Introduction to radiation.

EEE-4501: Industrial Electronics
3 hours/week Credit: 3

Power Semiconductor switches and triggering devices: Diode, BJT, MOSFET,SCR, IGBT, GTO, TRAIC, UJT and DIAC. Power diodes: Diode characteristics, type of powers, Recovery time, diodes with various load. Rectifiers: Uncontrolled, controlled, single phase and three phase. SCR: Two-Transistor model of thyristor.

Converters: Single phase and three phase, Series and parallel resonant converters,Full converters, dual converters, cyclo-converters, DC choppers: choppers with various loads, Buck, Boost, Buck-Boost, Cuk regulators.

Inverters: Single and three phase inverters, PWM inverters, Voltage control of three phase Resonant pulse converter: L-type and M-type ZCS.

Power Supply Applications: Switched Mode Power Supply (SMPS), power conditioners and uninterruptible power supplies (UPSs),

Application to motor drives: DC motor drives, induction motor drives, synchronous motor drives, commuted inverter drives.

Industrial applications: Magnetic amplifiers, Industrial relay circuits, Applications of photo-electric devices, Electronic control of welding machines, Induction and Dielectric heating.

EEE-4502: Integrated Circuits and Industrial Electronics Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-4501

EEE-4701: Control System
3 hours/week Credit: 3

Introduction to linear dynamic system and their representation by differential equations and Laplace transform; Block diagram representation and transfer function, Routh's criterion for stability; Frequency response methods, Bode, Nyquist, Nichols Plot, etc.

Types of systems and system analysis in time domain; Root locus; Cascade compensation using root locus and frequency methods, Feedback Compensation. Introduction to state variables.

EEE-4702: Control System Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-4701

EEE-4901: Power System Analysis
3 hours/week Credit: 3

Representation of power system, Symmetrical components and their applications to power system analysis, Positive, Negative and Zero sequence quantities in networks and sequence phasor diagrams; Solution of power systems networks for symmetrical and unsymmetrical faults; Sequence network of systems and their solution; Sequence impedances and constants of machines. Transmission line sequence impedances; Load flow studies involving simple system, Use of digital computer for simple studies.

Power system stability involving two machine systems; Swing equation, Equal-area criterion of stability and its applications, Solution of swing equation, factors affecting transient stability.

EEE-4902: Power System Analysis Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-4901

EEE-4000: Project & Thesis
3 hours/week (For 4th year 1st semester)
3 hours/week (For 4th year 2nd semester) Credit : 3

Experimental and theoretical investigation of various topics in Electrical Machines, Power Station, Electronic Devices and Circuits, Power Electronics, Digital Circuits, Microprocessors, Communication etc. The students will be required to submit thesis/project report at the end of the work.

4th Year 2nd Semester Courses

EEE-4203: Telecommunication-II
3 hours/week Credit: 3

Digital binary modulation – ASK, PSK, DPSK, QPSK and M-array data communication system.

Introduction to wireless communication system, Cellular mobile communication, Equalization, Diversity and Channel coding, Speech coding.

Multiple Access Techniques for wireless communication – FDMA, TDMA, CDMA.

Introduction Optical fiber, light propagation, Dispersion & losses, Optical source & detector.

Introduction to ISDN, B-ISDN, LAN, MAN, WAN, Data communication and Multimedia communication Computer Networking, Introduction to Radar & Satellite communication.

EEE-4204: Telecommunication-II Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-4203

EEE-4703: Material Science
3 hours/week Credit: 3

Atoms and aggregates of atoms, Crystals, Waves in crystals, Schroedinger wave Equation, Quantum statistics, Conductivity theory, Collision theory and conductivity of materials, Conductors, Carrier transport theory, P.N. junction, Photo cells, Solar cells, Tunneling principles, Dielectric, Polar and non-polar dielectric, Langevin function, Clausius-Mossotti equation, Ferro-electric dielectric, AC dielectric constant.

Magnetic properties of materials, Magnetic moment, Domain Wall motion and coercive force in crystals, Polycrystalline and permanent magnetic materials, Magnetic resonance, Testing of magnetic materials, Super conductivity, Quantum electronics.

EEE-4903: Power Station
3 hours/week Credit: 3
EEE-4903: Power Station
3 hours/week Credit: 3

Thermal, Steam, Hydroelectric Burge Mounted, Nuclear Power plant load curves: Estimates of load, Load Curves, Study and analysis of load curves, Interpretation of load curves, Determination of actual demand and capacity of various components in a system, Plotting the expected load curve of a system. Use of the load curves, Load growth and Extrapolation of load curves. Selection of Plant, Effect of variable load on power plant design. Continuity of service requirements and its effect on plant design, Cost consideration, Equations of performance for plant equipment and electric service, Selection of Units, Standby units, Large and small units, Number and sizes of units. Plant location: Considerations for site selection for different types of plants, General considerations for different types of power plants: Large, medium and small, conventional and nuclear.

Introduction to non-conventional renewable energy conversion: Solar, wind and wave electric energy converters.

Economic marginal transmission cost, Graphical solution for location of different types of distribution, Rectangular distribution of loads, Economic conductor selection, and General consideration. The ideal conductor, Effect of any deviation from the ideal cross-section, Limits for size of underground cables. Selection of ideal supply voltage. Plant performance and operation characteristics, Performance characteristics, Efficiency, Heat rate, Incremental rate method, Station performance characteristics, Station incremental rate, Capacity scheduling, Base load and peak load, Load division between steam and hydro stations, Bus system, Importance of power control, Current limiting reactors, Different types of bus system layouts, Forces on buses in the case of short circuits, Nuclear power stations: Comparison with conventional generation methods, Chain reactions, Moderators, Classification of reactors, Special power reactors, Shielding.
Renewable Energy: Wind turbine generators, Construction & basic characteristics solar cells , Photovoltaic systems.
Fuel cells, Hybrid systems, Tidal energy, Biogas &,Biomass energy.

EEE-4101: Advanced Electrical Circuits
3 hours/week Credit: 3

Introductory Network Concepts: Definitions and symbols, Sign convention. Terminals and ports, Network functions, Complex frequency, Driving point and transfer functions, Representation by poles and zeros, Properties of network function, Properties of immittance function: positive real function, Hurwitz polynomials, Natural frequencies of network: plots of network function (Magnitude and phase plots, Bode and Nyquist diagrams); Minimum phase transfer function; Calculation of a network function from prescribed real part, Imaginary part, Magnitude of phase, Syntheses of two-elements kind one port: LC, RC and RL one port networks.

Two Port Networks: Classification and characterization of two ports, Two port parameters and natural frequencies, Interconnections of two ports; Common two port configurations; Scattering parameters, one end parameter; Iterative and image parameters; Filters: Type of filters, Frequency and impedance scaling; Image parameters. Filters; Design frequency transformation, Butterworth and Schebychev response, Insertion loss, Methods of network analysis, Block diagrams, Signals flow graphs, State variable techniques, Lattice networks, Bartletts bisection theorem, Synthesis of Lattice networks. Unbalancing of Lattice networks; Transmission characteristics, Signal distortions, Relationship between bandwidth and rise time, delay time and network functions.

EEE-4102: Advanced Electrical Circuits Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-4101

EEE-4205: Radar & Satellite Communication
3 hours/week Credit: 3

Radar: propagation of radio waves, ionospheric, tropospheric and ground wave propagation, radar principles and civil, military and weather applications, transmitters and radiators, receivers and indicators, electronic navigation system, LORAN and ILS, sonar and other underwater sound systems.

Satellite Communication Systems: Communication satellite subsystems, earth station, satellite link analysis and different types of multiple access techniques – TDMA, FDMA and CDMA.

EEE-4206: Radar & Satellite Communication Sessional
3/2 hours/week Credit: 0.75
Laboratory experiments based on EEE-4205

EEE-4403: Microwave Engineering
3 hours/week Credit: 3

H.F. transmission lines, Smith chart, Impedance matching and applications, E.M. Wave propagation, Reflection and refraction, Wave guides, Parallel plane, Rectangular, Coaxial wave guides.

Transit time effects; Velocity modulation, Space charge wave; Microwave tubes, Klystron, Magnetron, Travelling wave tube, Amplifier, Wave guide components, Cavity resonators, Antennas and radiation; Hertzian dipole; Long antenna analysis, Radiation patterns, Rhombic and slot antenna, Antenna arrays, Introduction to antenna array design.

EEE-4404: Microwave Engineering Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-4403

EEE-4705: VLSI Circuits
3 hours/week Credit: 3

VLSI Technology: Fabrication, Diffution of impurities & characteristics of ICs, Top- down design approach, technology trends & styles, threshold voltage, body effect, V-I equations characteristics, NMOS & CMOS inverters: dc & transient characteristics, Pass transistors & pass gates, CMOS layout & design rules, Complex CMOS gates, Resistance & capacitance estimation & modeling, Signal propagation delay, noise margin & power consumption.

CMOS Building Blocks: Logic structures, electrical & physical design of logic gates, clocking strategies, Adders, counters, multipliers & barrel shifters, data paths, memory structures, programmable logic arrays (PLAs) & field programmable gate arrays (FPGAs). Ripple: Carry adder circuites, Multipliers, Memories & SRAM, SRAM arrays, Dynamic RAM, Logic Arrays. CMOS clocking & system Design.

VLSI Testing: Objectives and Strategies.
VLSI Design: System Specifications using (HDL/ Verilog HDL) Structural Gate-level Modeling, Switch-level Modeling, Design Hierarchies, RTL Modeling.

EEE-4706: VLSI Circuits Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-4705

EEE-4905: Switch Gear & Protection
3 hours/week Credit: 3

Circuit Breakers: Speed of circuit breakers, Relays, Voltage rating (High, Medium, Low) of circuit breakers, Oil circuit breakers, Circuit breaker operating mechanisms and control systems, Arc extinction, Recovery voltage, Devices to aid Arc extinction in oil; Maintenance of oil circuit breakers, Air circuit breakers, Air blast circuit breakers. Rating of power circuit breakers and selection of circuit breakers, Testing of circuit breakers,

Protective Relays: General requirements, Relay operation principles, Construction of relays, Relay currents and voltages, use of Instrument Transformer for relays.

Problem of high speed relaying transmission lines, over current relays, Directional relays, Impedance relays, Reactance relays, Mho relays, Modified impedance relays, Zero Sequence and negative sequence relays, Balance current relaying of parallel line, Ground fault relaying, Pilot relaying principles, Carrier pilot relays, Operating characteristics of different types of relays, Apparatus protection, Circuits and relay setting, Generator and Motor protection, Transformer protection, Bus protection, Line protection.

EEE-4906: Switch Gear & Protection Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-4905

EEE-4907: High Voltage Engineering
3 hours/week Credit: 3

High voltage supplies; AC cascaded transformers, Tesla coils; DC value, Rectifier circuits, Cascaded rectifiers; Electrostatic Generators: Vander-Graff generators, Corona, Power loss calculation, Break down of solid, liquid and gaseous di-electric, Insulation tests. Standard specification.

Impulse generators, Impulse wave shapes, Mathematical analysis and design consideration of impulse generators, Triggering of impulse generators. Measurement of high voltage, Transmission line design based on direct strokes, Insulation Co-ordination, Lightning arresters and protector tubes.

EEE-4908: High Voltage Engineering Sessional
3/2 hours/week Credit: 0.75

Laboratory experiments based on EEE-4907