DEPT. OF ELECTRICAL AND ELECTRONIC ENGINEERING SONARGAON UNIVERSITY, DHAKA

FACULTY: SCIENCE & ENGINEERING

PROGRAM: B.Sc. in Electrical and Electronic Engineering

PROPOSED REVISED OBE SYLLABUS BY Departmental Syllabus Committee (ACUG) and recommended by 36th Academic Council for the approval of UGC

Duration (minimum): 4 -Year (12 Semesters)

Year/Semester wise distribution of courses:

SEMESTER-WISE SUMMARY OF COURSES TO BE OFFERED

1st Year 1st Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	EEE 1101	Electrical Circuits I	3.0	3.00	--	--	3.00
2.	EEE 1102	Electrical Circuits I Sessional	--	--	3.0	1.50	1.50
3.	Math 1101	Mathematics I	3.0	3.00	--	--	3.00
4.	Chem 1101	Engineering Chemistry	3.0	3.00	--	--	3.00
5.	Chem 1102	Engineering Chemistry Sessional	--	--	3.0	1.50	1.50
6.	Hum 1101	Developing English Language Skills	3.0	3.00	--	--	3.00
Total			**12.0**	**12.00**	**6.0**	**3.00**	**15.00**

Contact hours: 12.0 (T) + 6.0 (S) = 18.0 hrs./week
Total credits: 15.0

No. of theory courses : 4
No. of sessional courses: 2

N.B.: Any student of a 4-year diploma in engineering, willing to obtain exemption of the courses of 1st Year 1st Semester, will have to submit an application to the Head of the concerned department for approval.

1st Year 2nd Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	EEE 1201	Electrical Circuits II (Preq: EEE 1101)	3.0	3.00	--	--	3.00
2.	EEE 1202	Electrical Circuits II Sessional	--	--	3.0	1.50	1.50
3.	Math 1201	Mathematics II	3.0	3.00	--	--	3.00

4.	CE 1202	Engineering Drawing Sessional	--	--	3.0	1.50	1.50
5.	Phy 1201	Engineering Physics I	3.0	3.00	--	--	3.00
		Total	**9.0**	**9.00**	**6.0**	**3.00**	**12.00**

Contact hours: 9.0 (T) + 6.0 (S) = 15.0 hrs./week
Total credits: 12.00, Preq = Pre-requisite

No. of theory courses : 3
No. of sessional courses: 2

1st Year 3rd Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	CSE 1301	Computer Fundamentals and Web Technology	3.0	3.00	--	--	3.00
2.	CSE 1302	Computer Fundamentals and Web Technology Sessional	--	--	3.0	1.50	1.50
3.	Phy 1301	Engineering Physics II	3.0	3.00	--	--	3.00
4.	Phy 1302	Engineering Physics I & II Sessional	--	--	3.0	1.50	1.50
5.	Ban 1301	বাংলা ভাষা ও সাহিত্য (Bengali Language and Literature)	2.0	2.00	--	--	2.00
		Total	**8.0**	**8.00**	**6.0**	**3.00**	**11.00**

Contact hours: 8.0 (T) + 6.0 (S) = 14.0 hrs./week
Total credits: 11.00

No. of theory courses : 3
No. of sessional courses: 2

2nd Year 1st Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	EEE 2101	Electronics I	3.0	3.00	--	--	3.00
2.	EEE 2102	Electronics I Sessional	--	--	3.0	1.50	1.50
3.	EEE 2104	Electronic Circuit Simulation Sessional	--	--	3.0	1.50	1.50
4.	Ban 2101	বাংলাদেশের অভ্যুদয়ের ইতিহাস (History of Bangladesh Independence)	3.0	3.00	--	--	3.00
5.	ME 2101	Mechanical Engineering Fundamentals	3.0	3.00	--	--	3.00
		Total	**9.0**	**9.00**	**6.0**	**3.00**	**12.00**

Contact hours: 9.0 (T) + 6.0 (S) = 15.0 hrs./week
Total credits: 12.00, Preq = Pre-requisite

No. of theory courses : 3
No. of sessional courses: 2

2nd Year 2nd Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	Math 2201	Mathematics III	3.0	3.00	--	--	3.00
2.	CSE 2201	Computer Programming	3.0	3.00	--	--	3.00
3.	CSE 2202	Computer Programming Sessional	--	--	3.0	1.50	1.50
4.	EEE 2201	Electronics II (Preq: EEE 2101)	3.0	3.00	--	--	3.00
5.	EEE 2202	Electronics II Sessional	--	--	3.0	1.50	1.50
6.	EEE 2206	Numerical Methods Sessional	--	--	3.0	1.50	1.50
		Total	**9.0**	**9.00**	**9.0**	**4.50**	**13.50**

Contact hours: 9.0 (T) + 9.0 (S) = 18.0 hrs./week
Total credits: 13.50, Preq = Pre-requisite

No. of theory courses : 3
No. of sessional courses: 3

2nd Year 3rd Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	EEE 2303	Energy Conversion I	3.0	3.00	--	--	3.00
2.	EEE 2304	Energy Conversion I Sessional	--	--	3.0	1.50	1.50
3.	EEE 2307	Continuous Signals and Linear Systems	3.0	3.00	--	--	3.00
4.	Math 2301	Mathematics IV	3.0	3.00	--	--	3.00
5.	Hum 2301	Financial and Managerial Accounting	3.0	3.00	--	--	3.00
		Total	**12.0**	**12.00**	**3.0**	**1.50**	**13.50**

Contact hours: 12.0 (T) + 3.0 (S) = 15.0 hrs./week
Total credits: 13.50, Preq = Pre-requisite

No. of theory courses : 4
No. of sessional courses: 1

3rd Year 1st Semester

Sl.	Course Code	Course Title	Theory (T)		Sessional (S)		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	EEE 3101	Energy Conversion II (Preq: EEE 2203)	3.0	3.00	--	--	3.00
2.	EEE 3102	Energy Conversion II Sessional	--	--	3.0	1.50	1.50
3.	EEE 3106	Electrical Services Design Sessional	--	--	3.0	1.50	1.50
4.	EEE 3107	Measurement and Instrumentation	3.0	3.00	--	--	3.00
5.	EEE 3108	Measurement and Instrumentation Sessional	--	--	3.0	1.50	1.50
6.	Math 3101	Mathematics V	3.0	3.00	--	--	3.00
		Total	**9.0**	**9.00**	**9.0**	**4.50**	**13.50**

Contact hours: 9.0 (T) + 9.0 (S) = 18.0 hrs./week
Total credits: 13.50, Preq = Pre-requisite

No. of theory courses : 3
No. of sessional courses: 3

3rd Year 2nd Semester

Sl.	Course Type	Course Code	Theory (T)		Sessional (S)		Total credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	EEE 3203	Digital Electronics (Preq: EEE 2201)	3.00	3.00	--	--	3.00
2.	EEE 3204	Digital Electronics Sessional	--	--	3.0	1.50	1.50
3.	EEE 3205	Engineering Electromagnetics	3.00	3.00	--	--	3.00
4.	EEE 3201	Electronic Properties of Materials	3.00	3.00	--	--	3.00
5.	EEE 3203	Power System I	3.00	3.00	--	--	3.00
6.	EEE 3204	Power System I Sessional	--	--	3.0	1.50	1.50
		Total	**12.0**	**12.0**	**6.0**	**3.0**	**15.0**

Contact hours: 12.0 (T) + 6.0 (S) = 18.0 hrs./week
Total credits: 15.00

No. of theory courses : 4
No. of sessional courses: 2

3rd Year 3rd Semester

Sl.	Course Type	Course Code	Theory (T)		Sessional (S)		Total Credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	EEE 3305	Communication Theory (Preq: EEE 2207)	3.00	3.00	--	--	3.00
2.	EEE 3306	Communication Sessional	--	--	3.0	1.50	1.50
3.	EEE 3307	Digital Signal Processing I (Preq: EEE 2207)	3.00	3.00	--	--	3.00
4.	EEE 3308	Digital Signal Processing I Sessional	--	--	3.0	1.50	1.50
5.	Hum 3301	Introduction to Economics	3.00	3.00	--	--	3.00
		Total	**9.0**	**9.0**	**6.0**	**3.0**	**12.0**

Contact hours: 9.0 (T) + 6.0 (S) = 15.0 hrs./week
Total credits: 12.00

No. of theory courses : 3
No. of sessional courses: 2

4th Year 1st Semester

Sl.	Course Type	Course Code	Theory (T)		Sessional (S)		Total Credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	EEE 4101	Control System I	3.00	3.00	--	--	3.00
2.	EEE 4102	Control System I Sessional	--	--	3.0	1.50	1.50
3.	EEE 4103	Industrial and Power Electronics (Preq: EEE 2201)	3.00	3.00	--	--	3.00
4.	EEE 4104	Industrial and Power Electronics Sessional	--	--	3.0	1.50	1.50
5.	EEE 4107	Solid State Devices	3.00	3.00	--	--	3.00
6.	Hum 4101	Ethics and Environmental Protection	3.00	3.00	--	--	3.00
		Total	**12.0**	**12.0**	**6.0**	**3.0**	**15.0**

Contact hours: 12.0 (T) + 6.0 (S) = 18.0 hrs./week
Total credits: 15.00

No. of theory courses : 4
No. of sessional courses: 2

4th Year 2nd Semester

Sl.	Course Type	Course Code	Theory (T)		Sessional (S)		Total Credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	EEE 4000	Project & Thesis	--	--	6.0	3.00	*3.00
2.	EEE 4205	Microprocessor and Interfacing (Preq: EEE 3103)	3.00	3.00	--	--	3.00
3.	EEE 4206	Microprocessor and Interfacing Sessional	--	--	3.0	1.50	1.50
4.	EEE 4213	Power System Protection	3.00	3.00	--	--	3.00
5.	EEE 4211	Electrical Power Transmission & Distribution	3.00	3.00	--	--	3.00
6.	EEE 4219	Power Plant Engineering	3.00	3.00	--	--	3.00
		Total	**12.0**	**12.0**	**9.0**	**4.5**	**16.50**

Contact hours: 12.0 (T) + 9.0 (S) = 21.0 hrs./week
Total credits: 16.50

No. of theory courses : 4
No. of sessional courses: 2

* This credit in addition to 3 credits of 4th year 3rd semester for Project & Thesis, will be assessed at the end of 4th Year 3rd Semester.

4th Year 3rd Semester

Sl.	Course Type	Course Code	Theory (T)		Sessional (S)		Total Credits
			Contact hrs/week	Credits	Contact hrs/week	Credits	
1.	EEE 4000	Project & Thesis	--	--	6.0	3.00	3.00
2.	EEE 4337	VLSI Design	3.00	3.00	--	--	3.00
3.	EEE 4338	VLSI Design Sessional	--	--	3.0	1.50	1.50
4.	EEE 4314	Power System Protection Sessional	--	--	3.0	1.50	1.50
5.	EEE 4355	Telecommunication Engineering	3.00	3.00	--	--	3.00
		Total	**6.0**	**6.0**	**12.0**	**6.0**	**12.00**

Contact hours: 6.0 (T) + 12.0 (S) = 18.0 hrs./week
Total credits: 12.00

No. of theory courses : 2
No. of sessional courses: 3

OPTIONAL COURSES

Option I (Electric Power Group)

Sl.	Course Code	Course Title	Theory hrs/week	Sessional hrs/week	Credits
1.	EEE 4211	Electrical Power Transmission & Distribution	3.0	--	3.00
2.	EEE 4213	Power System Protection	3.0	--	3.00
3.	EEE 4215	Power System II	3.0	--	3.00
4.	EEE 4217	Energy Conversion III	3.0	--	3.00
5.	EEE 4219	Power Plant Engineering	3.0	–	3.00
6.	EEE 4221	High Voltage Engineering	3.0	–	3.00
7.	EEE 4223	Renewable Energy	3.0	–	3.00
8.	EEE 4225	Power System Operation and Control	3.0	–	3.00
9.	EEE 4214	Power System Protection Sessional	--	3.0	1.50
10.	EEE 4222	High Voltage Engineering Sessional	--	3.0	3.00

Option II (Electronics & Computer Group)

Sl.	Course Code	Course Title	Theory hrs/week	Sessional hrs/week	Credits
1.	EEE 4231	Optoelectronics	3.0	--	3.00
2.	EEE 4233	Analog Integrated Circuits	3.0	--	3.00
3.	EEE 4235	Processing and Fabrication Technology	3.0	--	3.00
4.	EEE 4237	VLSI Design	3.0	--	3.00
5.	EEE 4239	Semiconductor Device Theory	3.0	–	3.00
6.	EEE 4241	Computer Networks	3.0	--	3.00
7.	EEE 4243	Multimedia Communications	3.0	--	3.00
8.	EEE 4245	Microprocessor System Design	3.0	--	3.00
9.	EEE 4247	Real Time Computer System	3.0	--	3.00
10.	EEE 4238	VLSI Design Sessional	--	3.0	1.50
11.	EEE 4242	Computer Networks Sessional	--	3.0	1.50

Option III (Communication & Signal Processing Group)

Sl.	Course Code	Course Title	Theory hrs/week	Sessional hrs/week	Credits
1.	EEE 4251	Optical Fiber Communication	3.0	--	3.00
2.	EEE 4253	Mobile Cellular Communication	3.0	--	3.00
3.	EEE 4255	Telecommunication Engineering	3.0	--	3.00
4.	EEE 4257	Digital Communication	3.0	--	3.00
5.	EEE 4259	Microwave Engineering	3.0	–	3.00
6.	EEE 4258	Digital Communication Sessional	--	3.0	1.50

Year/Semester wise distribution of courses:

SEMESTER-WISE SUMMARY OF COURSES TO BE OFFER

Description of all courses of the program including the following information for each course:

EEE 1101 : Electrical circuits I

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of the program in the Electrical and Electronic Engineering. Students will learn about fundamental of the circuit and circuit theorems which are used in Electrical Engineering. Without this course they can't capable with the Electrical circuit II courses of Electrical and Electronic Engineering in future.

Course Content:

Circuit Variables and Elements: Voltage, current, power, energy, independent and dependent sources, resistance etc.
Basic Laws of Electrical Circuits: Ohm's law, Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL).
Simple Resistive Circuits: Series and parallel circuits, voltage and current division, Source transformation, wye- delta transformation
Techniques of Network Analysis: Nodal and Mesh analysis including super node and super mesh
Network Theorems: Thevenin's, Norton's and superposition theorems with applications in circuits having independent and dependent sources, maximum power transfer condition and reciprocity theorem
Energy Storage Elements: Inductors and capacitors, their characteristics, series-parallel combination of inductors and capacitors
Responses of RL and RC Circuits: Natural and step responses.
Magnetic Quantities and Variables: Flux, permeability and reluctance, magnetic field strength, magnetic potential, flux density, magnetization curve
Laws in magnetic circuits: Ohm's law and Ampere's circuital law. Series, parallel and series-parallel magnetic circuits.

EEE 1102 : Electrical circuits I Sessional

Credits: 1.5 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of the program in the Electrical and Electronic Engineering. Students will able to acquire skills how to connect the circuit which are used in Electrical power distribution system. Without this course they can't capable with the further core courses of Electrical and Electronic Engineering in future.

Course Content:

Sessional based on the theory of courses EEE 1101.

Math 1101 : Mathematics I

Credits: 3.0 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of the program. Students will learn about basic fundamental mathematics in this course. Without this course, they can't handle future mathematical and engineering courses. After undergoing this course, students should be able to verify the value of the limit of a function at a point using the definition series, matrix and Determinant, Interpret the derivative of a function at a point the as the instantaneous rate of change in the quantity modeled, and state its units, Calculate solution of any equations at a point numerically and algebraically using appropriate techniques including , use the fundamental theorem of calculus to evaluate integrals involving algebraic and transcendental functions, and also Calculate angle, plane, straight line, sphere.

Course Content:

Logic, Application of Logic, Theory of Numbers: Congruence, Factor Theorem, Fermat Theorem, Euler Theorem, Diophantine Geometry, Series: Geometric Series, Harmonic Series, Matrix, Determinant, System of Linear Equations, Coordinate Geometry: Pair of Straight lines, Plane, Sphere, three-dimensional Straight Lines.

Chem 1101 : Engineering Chemistry

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is a high-level chemistry course focuses on the underlying of atomic and molecular structure, chemical bonds and also on the method of phase rule and principles of thermochemistry behavior used to develop and deploy pattern recognition applications in the real world.

Course Content:

Atomic Structure; quantum numbers; Pauli's exclusion principle; 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 mono component system; Properties of dilute solutions; Thermochemistry; chemical kinetics; chemical equilibrium; Ionization of water and pH concept; Electrical properties of solution.

Chem 1102: Engineering Chemistry Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

Qualitative analysis in Chemistry gives details of the presence or nonappearance of different chemical components in an unknown sample, while quantitative analysis gives the measure of various chemical components present in a given sample. It demonstrates various elements, or gatherings of elements like functional groups, and so forth present in the sample. Thus, a subjective investigation of any sample can be utilized to decide if a specific component is available in a sample or not.

Course Content:

Sessional based on the theory of course Chem 1101.

Phy 1201 : Engineering Physics I

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is a high-level physics course focuses on the underlying of waves and oscillations, behavior of

optical phenomenon, dual nature of matter particle and also on the thermal properties of materials used to develop and deploy pattern recognition applications in the real world.

Course Content:

Waves and oscillations: Differential equation of simple harmonic oscillator, total energy and average energy, combination of simple harmonic oscillations, spring mass system, torsional pendulum; two body oscillation, reduced mass, damped oscillation, forced oscillation, resonance, progressive wave, power and intensity of wave, stationary wave, group and phase velocities.

Optics: Defects of images: spherical aberration, astigmatism, coma, distortion, curvature, chromatic aberration. Theories of light; Interference of light: Young's double slit experiment, displacement of fringes and its uses, Fresnel bi-prism, interference in thin films, Newton's rings, interferometers; Diffraction: Diffraction by single slit, diffraction from a circular aperture, resolving power of optical instruments, diffraction at double slit and N- slits, diffraction grating; polarization: Production and analysis of polarized light, Brewster's law, Malus law, polarization by double refraction, Nicol prism, optical activity, Polarimeters.

Thermal Physics: Heat and work- the first law of thermodynamics and its applications; Kinetic Theory of gases- Kinetic interpretation of temperature, specific heats of ideal gases, equipartition of energy, mean free path, Maxwell's distribution of molecular speeds, reversible and irreversible processes, Carnot's cycle, second law thermodynamics, Carnot's theorem, entropy, Thermodynamic functions, Maxwell relations, Clausius and Clapeyron equation.

Hum 1101 : Developing English Language skills

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

The course will give the skills our students need to take a stand- to research, evaluate information, think, justify, argue their own subject knowledge in English and share these with confidence. Furthermore, it is mandatorily required for them to progress in life both personally and professionally. This course is also required for them to compete in the global job market, increase their career skills and start to meet people around the world.

Course Content:

Grammar: Tense, right form of verbs, voice, article, appropriate preposition, subject-verb agreement, phrase and clause, conditional and sentence structure, frequently used word list and basic technical vocabulary

Developing Writing skills: Generating sentences, clarity and correctness of sentences, linking sentences to form paragraphs, reports, formal and informal letters, e-mail, chart/diagram writing (Important features of effective writing: prewriting, brainstorming, outlining; mechanics of writing/short composition, paragraph & essay mapping: structure & types, using signals and transitional words for the cohesion and coherence)

Developing Reading Skills: Strategies of reading-skimming, scanning, predicting, inferencing, analyzing and interpreting variety of texts, practicing comprehension from literary and nonliterary text. (Filling in with missing information/ clauses/ sentences, asking & answering informative questions, conversation/role play on and about academic and non-academic affairs)

Developing Speaking Skills: Presentation Skills: Parts of presentation, planning, preparing, giving presentation, individual and collaborative presentations.

CE 1102: Engineering Drawing Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

It is very useful for designing and drawing schematics for sample blocks, orthographic and

isometric representations, dimensioning etc. which will be helpful during project works in later semesters as well as professionally.

Course Content:

Introduction- lettering, numbering and heading; instrument and their use; sectional views and isometric views of solid geometrical figures. Plan, elevation and section of multistoried building; building services drawings; detailed drawing of Course Curriculum of the Department of Electrical and Electronic Engineering lattice towers.

EEE 1201 : Electrical Circuit II

Credits: 3.00 **Contact hours: 3.0 hrs./week**

Rationale of the Course:

This is the basic course of the program in the Electrical and Electronic Engineering. Students will learn about the characteristics and connection of the different AC circuit which are used in Electrical Engineering. Without this
course they can't capable with the further core courses of Electrical and Electronic Engineering in future.

Course Content:

Alternating Current Basics: Instantaneous current, voltage, power, effective current and voltage, average power, phasors and complex quantities, impedance, real and reactive power, power factor.

Analysis of Single-Phase AC Circuits: Series and parallel RL, RC and RLC circuits, Resonance in AC circuits, Series and parallel resonance. Q of a circuit, nodal and mesh analysis, application of network theorems in AC circuits. Circuits with non-sinusoidal excitations, transients in AC circuits, passive filters. Magnetically couple circuits.

Analysis of Poly Phase Circuits: Poly phase supply, 3-phase conditions, balanced and unbalanced circuits, power calculation.

EEE 1202 : Electrical Circuits II Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of the program in the Electrical and Electronic Engineering. Students will learn about connection of the AC circuit which are used in Electrical power distribution system. Without this course they can't capable with the further core courses of Electrical and Electronic Engineering in future.

Course Content:

Sessional based on Electrical Circuits II (**EEE 1201**).

Math 1201: Mathematics II

Credits: 3.00 **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This entry-level Mathematics course for higher study in Computer Science and Engineering is designed to teach students the basic concepts of differential calculus and integral calculus.

Course Content:

Differential Calculus & Integral Calculus:

Limits, continuity and differentiability, Successive differentiation of various types of functions, Leibnitz's theorem, Rolle's theorem, Mean value theorem, Taylor's and Maclaurin's theorems in finite and infinite forms, Lagrange's form of remainders, Cauchy's form of remainders, Expansion of functions, evaluation of indeterminate forms of L' Hospital's rule, Partial differentiation, Euler's theorem, Tangent and normal, Subtangent and subnormal in cartesian and polar co-ordinates, Determination of maximum and minimum values of functions, Curvature. Asymptotes, Curve tracing.

Integration by the method of substitution, Standard integrals, Integration by successive reduction, Definite integrals, its properties and use in summing series, Walli's formulae, Improper integrals, Beta function, and Gamma function, Area under a plane curve and are an of a region enclosed by two curves in cartesian and polar co-ordinates, Volumes and surface areas of solids of revolution.

CSE 1201: Computer Fundamentals and Web Technology

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

As digitization is touching our lives in almost all spheres' computers are inevitable. Computers are present everywhere from schools to colleges to banks to post offices to professional world to personal life. Education is fully dependent on the rigorous use of computers. This course has been designed for newly admitted students with great enthusiasm to learn and apply their knowledge in the long run. This is the basic course of the program. Students will learn about basic computer components in this course. Without this course they can't handle the future course where they will learn to design the microprocessor and other electronic devices.

Course Content:

Introduction to computer systems. Historical evolution, Classification etc. Applications of computers. Number Systems, Binary arithmetic, Input/output devices: Hard-copy devices: Impact printers -DMPs, Daisy-wheel printers, Line-printers. Non-impact printers -Inkjet, Laser, Thermal, LED; Plotters. Soft-copy devices: Monitors, video-standards (VGA and SVGA). Memory & Mass Storage Devices, Concepts of Virtual and Cache memory. Software Concepts: Introduction, types of software -System & Application software etc., BIOS; System utilities -Editor, Loader, Linker, File Manager. Concept of GUI, GUI standards. Introduction to Algorithm & Flowcharts, Advantages & Disadvantages. MS-OFFICE:MS-Word, MS-PowerPoint, MS-Excel, HTML, CSS3, JavaScript, Dynamic Web Applications, Server-Side Scripting using PHP, MySQL DBMS.

CSE 1202: Computer Fundamentals and Web Technology Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Over the past few decades, technology has been changing at an ever-increasing rate. The development of different new software, improving the performance of existing software, and effectively using that software will only accelerate that rate. Therefore, it is required to acquaint the students with the practical, hands-on experience with the theoretical concepts and methodologies presented in CSE1201.

Course Content:

Sessional based on Computer Fundamental and Web Technology (CSE1201).

Phy 1301 : Engineering Physics II

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is a high-level physics course focuses on the underlying of electricity and magnetism, relativity, quantum

mechanical system and also on the method of principles of linear and angular momentum behavior used to develop and deploy pattern recognition applications in the real world.

Course Content:

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 equation

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 1302: Engineering Physics I & II Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This is a high-level physics course focuses on the underlying of method of oscillation, experimental knowledge about optical behavior, circuit design and analysis and also on the method of principles of conservation of energy used to develop and deploy pattern recognition applications in the real world.

Course Content:

Sessional based on the theory of courses Phy 1101 and Phy 1201.

Ban 1301 : বাংলা ভাষা ও সাহিত্য (Bengali Language and Literature)
(Credit increased from 2 to 3)

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is a high-level Bengali Language and Literature Course for all classes of student. Because as a Bengali Student it is necessary to acquire knowledge about Bengali Language and Literature. Not only that, Bengali Language and Literature occupy one of the most important places in the world. As a result, we have to have an idea about Bengali Language and Literature.

Course Content:

প্রথম খণ্ড-ভাষা

১। বাংলা ধ্বনি / বাগ ধ্বনি (Phone/Speech Sound); বর্ণ (Letter); অক্ষর (Syllable)
২। বাংলা ধ্বনির উচ্চারণ স্থান ও রীতি (Point of Articulation and Manner of Ariticulation)
৩। বাংলা উচ্চারণ-প্রমিত (Standard); আঞ্চলিক(Dialectal); বৈচিত্র্য (Variation)
৪। অপিনিহিত, অভিশ্রুতি, স্বরসঙ্গতি, শ্বাসাঘাত(Stress Accent): স্বরভঙ্গি/ স্বরতরঙ্গ (Intonation)
৫। বাংলা ও ইংরেজির তুলনা
৬। বাংলা লিখন দক্ষতা; সাধু/চলিত রীতি; বিরাম চিহ্ন প্রয়োগ। প্রমিত বাংলা বানানের নিয়ম (বাংলা একাডেমি)
৭। ব্যবহারিক বাংলা সংক্ষিপ্ত আলোচনা

একুশে ফেব্রুয়ারি মুক্তিযুদ্ধ, বাংলাভাষা, বিশ্বায়ন বাংলায় উৎসব, ষড়ঋতু, বাংলা নববর্ষ, আধুনিক তথ্য-প্রযুক্তি, বাংলার লোক সংস্কৃতি, মানবতা ও নৈতিকতা।

দ্বিতীয় খণ্ড-সাহিত্য

কবিতা

১। আবদুল হাকিম -দরনামা
২। মাইকেল মধুসূদন দত্ত – বঙ্গভাষা
৩। লালন সাই- খাঁচার ভেতর অচিন পাখি
৪। রবীন্দ্রনাথ ঠাকুর - নির্ঝরের সপ্নভঙ্গ
৫। কাজী নজরুল ইসলাম - আজ সৃষ্টি সুখের উল্লাসে
৬। জীবনানন্দ দাশ - রূপসী বাংলা
৭। হাসান হাফিজুর রহমান - অমর একুশে
৮। আলাউদ্দিন আল আজাদ - স্মৃতি স্তম্ভ
৯। শামসুর রাহমান- তোমাকে পাওয়ার জন্য হে স্বাধীনতা
১০। সৈয়দ শামসুল হক- পরিচয়

প্রবন্ধ

১। বঙ্কিম চন্দ্র চট্টোপাধ্যায়- বাঙ্গালা ভাষা
২। রবীন্দ্রনাথ ঠাকুর - সভ্যতার সংকট
৩। হরপ্রসাদ শাস্ত্রী – তৈল
৪। প্রমথ চৌধুরী - যৌবনে দাও রাজটিকা
৫। কাজী নজরুল ইসলাম - বর্তমান বিশ্বসাহিত্য
৬। মুহম্মদ আবদুল হাই- আমাদের বাংলা উচ্চারণ
৭। কবীর চৌধুরী - আমাদের আত্নপরিচয়

ছোটগল্প /অন্যান্য রচনা

১। রবীন্দ্রনাথ ঠাকুর - পোস্ট মাস্টার
২। রোকেয়া সাখাওয়াত হোসেন - অবরোধ বাসিনী
৩। বিভূতি-ভূষণ বন্দোপাধ্যায়- পুঁইমাচা
৪। সৈয়দ ওয়ালীউল্লাহ – নয়নচারা
৫। জাহানারা ইমাম- একাত্তরের দিনগুলি
৬। হাসান আজিজুল হক- ঘরগেরস্তি
৭। আখতারুজ্জামান ইলিয়াস – অপঘাত

নাটক

১। কবর- মুনির চৌধুরী

EEE 2101 : Electronics I

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of the program. Electronic devices have become an important part of our day-to-day life. Students will learn about basic electronic devices in this course as we live in a generation that uses electronics and technologies where robots and artificial intelligence are capable of doing human work with more ease and efficiency.

Course Content:

P-N Junction as a Circuit Element: Intrinsic and extrinsic semiconductors, operational principle of p-n junction diode, contact potential, biasing of diode, current-voltage characteristics of a diode, simplified DC and AC diode models, dynamic resistance and capacitance.
Diode Circuits: Half wave and full wave rectifiers, rectifiers with filter capacitor, characteristics of a Zener diode, Zener shunt regulator, clamping and clipping circuits.
Bipolar Junction Transistor (BJT): Current components, BJT characteristics and regions of operation, BJT as an amplifier, biasing the BJT for discrete circuits, small signal equivalent circuit models, BJT as a switch.
BJT Amplifier Circuits: Voltage and current gain, input output impedance of common base, common emitter and common collector amplifier circuits, multistage amplifiers.
Metal Oxide Semiconductor Field Effect Transistor (MOSFET): Structure and physical operation of an enhancement MOSFET, threshold voltage, body effect, current-voltage characteristics of an enhancement MOSFET, biasing discrete and integrated amplifier circuits, single–stage MOS amplifiers, MOSFET as a switch. Junction Field-Effect-Transistor (JFFET): Structure and physical operation of JFET, transistor characteristics, pinch-off voltage.

EEE 2102: Electronics I Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Students will learn about a comprehensive introduction to the electronic properties of semiconductors, technology, the theories and practices of the most important electronic devices, and their impacts on the performance of integrated circuits. This Course also provides a practical perspective on electronic devices.

Course Content:

Sessional based on the theory of course Electronics I (EEE2101)

EEE 2104 : Electronic Circuit Simulation Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This course provides the student with the fundamental skills to identify and utilize various electronic components and devices with their specifications to implement and verify the outputs of hardware circuits.

Course Content:

Sessional based on the theory of course EEE 2101.

ME 2101 : Mechanical Engineering Fundamentals

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Mechanical engineering plays a critical role in manufactured technologies, from cars to airplanes to refrigerators. In this course the students will learn the very basics of mechanical engineering. The basic courses are different sources of energy, boilers, different types of power plant cycles, basics of refrigeration and air conditioning, different types of turbine and basics of conduction and convection.

Course Content:

Introduction to sources of energy: Steam generating units with accessories and mountings. Power Plant Cycles: Ideal Cycles (Otto cycle, Diesel Cycle, Gas turbine cycle and Brayton cycle) Refrigeration and air conditioning: applications; refrigerants, different refrigeration methods. Fluid machinery: impulse and reaction turbines; centrifugal pumps, fans, blowers and compressors. Basics of conduction and convection: critical thickness of insulation.

Math 2201 : Mathematics III

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of the program. Students will learn about basic Calculus in this course. Without this course, they can't handle future mathematical and engineering courses. After undergoing this course, students should be able to verify the value order and degree of differential equations at a point using the definition of linear and nonlinear differential equations. Calculate homogeneous and nonhomogeneous differential equations.

Course Content:

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, Fresenius 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.

CSE 2201: Computer Programming

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

The computer programming course introduces the fundamental concepts and mechanisms of computer programming skills. It helps to develop baseline programming knowledge to design and develop algorithms to solve real world problems. This Course begins with introductory concepts of structured programming language and then covers other important topics such as Control Statements, Loop, Array, String, Function, Pointer, Structure, File I/O, Storage Classes, Error Handling, Dynamic Memory Allocation, Command Line Parameters and also some basic topics of Object-Oriented Programming like class, object, polymorphism etc.

Course Content:

Introduction to digital computers: Programming languages, algorithms and flow charts
Structured Programming using C: Variables and constants, operators, expressions, control statements, functions, arrays, pointers, structure unions, user defined data types, input-output and files
Object-oriented Programming using C++: Introduction, classes and objects, polymorphism, function and

operator overloading, inheritance

CSE 2202: Computer Programming Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

The computer programming Lab Work course is designed to introduce the fundamental concepts and mechanisms of computer programming skills using C. It helps to develop baseline programming knowledge to design and develop algorithms to solve real world problems practically. This sessional course begins with practicing introductory concepts of structured programming and then covers other important topics such as Control

Statements, Loop, Array, String, Function, Pointer, Structure, File, Error Handling and library functions als basic concept of OOP like class, object, encapsulation, polymorphism etc using C++.

Course Content:

Sessional based on the theory of course CSE 2101.

Ban 2101 : বাংলাদেশের অভ্যুদয়ের ইতিহাস (History of Bangladesh Independence)

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This course has been designed to help the students in obtaining comprehensive idea about the history, culture and heritage of Bangladesh. It will introduce students with economy, society, politics, diplomacy and foreign policy of Bangladesh. Students will learn about the challenges and potentials of Bangladesh in shaping its peaceful and sustainable future. It will also assist the students in assessing roles and contribution of Bangladesh in the regional and international bodies which are dedicated to establish world peace.

Course Content:

Ancient period and Muslim period of Bengal, British period, Pakistan period: an overview (1952-1971),The problem of national integration under ayub regime, Elite in crisis during Pakistan rule, nation-building in the new

state, The ideals and philosophy of constitution- making of Bangladesh, Study on the coup and assassination of mujib, Philosophy and fundamental changes of zia regime, Constitutional amendments of Bangladesh, Corruption and good governance in Bangladesh, Issues of governance of Bangladesh, Bangladesh economy, Ideas on political and ethnic conflict in Bangladesh, Geographical setting of Bangladesh, environmental challenges of Bangladesh, Bangladesh foreign policy: realities and challenges, Foreign policy-decision-making process in Bangladesh, Bangladesh-soviet union relations.

EEE 2201: Electronics II

Credits: 3.0 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of the program where students will learn about the basic and advanced levels of electronics, especially operational amplifiers (Op-Amp) in this course. Without this course, they might face a lot of problems in the future course where they will learn to design the Op-Amp related projects and other electronic devices.

Course Content:

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.
Operational Amplifiers (Op-Amp): Properties of ideal OP-Amps, non-inverting and inverting amplifiers, inverting integrators, differentiator, weighted summer and other applications of Op-Amp circuits, Electronic Analog computation Schmitt trigger, Differential Amp, Differential and Common gain, comparator, effects of finite open loop gain and bandwidth on circuit performance, logic operation of Op-Amp, DC imperfections. DC analysis, small-signal analysis of different stages, gain and frequency response of 741 OP-Amp.
Feedback Amplifier: Properties, basic topologies, feedback amplifiers with different topologies, stability, frequency compensation.
Active Filters: Different types of filters and specifications, transfer functions, realization of first and second order low, high and band pass filters using OP-Amps.
Stability and Oscillators: Sinusoidal oscillators, Phase shift oscillator, resonant circuit oscillator, general form of oscillator circuit, wein-bridge oscillator, crystal oscillators.
Power Amplifiers: Classification of output stages, Class A, B and AB output stage, Class C and Class D.

EEE 2202: Electronics II Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic sessional course of the program where students will learn about the fundamental electronic circuit construction, especially operational amplifiers (Op-Amp). Without this course, they might face various challenges in the future sessional course where they will learn to design the Op-Amp related electronic devices.

Course Content:

Sessional based on the theory of courses EEE 2201.

EEE 2303 : Energy Conversion I

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of electrical machine. Students will learn about basic theories of energy conversion. This course will be helpful for students when they will design electrical machines.

Course Content:

Transformer: Ideal transformer- transformation ratio, no-load and load vector diagrams; actual transformer- equivalent circuit, regulation, short circuit and open circuit tests, Three phase transformer and its V- connection; Vector group of three phase transformers.
Three Phase Induction Motor: Rotating magnetic field, equivalent circuit, vector diagram, torque speed characteristics, effect of changing rotor resistance and reactance on torque-speed curves, motor torque and developed rotor power, no-load test, blocked rotor test, starting and braking and speed control.
Single Phase Induction Motor: Theory of operation, equivalent circuit and starting

EEE 2304 : Energy Conversion I Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the sessional course of electrical machine. Students will learn about how to relate theoretical knowledge to practical work. With this sessional course they will learn to design electrical machine.

Course Content:

Sessional based on the theory of courses EEE 2303.

EEE 2206: Numerical Methods Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Students will learn about application of software technology in this course. Without this course they won't be able to learn to solve numerical problems using software technology and get along with computer-based system.

Course Content:

Introduction: Motivation and errors in numerical techniques. Taylor series. Finite difference calculus: Forward, backward, divided, and central difference and difference of a polynomial. Interpolation: Newton's formula, Lagrange, spline, Chebyshev and inverse. Extrapolation. Nonlinear equations: Iteration, bisection, false position, Raphson, Secant and Muller's methods. Simultaneous linear algebraic equations: Cramer's rule, inversion of matrices, Gauss elimination, Gauss-Jordan method, factorization and Gauss-Siedel iteration methods. Curve Fitting: Linear and polynomial regression, fitting power, exponential and trigonometric functions. Ordinary differential equations: Initial value problem, Taylor's series method, Picard's method of successive approximation, Euler's method and Runge Kutta method. Boundary value problems. Numerical integration: general quadrature formula, trapezoidal rule and Simpson's rule. Numerical differentiation.

EEE 2307: Continuous Signals and Linear Systems

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of the program. Students will learn about basics of signals and systems in this course. Without this course they won't be able to handle the future course where they will learn to analyze the processing of signals and their application in different fields.

Course Content:

Classification of Signal and Systems: Signals- classification, basic operation on signals, elementary signals, representation of signal using impulse function; systems classification.

Properties of Linear Time Invariant (LTI) Systems: Linearity, causality, time invariance, memory, stability, invertibility.

Time Domain Analysis of LTI Systems: Differential equations- system representation, order of the system, solution techniques, zero state and zero input response, System properties: impulse response – convolution integral, determination of system properties; state variable- basic concept, static equation and time domain solution. Frequency Domain

Analysis of LTI Systems: Fourier series- properties, harmonic representation, system response, frequency response of LTI systems; Fourier transformation- properties, system transfer function, system response and

distortion less systems.

Applications of Time and Frequency Domain Analysis: Solution of analog electrical and mechanical systems, amplitude modulation and demodulation, time-division and frequency division multiplexing. Laplace Transformation: Properties, inverse transform, solution of system equations, system transfer function, system stability and frequency response and application.

Analogous Systems: Electrical, mechanical and electro-mechanical systems.

Math 2301: Mathematics IV

Credits: 3.00 **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This is an entry-level Mathematics course for higher study in Electrical and Electronic Engineering designed to teach students the basic concepts of ordinary and partial differential equations.

Course Content:

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 2301 : Financial and Managerial Accounting

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is a high-level accounting course focuses on the underlying of objectives and importance of accounting, costs and management Accounting and also on the industrial management used to develop and deploy pattern recognition applications in the real world.

Course Content:

Financial Accounting: Objectives and importance of accounting, branches of accounting, accounting as an information system, computerized system and applications in accounting. Recording system: Double entry mechanism, accounts and their classification, accounting equation, accounting cycle journal, ledger, trial balance. Preparation of financial statements considering adjusting and closing entries. Accounting concepts and conventions. Financial statements analysis and interpretation: ration analysis- tests for profitability, liquidity, solvency and overall measure.

Costs and Management Accounting: Cost concept and classification. Segregation and mixed cost. Overhead cost: meaning and classification, allocation of overhead cost, overhead recovery method. Job order costing: preparation of job cost sheet and quotation price. Inventory valuation: absorption costing and variable costing technique. Cost volume profit analysis: meaning, breakeven analysis, contribution margin approach, sensitivity analysis, short-term investment decisions: Relevant and differential cost analysis; Linear programming. Long-term investment decisions: Capital budgeting, various techniques of evaluation of capital investment, investment appraisal under uncertainty, risk management, capital rationing. Concept of working capital, need for working capital, management of cash, stock debtors.

Industrial Management: Evolution, management function, organization and environment. Operational Management: Production planning, types of production systems, forecasting, ABC analysis, inventory control, work study. Organization: Theory and structure, coordination, span of control, authority delegation, groups, committee and task force, manpower planning. Personnel Management: Scope, importance, need hierarchy, motivation, job redesign, leadership, participative management, training, performance appraisal, wages & incentives, informal groups, organizational change and conflict. Cost and Financial Management: Elements of costs of products, depreciation, break-even analysis, investment analysis, benefit cost analysis. Marketing Management: Concepts, strategy, sales promotion, patent laws. Technology Management: Management of innovation and
changes, technology life cycle. Case studies.

EEE 3101: Energy Conversion II

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of electrical machine. Students will learn about basic theories of energy conversion. This course will be helpful for students when they will design electrical machines.

Course Content:

Synchronous Generator: Windings, excitation systems, equivalent circuit, vector diagrams at different loads, factors affecting voltage regulation, synchronous impedance, synchronous impedance methods of predicting voltage regulation and its limitations. Parallel operation: necessary conditions, synchronizing, circulating current and vector diagram.

Synchronous Motor: Operation, effect of loading under different excitation condition, effect of changing excitation, V-curves and starting.

DC Generators: Types, no-load voltage characteristics, buildup of a self-excited shunt generator, critical field resistance, load-voltage characteristic, effect of speed on no-load and load characteristics and voltage regulation.

DC Motor: Torque, counter emf, speed, torque-speed characteristics, starting and speed regulation. Introduction to wind turbine generators. Construction and basic characteristics of solar cells.

EEE 3102: Energy Conversion II Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the sessional course of electrical machine. Students will learn about how to relate theoretical knowledge to practical work. With this sessional course they will learn to design electrical machine.

Course Content:

Sessional based on the theory of courses EEE 3101.

EEE 3207 : Digital Electronics

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Digital electronics are those electronics systems that use a digital signal instead of an analog signal. Students will learn about the most common representation of Boolean algebra and are the basis of all digital circuits for computers, mobile phones, and numerous other consumer products in this course. Without this course they can't handle the future course where they will learn to design the microprocessor and other electronic devices.

Course Content:

Analysis and Synthesis of Digital Logic Circuits: Number system and codes. Boolean algebra, De Morgan's law, logic gates and truth tables, combinational logic design, minimization techniques, implementation of basic static logic gates in CMOS and BiCMOS. Arithmetic and data handling logic circuits, decoders and encoders, multiplexers and combinational circuit design.
Programmable Logic Devices: Logic arrays, Field Programmable Logic Arrays and Programmable Read Only Memory.
Sequential Circuits: Different types of latches, flip-flops and their design using ASM approach, timing analysis, timing analysis and power optimization of sequential circuits.
Modular sequential logic circuit design: Shift registers, counters and their applications.

EEE 3208: Digital Electronics Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This laboratory will enable the students to learn the basic concepts and techniques in digital electronic circuits and systems. Without this course they can't handle the future course where they will learn to design the Industrial and power electronics devices, microprocessor and other electronic devices.

Course Content:

Sessional based on the theory of course Digital Electronics (EEE 3207)

EEE 3205 : Engineering Electromagnetics

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Electromagnetics is the fundamental physics of electrical engineering, and describes how electric charges and currents create electric and magnetic fields. Students who well understand the basis of electromagnetic phenomena are well-equipped to attack a broad spectrum of important problems to advance electrical and computer engineering and to directly benefit our society.

Course Content:

Review of Vector Analysis: Coordinate Systems, Vector algebra, gradient, divergence and curl.

Static Electric Field: Postulates of electrostatics, Coulomb's law for discrete and continuously distributed charges, force, field intensity, flux density, Gauss's law and its applications, electric potential due to charge distribution, conductors and dielectrics in static electric field, boundary conditions; capacitance- electrostatic energy and forces, energy in terms of field equations, capacitance calculations of different geometries; boundary value problems- Poisson's and Laplace's equations in different co-ordinate systems, method of images, graphical field mapping.

Static Magnetic Field: Postulates of magnetostatics, Biot-Savart's law, Ampere's law and applications, vector magnetic potential, magnetic dipole, magnetization, magnetic field intensity, permeability, boundary conditions for magnetic field, magnetic energy, magnetic forces, torque and inductance of different geometries.

Time Varying Fields and Maxwell's Equations: Faradays law of electromagnetic induction, Maxwell's equations differential and integral forms, boundary conditions, potential functions; time harmonic fields and Poynting theorem, depth of penetration, internal impedance, and power loss.

Plane Electromagnetic Wave: Plane wave in lossless media- Doppler effect, transverse electromagnetic wave, Polarization of plane wave; plane wave in lossy media- low loss dielectrics, good conductors; transmission line analogy- reflection coefficient, transmission coefficient, characteristics impedance, standing wave ratio, group velocity, instantaneous and average power densities, normal and oblique incidence of plane waves at plane boundaries for different polarization.

EEE 3106: Electrical Service Design

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is a sessional course of service designing. Students will learn about basic computer components in this course. With this course they will learn to design various systems.

Course Content:

Wiring system design, drafting, estimation; Design for illumination and lighting; Electrical installation system design: substation, BBT and protection, air conditioning, heating and lifts; Design of security system including CCTV, fire alarm, smoke detector, burglar alarm and sprinkler system; A design problem on a multistoried building using AutoCAD.

EEE 3107 : Measurement and Instrumentation

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Accurate measurement is an essential part of the smooth operation of any process. When working with heavy and dangerous equipment, getting accurate measurements can be a very difficult process. This is why instrumentation is so important. Because of the number of processes involved in modern machines, accurate instrumentation is needed to ensure that everything is operating properly.

Course Content:

Introduction: Applications, functional elements of a measurement system and classification of instruments.
Measurement of electrical quantities: Current and voltage, power and energy measurement. Current and potential transformer.
Transducers: mechanical, electrical and optical.
Measurement of non-electrical quantities: Temperature, pressure, flow, level, strain, force and torque.
Basic elements of DC and AC signal conditioning: Instrumentation amplifier, noise and source of noise, noise elimination compensation, function generation and linearization, A/D and D/A converters, sample and hold circuits.
Data Transmission and Telemetry: Methods of data transmission, DC/AC telemetry system and digital data transmission. Recording and display devices. Data acquisition system and microprocessor applications in instrumentation.

EEE 3108 : Measurement and Instrumentation Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Measurement is fundamental to control, to improvement and to verification. This course encompasses the measurement of various electrical and non-electrical parameters and designing suitable instruments for these measurements.

Course Content:

Sessional based on the theory of course EEE 3107.

Math 3101: Mathematics V

Credits: 3.00 **Contact hours: 3.0 hrs. /week.**

Rationale of the Course:

This is an entry level Mathematics course for higher study in Electrical and Electronic Engineering designed to teach students the basic concepts of Linear Algebra and Statistics.

Course Content:

Linear Algebra: Introduction to systems of linear equations, Gaussian elimination, Definition of matrices, Algebra of matrices, Transpose of a matrix and inverse of a matrix, Factorization, Determinants, Quadratic forms, Matrix polynomials, Euclidean n-space, Linear transformation from IRn to IRm, Properties of Linear transformation from IRn to IRm, Real vector spaces and subspaces. Basis and dimension, Rank and nullity, Inner product spaces, Gram-Schmidt process and QR-decomposition, Eigenvalues and eigenvectors, Diagonalization, Linear transformations, Kernel and Range, Application of linear algebra to electric networks.

Statistics: Introduction, Frequency distribution, Mean, median, mode. Standard deviation, moments, skewness and kurtosis, Sets and Probability, Random variable and its probability distributions, Treatment of grouped sampled data, Some discrete probability distributions, Normal distribution, Binomial, poison and negative binomial, Sampling theory, Estimation theory, Tests of hypotheses, Regression and correlation, Analysis of variance.

EEE 3201 : Electronic Properties of Materials

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is a fundamental course of electrical and electronic engineering. Students will learn different properties and characteristics of Electrical materials.

Course Content:

Atoms and Aggregates of Atoms: Bohr atomic model, shell model.
Bonding and Types of Solids: Primary bonding, secondary bonding, mixed bonding.
Crystal Structures: Types of crystals, lattice and basis, Bravais lattice and Miller indices.
Classical Theory of Electrical and Thermal Conduction: Scattering, mobility and resistivity, temperature dependence of metal resistivity, Matthiessen's rule, Hall effect and thermal conductivity.
Modern Theory of Metals: Determination of Fermi energy and average energy of electrons, classical and quantum mechanical calculation of specific heat.
Dielectric Properties of Materials: Polar and nonpolar dielectrics, dielectric constant, polarization electronic, ionic and orientational; internal field, Clausius-Mosotti equation, spontaneous polarization, frequency dependency of dielectric constant, dielectric loss, piezoelectricity, ferroelectricity.
Magnetic Properties of Materials: Magnetic moment, magnetization and relative permeability, different types of magnetic materials, origin of ferromagnetism and magnetic domains, coercive force, polycrystalline and permanent magnetic materials, introduction to superconductivity: Zero resistance and Meissner effect, Type I and Type II superconductors and critical current density.
Band Theory of Solids: Band theory from molecular orbital, Bloch theorem, Kronig-Penny model, effective mass, density of states.
Quantum Mechanics: Wave nature of electrons, Schrodinger's equation, one dimensional quantum problems-infinite quantum well, potential step and potential barrier; Heisenberg's uncertainty principle and quantum box.
Carrier Statistics: Maxwell-Boltzmann and Fermi-Dirac distributions, Fermi energy.

EEE 3203 : Power System I

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This course is to produce competent electrical engineering graduates with a strong foundation design, analytics and problem-solving skills for successful professional careers in industry, research and public service. The students will be able to analyze the performance and stability of power systems, and will be able to learn the effective use of next-generation power devices for solving problems.

Course Content:

Network representation: Single line and reactance diagram of power system and per unit.
Line representation: equivalent circuit of short, medium and long lines. Load flow: Gauss- Seidel and Newton Raphson Methods.
Power flow control: Tap changing transformer, phase shifting, booster and regulating transformer and shunt capacitor.
Fault analysis: short circuit current and reactance of a synchronous machine.
Symmetrical fault calculation methods: symmetrical components, sequence networks and unsymmetrical fault calculation.
Protection: Introduction to relays, differential protection and distance protection. Introduction to circuit breakers.
Typical layout of a substation.
Load curves: Demand factor, diversity factor, load duration curves, energy load curve, load factor, capacity factor and plant factor.

EEE 3204 : Power System I Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Power system analysis lab is to produce competent electrical engineering graduates with a strong foundation design, analytics and problem-solving skills for successful professional careers in industry, research and public service. The students will be able to analyze the performance and stability of power systems, and will be able to learn the effective use of next-generation power devices for solving problems.

Course Content:

Sessional based on the theory of course EEE 3203.

EEE 3305 : Communication Theory

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of the analog and digital communication. Students will learn about basic communication systems in this course. Without this course they can't handle the future course where they will learn to design complex communication design.

Course Content:

Overview of Communication Systems: Basic principles, fundamental elements, system limitations, message source, bandwidth requirements, transmission media types, bandwidth and transmission capacity.

Noise: Source, characteristics of various types of noise and S/N ratio.

Information Theory: Measure of information, source encoding, error free communication over a noisy channel, channel capacity of a continuous system and channel capacity of a discrete memoryless system, communication entropy, data compression.

Communication Systems: Analog and digital communication, carrier, baseband, bandpass and broadband communication; broadcast- and point to point mode of communication.

Continuous Wave Modulation: AM- DSB, SSB, VSB, QAM, spectral analysis of each type, envelope and synchronous detection; angle modulation instantaneous frequency, FM, PM, spectral analysis, demodulation of FM and PM.

Pulse Modulation: Sampling- sampling theorem, Nyquist criterion, aliasing, instantaneous and natural sampling; PAM principle, bandwidth requirements; PCM- quantization principle, quantization noise, non-uniform quantization, signal to quantization error ratio, demodulation of PCM, DPCM and DM principle, adaptive DM; line coding formats and bandwidths.

Digital Modulation: ASK principle, bandwidth requirements, detection, noise performance; PSK principle, bandwidth requirements, detection, DPSK, QPSK- noise performance, FSK- principle, continuous and discontinuous phase FSK, detection of FSK, MSK- bandwidth requirements.

Multiplexing: TDM- principle, receiver synchronization, frame synchronization, TDM of multiple bit rate systems; FDM- principle, demultiplexing; WDM, multiple access network- TDMA, FDMA, CDMA- spread spectrum multiplexing, coding technique and constraints of CDMA.

Communication Systems: Mobile cellular communication system, Fiber optic communication system, Microwave communication system and Satellite communication system.

EEE 3306 : Communication Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Students will learn about modulation and demodulation techniques of analog as well as digital communication systems. This course also provides a practical perspective on data communication and topologies.

Course Content:

Sessional based on the theory of course EEE 3305.

EEE 3307 : Digital Signal Processing I

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Students will start learning from the basic concepts of digital signals and proceed to learn how to analyze the data and how to manipulate the data which helps to reduce the distortion of the signal and get optimized signal for digital image processing, speech recognition, biomedicine and more.

Course Content:

Introduction to Digital Signal Processing (DSP): Discrete-time signals and systems, analog to digital conversion, impulse response, finite impulse response (FIR) and infinite impulse response (IIR) of discrete time systems, difference equation, convolution, transient and steady state response.

Discrete Transformations: Discrete Fourier series, discrete-time Fourier series, discrete Fourier transform (DFT) and properties, fast Fourier transform (FFT), inverse fast Fourier transform, Z-transformation properties, transfer f unction, poles and zeros and inverse Z-transform.

Correlation: Circular convolution, auto correlation and cross correlation.

Digital Filters: FIR filters- linear phase filters, specifications, design using window, optimal and frequency sampling methods; IIR filters specifications, design using impulse variant, bi-linear z-transformation, least square methods and finite precision effects.

EEE 3308 : Digital Signal Processing I Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Students will start learning and modeling from the basic discrete time signals and proceed to learn how to analyze the data and how to manipulate the data which helps to reduce the distortion of the signals and get optimized signals for digital applications.

Course Content:

Sessional based on Digital Signal Processing (EEE 3307).

Hum 3301 : Introduction to Economics

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is a high-level accounting course focuses on the underlying of objectives and importance of accounting, costs and management Accounting and also on the industrial management used to develop and deploy pattern recognition applications in the real world.

Course Content:

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 4101 : Ethics and Environmental Protection

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Conservation ethics, like environmental ethics, largely rely on the respect that humans either have or don't have for the environment and ecosystems. Conservation ethics also revolve around making human communities and ecosystems better, protecting important resources for the present and future.

Course Content:

Society: emergence of Sociology as moral lessons for society; Basic institutions in society, organization and institutions in society, Types of Society; Culture: basics of culture, elements of culture, cultural change, socialization, and social issues around us; Technology and society: interaction between technology and society; Engineering ethics: understanding ethics, engineering ethics; Moral reasoning and engineering as social experimentation; The engineers' concern for safety, professional responsibility; Employer authority; Rights of engineers; Global issues; Career choice and professional outlook; Ethical problems are like design problems; Genetically modified objects (GMO); Environment: environment and environmental issues environmental degradation, waste management and renewable energy; Basic understanding of sustainable development, SDGs, climate change adaptation; Disability and Accessibility.

EEE 4000 : Project & Thesis

Credits: 6.00 **Contact hours: 6.0 hrs. /week**

Rationale of the Course:

This is one of the major and final evolutionary course. Student will learn how to solve real world practical and theoretical problem with structured research and independent study. They will also demonstrate team work to solve a complex task.

Course Content:

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.

EEE 4101 : Control System I

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Control engineering is the application of mathematical techniques to the design of algorithms and devices to control processes or pieces of machinery. Control engineering efforts toward an efficient and quality production line with minimum time and cost. Students will learn about how to include the use of control design strategies for improving manufacturing processes, the efficiency of energy use, reduction of production time etc.

Course Content:

Introduction to Control Systems: Linear system models- transfer function, block diagram and signal flow graph (SFG).

State Variables: SFG to state variables, transfer function to state variable and state variable to transfer function.

Feedback Control System: Closed loop systems, parameter sensitivity, transient characteristics of control systems, effect of additional pole and zero on the system response and system types and steady state error. Routh stability criterion.

Analysis of Feedback Control System: Root locus method and frequency response method.

Design of Feedback Control System: Controllability and observability, root locus, frequency response and state variable methods.

Digital Control Systems: Introduction, sampled data systems, stability analysis in Z-domain.

EEE 4102 : Control System l Laboratory

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This laboratory will enable the students to learn the basic concepts and techniques in control systems. Control engineering is the application of mathematical techniques to the design of algorithms and devices to control processes or pieces of machinery. This course also provides a simulation based knowledge for designing control system.

Course Content:

Sessional based on the theory of course EEE 4101.

CLO 1: Demonstrate the ability to apply the concepts of control engineering using both analog and digital techniques.
CLO 2: Evaluate the characteristics of a given DC Servo motor.
CLO 3: Analyze the second order system in time domain and frequency domain using both hardware and software tools.
CLO 4: Design and analyze feedback control systems.

EEE 4103 : Industrial and Power Electronics

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Students will learn about different power electronic devices in this course. After completing this course, they will be able to understand the operation and behavior of power electronics circuits and how to control them.

Course Content:

Power semiconductor switches and triggering devices: BJT, MOSFET, SCR, IGBT, GTO, TRIAC, UJT and DIAC.
Rectifiers: Uncontrolled and controlled single phase and three phase.
Regulated power supplies: Linear-series and shunt, switching buck, buck boost, boost and Cuk regulators.
AC voltage controllers: Single and three phase. Choppers. DC motor control. Single phase cycloconverter. Inverters: Single phase and three phase voltage and current source. AC motor control. Stepper motor control. Resonance inverters. Pulse width modulation control of static converters.

Course Learning Outcomes (CLOs):

CLO1: Identify different power semi-conductor switching devices including the triggering devices, protection circuits and Speed control schemes for different electric motors.
CLO2: Explain the operating modes along with their characteristics of different switching devices and different schemes of power supply used for main power control.
CLO3: Analyze the working operation of different static power converters.

EEE 4104 : Industrial and Power Electronics Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Students will learn about basics of different power electronic devices and their application in this course. By completing this course, they will learn to design different circuits using the devices and learn their behavior in a certain system.

Course Content:

Sessional based on the theory of course EEE 4103.

EEE 4205 : Microprocessor and Interfacing

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

The microprocessor is the central unit of a computer system that is an important part of a computer architecture. Students will learn about basic computer components, various types of microprocessors, micro controller trainer kits along with different interfacing modules to demonstrate the detailed applications of microprocessors in this course.

Course Content:

Fundamental Concepts: Microprocessor: A programmable device; microcomputer components and support ICs, building blocks of MPU based systems, microprocessor buses, programming principles using MASM, microprocessor instructions.

16-bit Architecture: Pin diagram and functions, memory organization, bus activities, register layout, internal processing blocks.

Instruction Set: Classifications of instructions, addressing modes, address computing chart.

I/O Controller Programming: Port definition and read/write instructions, parallel I/O programming using 8255, serial I/O programming using 8251, display programming using 8279 and LCD, keyboard programming using 8279 and discrete components, generation of timing functions using 8253 PIT controller.

Interrupt Structure: Interrupt terminologies, hardware and software interrupt, multiple interrupt management.

Data Conversion Algorithm: Number system and BCD arithmetic, BCD2BIN conversion, BIN2BCD conversion, binary multiplication, binary division. System Design (8086 based digital weighing machine: DWM) Top down/Bottom-up design concept, hardware block diagram, control program flow chart, weight/rate acquisition and processing and display, cost computation and processing and display.

Advanced Microprocessors and Microcontrollers: History of the evolution of MPU/MCU, multitasking systems, PVAM operation of Intel high performance architecture, overview of 80286 architecture, instruction and programming; overview of 80386 architecture, instruction and programming; overview of CISC and RISC microcontrollers, instruction and programming.

EEE 4206 : Microprocessor and Interfacing Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This Lab has various types of microprocessor, micro controller trainer kits along with interfacing modules to demonstrate the detailed applications of microprocessors. Without this course they can't handle the future course where they will learn to design the microprocessor and micro controller, basic computer components and other embedded systems.

Course Content:

Sessional based on the theory of course Microprocessor and Interfacing (EEE 4205)

EEE 4107 : Solid State Devices

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

Students will start learning from the basic concepts of solid state devices, their construction, fabrication, operation, application and proceed to learn how these devices revolutionizing the electronic market. Students will also be able to learn how to Trade-offs between the efficiency, cost-effectiveness, sustainability, and environmental impact of the technology.

Course Content:

Semiconductors in Equilibrium: Electronic model of semiconductors and solids, valance band model, valance band, energy gap, conduction band, Energy bands, filling the energy band levels by electrons, energy band diagram of semiconductors, E-K, E-x, intrinsic and extrinsic semiconductors, Fermi levels, concept of holes, electron and hole concentrations, mass action law, charge neutrality conditions, temperature dependence of carrier concentrations and invariance of Fermi level.

Carrier Transport Processes and Excess Carriers: Drift and diffusion, lattice scattering and impurity scattering generation and recombination of excess carriers, built-in-field. Electric field dependence of mobility Einstein relations, Boltzmann relations, continuity and diffusion equations for holes and electrons and quasi-Fermi level. Trapping and tunneling. PN Junction: Basic structure, equilibrium conditions, contact potential, equilibrium Fermi level, DC electrical characteristics of p-n junction, energy band diagram of a biased p-n junction, Shockley diode equation, charge control switching analysis of p-n junction. Space charge, non-equilibrium condition, forward and reverse bias, carrier injection, minority and majority carrier currents, transient and AC conditions, time variation of stored charge, reverse recovery transient and capacitance turn on and turn off transients, metal semiconductor diode, band diagram. Bipolar Junction Transistor: Basic principle of pnp and npn transistors, emitter efficiency, base transport factor and current gain, diffusion equation in the base, terminal currents, coupled-diode model and charge control analysis, Ebbers-Moll equations and circuit synthesis, switching transients, deviation from ideal behavior. Metal-Semiconductor Junction: Energy band diagram of metal semiconductor junctions, rectifying and ohmic contacts. MOS Structure: MOS capacitor, energy band diagrams and flat band voltage, threshold voltage and control of threshold voltage, static C-V characteristics, charge control modes, qualitative theory of MOSFET operation, body effect and current-voltage relationship of a MOSFET. Junction Field Effect Transistor: Introduction, qualitative theory of operation, pinch off voltage and current- voltage relationship.

EEE 4211 : Electrical Power Transmission & Distribution

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

In this course students will learn the different stages of transmission and distribution of electrical power from the

generating station to the consumer end. This course will also help the students to understand the reasoning behind the different methods used by different electrical supply utilities and organizations throughout the world.

Course Content:

An overview on transmission & distribution system of Bangladesh.
Transmission Line: Inductance, Capacitance for single phase & three phase lines.
Underground cables: Types, electrostatic stress, grading of cables, Capacitance of single phase and three phase cables.
High voltage AC & DC transmission: Advantages & disadvantages of each type of transmission, kinds of dc link.
Mechanical design of transmission line: Types of insulators, voltage distribution along string of insulators, string efficiency, methods of equalizing potential;
Sag: Sag calculation, effect of ice & wind on sag.
Stability: Swing equation, power angle equation, equal area criterion, multi-machine system, step by step solution of swing equation, factors affecting stability.
Flexible AC transmission system (FACTS): Objective of FACTS, basic types of FACTS controllers and devices, Series compensation, Parallel compensation, Distribution automation & control (DAC), harmonics in power system.
Distribution System: Effect of voltage on transmission efficiency, comparison of various transmission and distribution systems, Kelvin's law, method of feeding distribution.

EEE 4213 : Power system protection

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the optional course of the program within electric power group. Students will learn about protection of power system through this course. Without this course they can't handle the microprocessor based power system in future.

Course Content:

Instrument transformers: CTs, PTs, accuracy class of CTs &PTs.

Criteria for detecting faults: Over current, differential current, difference of phase angles, over and under voltages, power direction, symmetrical components of current and voltages, impedance, frequency and temperature. Harmonics in power system and power quality. Electromechanical, electronic and digital
Relays: Basic modules, over current, differential, distance and directional. Trip circuits.

Unit protection schemes: Generator, transformer, motor, bus bar, transmission and distribution lines. Miniature circuit breakers and fuses. Circuit breakers: Principle of arc extinction, selection criteria and ratings of circuit breakers, types - air, oil, SF6 and vacuum.

EEE 4219 : Power Plant Engineering

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of powerplant. Students will learn about basic components of powerplants which will help them to understand better about powerplant's working mechanism.

Course Content:

Sources of energy: Fuels, nuclear energy, wind power, solar energy, tidal power.
Power plant cycles: Vapor power cycle, gas power cycle, gas turbine cycles and others.
Power plants: General layout and principles,
Turbines: Steam turbine, gas turbine, combined cycle gas turbine, IC engines, hydro, nuclear and thermal

power plant.
Power plant instrumentation: Measurement of pressure, temperature, fuel and speed; electrical measurements, instrumentation and controls in steam power stations.
Selection of location: Technical, economical and environmental factors, Load forecasting.
General scheduling: Deterministic and probabilistic,
Electricity tariff: formulation and types.

EEE 4314 : Power System Protection Sessional

Credits: 1.5 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the optional course of the program within electric power group. Students will able to acquire skills how to protect the power system through this course. Without this course they can't handle the microprocessor based power system in future.

Course Content:
Familiarization with different kinds of insulators, fuses and miniature circuit breakers. Determination of Time Current Characteristics (TCC) curve of a rewire able fuse & MCB.
Study of performance of an electro-mechanical over current relay and thermal overload relay. Performance study of a trip circuit for a protected line. Performance study of an O/C relay, O/C relay co-ordination & advantage of parallel feeder. Performance study of directional relay. Performance study of a differential relay for the protection of generator and transformer. Study of different components and their functions of an Air Circuit Breaker (ACB). Study of different types of motor protection system.

EEE 4337 : VLSI Design

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the fundamental course of the program where students will learn about the basic and advanced levels of VLSI technology, especially CMOS circuits in this course. Without this course, they might face a lot of problems in the future course where they will learn to design complicated CMOS electronic devices.

Course Content:
VLSI technology: Top down design approach, technology trends and design styles.
Review of MOS transistor theory: Threshold voltage, body effect, I-V equations and characteristics, latchup problems, NMOS inverter, CMOS inverter, pass-transistor and transmission gates.
CMOS circuit characteristics and performance estimation: Resistance, capacitance, rise and fall times, delay, gate transistor sizing and power consumption. CMOS circuit and logic design: Layout design rules and physical design of simple logic gates.
CMOS subsystem design: Adders, multiplier and memory system, arithmetic logic unit. Programmable logic arrays. I/O systems. VLSI testing.

EEE 4338 : VLSI Design Sessional

Credits: 1.50 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the fundamental course of the program where students will learn about the basic and advanced levels of VLSI technology, especially CMOS circuits in this course. Without this course, they might face a lot of problems in the future course where they will learn to design complicated CMOS electronic devices.

Course Content:

Sessional based on the theory of courses EEE 4337**.**

EEE 4355: Telecommunication Engineering

Credits: 3.00 **Contact hours: 3.0 hrs. /week**

Rationale of the Course:

This is the basic course of telecommunication. Students will learn about basic theories of communication in this course. With this course they will know about evaluation of modern communication.

Course Content:

Introduction: Principle, evolution, 'networks, exchange and international regulatory bodies.
Telephone apparatus: Microphone, speakers, ringer, pulse and tone dialing mechanism, sidetone mechanism, local and central batteries and advanced features.
Switching system: Introduction to analog system, digital switching systems - space division switching, blocking probability and multistage switching, time division switching and two-dimensional switching.
Traffic analysis: Traffic characterization, grades of service, network blocking probabilities, delay system and queuing.

Modem telephone services and network: Internet telephony, facsimile, integrated services digital network, asynchronous transfer mode and intelligent networks. Introduction to cellular telephony and satellite communication.