SYLLABUS FOR CAPE COAST TECHNICAL UNIVERSITY IN GHANA

ELECTRICAL/ELECTRONICS

ENGINEERING PROGRAMME

PREAMBLE:

One of the objectives of the Economic Recovery Programmed (ERP) is to attract and retain foreign investment and foreign participation in industry (manufacturing, food processing etc. It behooves the nation therefore to have in place a cadre of very skilled and dedicated technicians to meet, maintain and sustain the needs, demands and challenges of the industrial environment which will be created as a result of this ERP goal.

Another goal is to boost and promote small-scale industry and private enterprises.

Products of the polytechnics are therefore not only being prepared for industry, but also to be equipped with skills to create and develop their own enterprises after graduating from the polytechnics.

To meet these and other requirement, demands and challenges in the future envisaged for the nation on the industrial scene on our way to industrialization, it will be necessary to emphasize wherever possible in any combination of course offerings by Polytechnic students, the acquisition of the following skills:

i. A very high level of occupational / practical skills.
ii. Entrepreneurship skills
iii. Business management skills, and
iv. To some extent an ability to innovate and adapt existing technologies.

In addition, to prolong the life of equipment, instruments, achiness, structures and infrastructure in the country, courses in which aspects to maintenance (routine/preventive) and repair are vital and should have their curricula oriented and structured to highlight these aspects.

In the light of the foregoing, students opting for Electrical Engineering should study both Electrical Engineering and some courses in Electrical engineering. The courses in Electronic Engineering should have a strong as in Power Electronics, computer and Micro process or Controllers. Besides Electrical Power, Engineering requires courses in Thermodynamics (Heating and Cooling). Fluid Mechanics (Hydraulic and Pneumatic systems) and Mathematics. It is strongly being recommended that there should be courses in Business, Entrepreneurship and Maintenance for all technical students in the Polytechnics.

In order to emphasize and encourage close working relationship between industry and the polytechnics, the organization of laboratory classes and project work should be geared to industrial practices. In particular, project assignments should be worked out in collaboration with industry

RATIONALE FOR THE SUBJECT.

The rational for the Programme is to provide students with broad technological and basic managerial skills required for the installation, operation, maintenance and repair of domestic and industrial electrical equipment.

NEED ASSESSMENT SUMMARY

Major needs to be addressed:

1. Need for technological skill development

   Provision of qualified manpower and expertise required for the smooth and rapid expansion of electrical energy and technology to all parts of the country.

   Installation, operation, maintenance and repair of domestic and industrial electrical equipment,

   Meeting future manufacturing needs of the country.

   Contributing to the total economic and industrial development of the country

   Enhancing national self-reliance in modern technology.

OBJECTIVES

The syllabus objectives are to enable students to:

Acquire knowledge and understanding of the concepts and principle of electricity and electronics.

Acquire the proper techniques in the use of tools and equipment

Apply their knowledge in the correct use of electricity to promote safe working procedures and safety precautions.

Develop skills in the use of appropriate tools and electronics instruments in measurement, trouble shouting and repairs.

Acquires the ability to prepare lay-out, install and commission industrial equipment and electrical services.

ADMISSION REQUIREMENTS TO PROGRAMME

Students for the Programmed should satisfy the following admission requirements:

(a) **S.S.S**

Passes in Applied Electricity/Electronics/Chemistry, Elective mathematics, core Mathematics, English, integrated Science.

(b) **G,C.E**

Passes at Advanced Level Mathematics/statistics, Physics and Chemistry/ and other science subjects.

Credit passes in English, Mathematics, Physics and any other two subjects at the ordinary level.

(c) **O.T.D**

Students with the Ordinary Technician Diploma may be admitted to the second year of the Programme, but they will be required to do African Studies and Communication Skills.

(d) **E.E.T. Part III**

Credit Passes in all the three courses

Credit passes in English, Mathematics, Physics and any other subject at the Ordinary Level may be admitted.

(e) **Telecommunications Part III**

Credit Passes in all the three courses.

Credit Passes in English, Mathematics and Physics and any other two subjects at the Ordinary Level may be admitted.

(f) **EET I**

Credit passes in all three subject and five credit passes at the Ordinary Level may be admitted.

(g) EET I

Credit passes in all three subjects and passes in five subjects including English and core mathematics at the SSS Level may be admitted.

ASSESSMENT REQUIREMENTS

On each individual subjects, the assessment requirement will be as follows:

Continuous assessment…….40%

Final Examination…….60%

STUDENT RETENTION AND GRADUATION REQUIREMENTS

CONDITIONS FOR A PASS

Student should obtain a mark of at least 40% in each course.
The Cumulative Grade Point average (CGPA) for the year should be at least 1.50.
A student passes with DISTINCTION if his CGPA is at least 1.5

PROBATION

Student will be on probation for 2 semesters if his CGPA falls below 1.50.

SUPPLEMENTARY EXAMINATION

Students will be allowed to take a supplementary examination at the end of the second semester, if he fails up to 4 courses in ANY year. In the second and third years he can take a resit in any of courses.

WITHDRAWALS

A student will be withdrawn if

1. he fails more than four (4) courses at the end of EACH Semester
2. he fails to bring up his CGPA up to 1.50 after being on probation for two (2) semesters.

STRUCTURE OF PROGRAMME

ELECTRICAL AND ELECTRONICS ENGINEERING

The programmes under electrical and electronics engineering are :-

Electrical Engineering

1. Utilization of Electrical Energy
2. Power Supply and Distribution.

Electronic Engineering

1. Electronics and Telecommunication
2. Instrumentation and Control System
3. Computer Hardware Engineering
4. Hospital engineering

Each Programme duration is three(3) years for six(6) semesters.

The first four (4) semesters are common to both electrical Engineering and electronics engineering Programmes.

Even though the duration of the course is three (3) years students have five (5) semesters in which to complete the Programme to allow for referrals.

COMMON

1ST YEAR 1ST SEMESTER

COURSE TITLE	CODE	T	P	C
Engineering Mathematics I	MATH 111	3	0	3
Electronics I	EEE 101	3	0	3
Instrument & Measurement	EEE 125	3	0	3
Engineering Drawing	MCE 115	0	3	1
Network Analysis I	EEE 121	3	0	3
Electrical Engineering Lab I	EEE 143	0	6	2
Communication Skills I	COS 101	2	0	2
Computer Literacy I	CLT 101	1	2	2
African Studies I	AFS 100	2	0	0
19	**11**	**19**		

COMMON

1ST YEAR 2ND SEMESTER

COURSE TITLE	CODE	T	P	C
Engineering Mathematics II	MATH 112	3	0	3
Electronics II	EEE 102	3	0	3
Mechanics of Fluids	MCE 132	2	0	2
Electrical Machines I	EEE 132	3	0	3
Electrical Engineering Lab II	EEE 144	0	6	2
Network Analysis II	EEE 122	2	0	2
Communication skills II	COS 102	2	0	2
African Studies II	AFS 100	2	0	2
Computer Literacy II	CLT 102	1	2	2
		18	**8**	**21**

COMMON

2ND YEAR 1ST SEMESTER

COURSE TITLE	CODE	T	P	C

Engineering Mathematics III	MATH 211	3	0	3
Introduction to Computer programming	EEE 221	1	2	2
Electrical Machines II	EEE 231	3	0	3
Telecommunication I	EEE 211	3	0	3
Digital Electronics	EEE 207	3	0	3
Electrical Engineering Lab III	EEE 243	0	6	2
Power Systems I	EEE 241	3	0	3
Thermodynamics	MCE 211	3	0	3
		13	**11**	**22**

COMMON

2ND YEAR 2ND SEMESTER

COURSE TITLE	**CODE**		**T**	**P**	**C**
Engineering Mathematics IV	MATH 212		3	0	3
Control Systems I	EEE 222		3	0	3
Electrical Engineering Lab IV	EEE 244		0	6	2
Power Systems II	EEE 242		3	0	3
Telecommunication II	EEE 212		3	0	3
Electrical Machines III	EEE 232		3	0	3
Entrepreneurship	ETP 202		2	0	2
Research Methodology	RSM 218		2	0	2
		19	**6**	**21**	

COMMON

3RD YEAR 1ST SEMESTER

COURSE TITLE	**CODE**	**T**	**P**	**C**
Equipment Maintenance	EEE 337	0	6	2
Electrical Engineering Practice	EEE 315	3	0	3
Management and Organisation I	SMS 311	3	0	3
Project Work I	EEE 347	0	9	3
Computer Applications	EEE 325	0	6	2
Micro Computer	EEE 301	3	0	3
Electrical Engineering Lab V	EEE 343	0	6	2
		9	**27**	**18**

ELECTIVES

Power Systems III	EEE 341	3	0	3
Power Electronics I	EEE 331	3	0	3
Telecommunication III	EEE 311	3	0	3
Computer Operating Systems	EEE 323	3	0	3

Medical Equipment Technology I	EEE 315	3	0	3
Instruments & Control 2	EEE 321	3	0	3
		12	**27**	**21**

COMMON

3RD YEAR 2ND SEMESTER

COURSE TITLE	**CODE**	**T**	**P**	**C**
Fault Diagnosis in Electrical Machines and Power Systems	EEE 328	0	6	2
Management and Organisation II	SMS 312	2	0	2
Project Work II	EEE 348	0	10	4
Fin Mgt & Acct.	ACT 306	3	0	3
Electronic Servicing	EEE 306	0	3	1
Electrical Engineering Lab VI	EEE 344	0	3	1
		5	**22**	**13**

ELECTIVES

Power Systems IV	EEE 342	3	0	3
Power Electronics II	EEE 332	3	0	3
Telecommunications IV	EEE 312	3	0	3
Digital Computer Design	EEE 324	3	0	3
Medical Equipment Technology II	EEE 316	3	0	3
Instrument & Control 2	EEG 322	3	0	3
		8	**22**	**16**

1ST YEAR - 1ST SEMESTER

MATHS 111 ENGINEERING MATHEMATICS 1

TOPICS

1. Functions, Series, and Polynomials
2. Ordinary Differential Calculus
3. Partial differential Calculus
4. Integral Calculus
5. Complex numbers

GENERAL OBJECTIVE

At the end of the module, student should be able to:

1. Recognize functions, which are continuous, discontinuous, periods, odd and even
2. Use Maclaurin's and Taylor's series to approximate functions
3. Use ordinary differential calculus to solve maxima and minima problems
4. Use partial differential calculus to solve maxima and minima problems subject to some constraints
5. Use integral calculus to determine areas and volumes
6. Use integral calculus to determine functions whose rates of changes are known.
7. Use complex numbers to represent phasors in AC systems
8. Use complex numbers to solve problem involving the hyperbolic function

PERFORMANCE OBJECTIVES

1.0 FUNCTIONS, SERIES, AND POLYNOMIALS

1.1 Explain the term FUNCTION as relationship between independent and dependent variables
1.2 Distinguish between functions defined as one-to-one functions
1.3 Explain the term PERIODIC FUNCTIONS and plot graphs of these
1.4 Distinguish between ODD FUNCTIONS and EVEN FUNCTIONS
1.5 Distinguish between CONTINUOUS and DISCONTINUOUS FUNCTIONS (intuitive treatment only)
1.6 Determine the inverses of functions and plot graphs of these
1.7 Explain the terms SEQUENCES and SERIES OF REAL NUMBERS
1.8 Distinguish between convergent and divergent series (non-rigorous definition and simple cases only)
1.9 Determine the limits of convergent series
1.10 Explain the term POLYNOMIAL
1.11 Discuss the algebraic properties of polynomial
1.12 Explain the term RATIONAL FUNCTION and discuss its algebraic properties
1.13 Resolve a rational function into the sum of its partial fractions

2.0 ORDINARY DIFFERENTIAL CALCULUS

2.1 Explain the term DIFFERENTIATION as a process for determining the rate at which a function changes. (Restricted to functions of a single variable)
2.2 Explain the term DERIVATIVE as a limiting value of the average rate of change of a function
2.3 Develop the techniques of differentiation
2.4 Apply the techniques in 2.3 to engineering related problems
2.5 Use differentiation to solve problems of maxima and minima
2.6 Differentiate polynomials, trigonometric functions, exponential functions and logarithmic functions
2.7 Determine higher derivatives of various functions
2.8 State Taylor's and Maclaurin's series
2.9 Use the series of 2.8 to approximate functions

2.10 Explain and solve simple problems involving implicit differentiation
2.11 Explain and solve simple problems involving parametric differentiation
2.12 Explain and solve simple problems involving logarithmic differentiation

3. PARTIAL DIFFERENTIAL CALCULUS

3.1 Distinguish between ordinary and partial derivatives
3.2 Solve problems involving partial derivatives
3.3 Determine all second-order partial derivatives of a function of two variables
3.4 Use the second-order partial derivatives test to distinguish between a relative maximum, a relative minimum and a saddle point on a surface

4. INTEGRAL CALCULUS

4.1 Explain the term INTEGRATION as the reverse process of differentiation
4.2 Distinguish between indefinite and definite integrals
4.3 Explain the basic properties of the definite integral
4.4 Evaluate integrals by means of:
  a. Substitution or change of variable
  b. Partial fractions
  c. Integration by parts
  d. Reduction formula
4.5 Explain the definite integral as the area of the finite region enclosed by a curve and the coordinate axes
4.6 Determine the area of the finite region enclosed by a curve and the coordinate axes
4.7 Determine the volume of the solid of revolution generated by rotating the area enclosed by a curve and the coordinate axes about an axis
4.8 Determine the mean value of a function over a given interval
4.9 Determine the root mean square value of a function over a given interval

5. COMPLEX NUMBERS

5.1 Represent real numbers on the number line
5.2 Distinguish between real and complex numbers
5.3 Determine the modulus and argument of a complex number
5.4 Represent a complex number in the:
  a. Cartesian coordinate form
  b. Polar coordinate form
5.5 Convert a complex number in the Cartesian coordinate form into the polar coordinate form and vice versa
5.6 Represent complex numbers in an argand diagram
5.7 Perform the operation of addition, subtraction, multiplication and division of complex numbers in both Cartesian and polar coordinates
5.8 State De Moivre's theorem and use it to solve simple problems
5.9 Express a complex number in the exponential form
5.10 Deduce Euler's formula
5.11 Use Euler's formula in1.10 to solve simple problems involving hyperbolic functions and their inverses

1ST YEAR – 1ST SEMESTER

EEE 101 ELECTRONICS 1 (3, 0, 3)

Objectives:

The objectives of this course is to introduce students to the basic physics and applications of diodes, resistors, and thyristors. It also serves on our introduction to the various types of amplifiers, switching device and power supplies.

Semi-conductor materials:
Intrinsic and extrinsic semi-conductors, p-n junction. Current/ voltage (V-I) characteristics, junction barrier, junction break-down, applications of p-n diode, rectifiers.

Transistors:- The Bipolar junction and field effect transistors, current / voltage (V-I) characteristics of CE. CB and CC(CS,CD & CG) configuration,

Transistors as amplifiers: Introduction to electronics amplifiers, amplifier states, biasing, stability, load line techniques for transistor amplifiers. Design considerations for an AC/DC coupled amplifier.

Power supply: Rectifiers, power supplies, passive filters, multipliers, voltage regulation, AC/AD converters, thyristors – operation and characteristics, single-phase controlled rectifiers.

1ST YEAR – 1ST SEMESTER

EEE 125 MEASUREMENT & INSTRUMENTS (3, 0, 3)

At the end of this course students should be able to know the principle and applications of various a.c. and d.c. measuring instruments. Topics include electronic measurements, multi-purpose instruments, measurement of power, energy and power factor

Analogue instruments: Principles of operation and application of a.c. and d.c measuring instruments. Deflection, control and damping devices. Multirange and multipurpose instruments.

Electronic instruments, Instrument transformers. Bridge methods (a.c and d.c). Resonance methods measurement of power, energy and power factor. Insulation measurement. Sensors and measurements of electrical quantities.

1ST YEAR – 1ST SEMESTER

MCE 115 – ENGINEERING DRAWING (0, 3, 1)

This is a basic course in engineering drawn to enable students understand and draw technical views of 3-dimension objects and machine parts.

Visualization in 3-dimensions interpretation of orthographic views. Geometrical construction, orthographic projection, descriptive geometry, intersection and development.

1ST YEAR – 1ST SEMESTER

EEE 121 – NETWORK ANALYSIS I (3, 0, 3)

Objective:

The objective of this course is to introduce students to circuit laws and theorems, electromagnetism, magnetic circuits and inductance. Calculations of electrical and magnetic circuits are included.

Network theorems:
Kirchoff's Laws, mesh and nodal analysis, Superposition Theorem, Thevenin's and Norton's theorems, Reciprocity theorems, Delta-star and star-delta transformations.

Electromagnetism:
Magnetic field due to an electric current, magnetic field of solenoid, force on a conductor carrying current across a magnetic field. Faraday's Law of Electromagnetic Induction, cycles and frequency.

Magnetic circuits
Magnetomotive force, magnetic afield strength, permeability of free space, relative permeability. B-H curves of materials, reluctance, comparison of electric and magnetic circuits, Kirchoff's laws of magnetic circuits.

Inductance as circuits element:

Charging and discharging currents of an inductor inductance in terms of flux-linkages per ampere factors determine the inductance of a coil.

Energy stored in an inductor, self and mutual inductance, coupling coefficient, inductance of inductively – coupled coils connected in series.

1ST YEAR – 1ST SEMESTER

EEE 143 (N) ELECTRICAL ENGINEERING LAB I (NETWORK ANALYSIS)

The student attends this laboratory once a week every class lasts 3 hours
Experiments:

-Verification of circuit laws
-Verification of circuit theorems
-Verification of Faraday's law
-B-H curves

1ST YEAR – 1ST SEMESTER

EEE 143 (I) ELECTRICAL ENGINEERING LAB I MEASUREMENTS AND INSTRUMENTS

Students perform experiments using oscilloscope and multimeters and apply transducers to measure non-electrical parameters.

The student attend this lab once a week, and every class last, 3 hours.

Experiments:- -use of oscilloscopes and multimeters
-measurement of voltage, current, energy, power, power factor, R.L. and C and insulation resistance
-application of transducers to measure non-electrical parameters.

1ST YEAR – 1ST SEMESTER

EEE 143 (E) ELECTRICAL ENGINEERING LAB 1 (ELECTRONICS)

Objective of this laboratory is to introduce students to the use in circuit of diode, transistors and C and to verify characteristics discussed in theory. Students must construct and test circuit. Circuits must be seen to work correctly.

Student attend thus Laboratory, once a week and every laboratory class lasts for 3 hours.

Experiments:- diode characteristics (p-n, Zener)
- transistor characteristics (bi-polar, field effect)
- use of load line in amplifier design
- simple unregulated and regulated d.c. power supplies

Students must construct and test circuits:

1ST YEAR – 2ND SEMESTER

MATH 112 -ENGINEERING MATHEMATICS II

TOPICS

1. Fourier Series
2. Vector Algebra
3. Matrices and Determinants
4. Hyperbolic Function
5. De Movie's Theorem

GENERAL OBJECTIVES

At the end of the module, the students should be able to:

1.0 Distinguish between scalar and vector quantities
2.0 Recognize geometric and physical applications of vectors
3.0 Solve problems involving scalar and vector products of vectors
4.0 Solve systems of linear equations by means of:
   a. Determinants
   b. Matrix methods
   c. Row operations method

PERFORMANCE OBJECTIVES

6. VECTOR ALGEBRA

6.1 Distinguished between scalar and vector quantities
6.2 Resolve vectors into components
6.3 Perform operation of addition, subtraction, and scalar multiplication of vectors
6.4 Explain the term RESULTANT of vectors
6.5 Explain the scalar product of two vectors
6.6 Discuss the properties and applications of scalar product. E.g. work done by a force
6.7 Explain the vector product of two vectors
6.8 Discuss the properties and applications of the vector product
6.9 Explain geometrically the scalar triple product
6.10 Differentiate vector functions (simple cases only)

6.11 Integrate vector functions (simple cases only)

7. MATRICES, DETERMINANTS AND LINEAR EQUATIONS

2.1 Explain the term MATRIX as a rectangular array of numbers
2.2 Perform the operation of addition, subtraction, and scalar multiplication of matrices
2.3 Evaluate the product of two matrices
2.4 Perform elementary row operations on a given matrix
2.5 Explain the term DETERMINANT of a square matrix
2.6 Evaluate the determinant of a square matrix by means of :
   a. The diagonal rule
   b. The co-factor method
2.7 Explain the term SINGULAR and NON-SINGULAR matrices
2.8 Determine the inverse of a square matrix by means of:
   a. Determinants
   b. Raw operations
2.9 Explain the phrase SYSTEM OF HOMOGENEOUS LINEAR EQUATIONS and SYSTEM OF NON-HOMOGENEOUS LINEAR EQUATIONS
2.10 Distinguish between consistent and inconsistent systems of linear equations
2.11 Solve a system of homogeneous linear equations by means of:
   a. Cramer's rule (determinants)
   b. Inverse of a matrix
   c. Row operations
2.12 Solve a system of non-homogeneous linear equations by means of:
   a. Cramer's rule (determinants)
   b. Inverse of a matrix
   c. Row operations

1ST YEAR 2ND SEMESTER

EEE 102 ELECTRONICS 2 (3, 0, 3)

The objectives of this course are to provide students with knowledge in various amplifiers, noise and distortion and wideband video amplifiers. It will also introduce students to analogue systems, signal generators and AC/dc converters.

Amplifiers: Small signal amplifiers, operational amplifiers, active filters, power amplifiers, frequency compensation, noise and distortion, tuned amplifiers, wideband video amplifiers.

Feed back : positive and negative feedbacks

Analogue Systems: Operational amplifiers, Summers, multipliers, integrators, differentiators and integrators, active filters, applications to control systems.

Signal Generation and Conditioning
Sinewave, ramp and square wave oscillators, comparator circuits, Schmitt trigger, modulation. PLL, sample and hold, analogue multiplexer.

1ST YEAR – 2ND SEMESTER

MCE 132 MECHANICS OF FLUIDS (2, 0, 2)

Objectives: The objectives is to enable students learn squid, static, fluid properties, hydraulic and pneumatic machinery.

Introduction

Definition of fluid, dimension and units, fluid properties.
Fluid Static.

Fundamental law of fluid static, total force resulting pressure distribution.

Fluid Properties

Properties of mass, viscosity, elasticity, surface tension, vapour pressure, instruments for measurement of pressures.

Hydraulic and Pneumatic Machinery:

Basic features pf hydraulic and pneumatic machinery, pumps, turbines, fans. Effects to pressure head.

Hydraulic and pneumatic control systems, symbols interpretation of drawings, components and features, specifications, installation, trouble shooting and maintenance.

1ST YEAR – 2ND SEMESTER

EEE 132 – ELECTRICAL MACHINES I (3, 0, 3)

Objective:

This is an introductory course in a.c. three – phase circuits and transformers. Calculation of losses and efficiency and other general characteristics are include.

The principles of power circuits and electromechanical energy conversion. Three phase systems, definitions, symmetrical and non-symmetrical load, active and reactive power, apparent power, power factor.
Singly and doubly excited electromagnetic devices.

Single-phase and three-phase transformers, construction, principle of operation, equivalent circuit, phasor diagrams, voltage regulations, no-load, short-circuit operation, efficiency, all-day efficiency, parallel operation, methods of cooling, tap changing (non-off load).

Special transformers: Auto-transformers, construction, principle of operation, applications.

1ST YEAR - 2ND SEMESTER

EEE 144 (E) ELECTRICAL ENGINEERING LAB II (ELECTRONICS)

Students are to learn through practical experiments, or amplifiers analogue systems and signal generators.

The students attends this lab once a week and every class lasts 3 hours.

Experiments

- Amplifiers and their characteristics
- Filter
- Summers, integrators and differentiators
- Signal generation: sinewave and square wave, saw-tooth.

Circuits must be constructed and tested.

1ST YEAR - 2ND SEMESTER

EEE 144 (M) ELECTRICAL ENGINEERING LAB II (ELECTRICAL MACHINES I).

Objective:

The objective of this Laboratory is to introduce students to the measurements in 3 phase circuits and the performances of single and three phase transformers.

Experiments:-

Measurement of voltages, currents, power and power factor in 3-phase a.c. circuits, - with resistive, inductive and capacitive loads.
Investigate the operations of single, three-phase and auto-transformers.

1ST YEAR – 2ND SEMESTER

EEE 144 (N) ELECTRICAL ENGINEERING LAB II (NETWORK ANALYSIS II)

OBJECTIVES: Objective here is to let the student verify the circuit laws in the Laboratory.

The student attends this lab once a week and every class last 3 hours.

Experiments:- Verification of AC circuit with R-L-C Circuits
Delta-star and star-delta transformations

1ST YEAR 2ND SEMESTER

EEE 122 NETWORK ANALYSIS II (2, 0, 2)

Objectives: The objective of this course is to introduce students to electrostatics, electromagnetic, a.c. circuits and single phase circuits.
Electrostatics

Capacitors, types of capacitors, relationship between the charge and applied voltage, capacitance capacitors in parallel and in series, factors determining the capacitance of a capacitors electric field strength and electric flux density, relative permittivity, capacitance of a multiplane capacitors, capacitance of and potential gradient in a parallel plat. Capacitor with composite dielectric. Comparison of electrostatics and electromagnetic terms. Charging and discharging currents, energy stored in a charged capacitor, dielectric strength.

Alternating Voltage and Current

Average and r.m.s. values of alternating currents and voltages, harmonies, representation of a smusoidal alternating quantities by phasors, addition and subtraction of sinusoidal quantities.

Single Phase Circuits

A.C. R-L-C circuits, resonance and Q factors, complex power factor, active and reactive current Solving single phase R-C-L-circuits using j operator.

2ND YEAR 1ST SEMESTER

MATHS 211 ENGINEERING MATHEMATICS 111

1. Matrix Algebra	-	reduction to echelon form
	-	rank of a matrix
2. System of linear equations	-	Crammer's rule
3. Ordinary Differential Equation (o.d.e.)	-	linear differential equations of 1st
	-	second order linear equations with constant coefficients
4. Laplace transform	-	application to o.d.e.
5. Simple Probability Theory	-	independent events
	-	mutually exclusive events
	-	Baye's Theorem

2ND YEAR – 1ST SEMESTER

EEE 221 INTRODUCTION TO COMPUTER TECHNOLOGY (1, 2, 2)

This course introduces the student to computer organization, Input/Output devices and computer programming. Computer organization C.P.U. function, memory devices and organization executing a stored programmed, interrupt. Input/Output (I/O) devices, interphase adapters, standard buses and communication cables.

Computer Programming
High level programming - BASIC

2ND YEAR – 1ST SEMESTER

EEG 231 ELECTRICAL MACHINES II (3, 0, 3)

OBJECTIVES: This course imparts to the students with a knowledge in the design and analysis of machines as well as the steady state and transient performance of D.C. machines.

Machines Fundamentals, Design and Analysis

Force on current-carrying conductor: Faraday's law and motional e.m.f. concentrated windings, m.m.f., working leakages flux. Phase windings for a.c. machines. Flux density distributions and m.m.f. With smooth air-gap, including harmonic m.m.f.'s. Chord, distribution and winding factors. Machine rating; losses, cooling, temperature rise; duty cycle. Equation of motion for rotary dynamic systems.

D.C. Machines
Steady-state performance; equations, equivalent circuits and characteristics of separately-excited, shunt and series machines. Armature reactions and compensation. Transient performance with and without armature inductance. Universal (a.c series commutator) machines. Awareness of commutation process and methods of improving commutation.

2ND YEAR – 1ST SEMESTER

EEE 211 TELECOMMUNICATION I

This course is intended to provide students with sufficient background knowledge to understand a basic principle behind Radio Communication and Line Transmission. It includes propagation frequencies up to 300 MHz, AM and FM. The super-heterodyne principle, Noise and Cross link, carrier telephone and Multi-channel Voice Frequency, Telegraphy systems.

Radio Telecommunications

Propagation of frequencies up to 300MHz. Amplitude-and frequency modulation, PMP, AM, PCM, PWM,. The superheterodyne principle. Single and double-sideband transmission. Block diagram of broadcast transmitter and receivers. Use of standard and FM-signal operators for test purpose.
Communication systems: quantization, sampling, coding and decoding.
The Transmission.

Simple treatment of the dc/ac transmission line. Statement of characteristic impedance and propagation coefficient. Reflection at impedance changes. Primary coefficients of overhead and underground lines. Noise and across talk. Carrier telephone, digital hierarchy and multi-channel voice frequency telegraphy systems. Trunk, junction and local circuits, transmission requirements.
Articulation, intelligibility and repetition rates. Design, construction, maintenance and routine mounting of plant. Mounting and cabling of audio and carrier transmission equipment. Power plant transmission equipment.

2ND YEAR – 1ND SEMESTER

EEE 207 DIGITAL ELECTRONICS (3, 0, 3)

Objective: Students are introduced to digital systems, A/D and D/A converters

Digital Systems: Basic logic families, basic logic gates, Boolean algebra, minimization of logic expressions by Karnaugh Maps, flip flops: JK, D- types, JK master –slave, latches shift registers, counter, introduction to general sequential techniques. Applications-digital circuit analysis, hard wired logic.

A – D and D – A converters and their principles of operation. Number system: binary, octa and hexa –decimals.

2ND YEAR - 1ST SEMESTER

EEE 243 (M) ELECTRICAL ENGINEERING LAB III (ELECTRICAL MACHINES II)

The objective of this Laboratory work is to let the students perform various test on Dc Machines.

The student attends this lab once a week and every class lasts 3 hours.

Experiments:-

D.C. Machines

- Separately excited machine
- Shunt machine
- Series machine
- Compound machine

2ND YEAR – 1ST YEAR SEMESTER

EEE 243 (T) ELECTRICAL ENGINEERING LAB III (TELECOMMUNICATIONS 1)

The students perform experiments on AM, FM signals

Experiments/Demonstration:

- amplitude modulation using signal generators and aCRO
- determine modulation factor and modulation index of amplitude-modulated wave
- frequency modulation
- standard and FM signal generators
- voltage drop and power loss in lines and cables

2ND YEAR – 1ST SEMESTER

EEE 243 (P) ELECTRICAL ENGINEERING LAB III (POWER SYSTEMS)

Students are to perform experiments on power factor correction and measurement of earth resistance.

Students attends this lab once a week and every class lasts 3 hours.
Experiments:- Power factor correction

MEASUREMENT OF EARTH RESISTANCE

2ND YEAR – 1ST SEMESTER

EEE 241 POWER SYSTEMS I (3, 0, 3)

Objective

The objective of this course is to introduce students to energy sources, regulators, tariffs, rectifiers, and interest.

ENERGY SOURCES

Primary sources of energy, characteristics, location and economics of fossil, nuclear and hydroplants, principles of thermos electronics, thermos electric and magneto-hydrodynamic converters.

Alternative natural sources: solar, wind, wave geothermal, tidal.

Switchgear and productive devices:

Switches, (isolators, MCB, contactors) and protective devices: fuses-low and high voltage fuses, overload trips, earthling, earth leakage protection.

Economics of power generation:

Metering of energy, maximum demand, load-summation. Load factor, diversity,. Economic choice of plant. Private generation. Load management and tariff formulation. Power factor correction. Effects of voltage fluctuating, unbalanced and harmonic generating loads on power factor correction.

D.C Transmissions:

Operation and characteristics of HVDDC link converters; limitations. Effects of converter-fed loads on system; origin and limits of supply distortion.

2ND YEAR – 1ST SEMESTER

MCE 211 APPLIED THERMODYNAMICS (3, 0, 3)

Objective: This course is intended to teach students the basic concepts in thermodynamics, it includes thermodynamics laws and their application to heat engines. It also covers basic principle of operation of various types of engines and turbines, refrigerators and air-conditioners.

Basic concept of 1st and 2nd laws of thermodynamics,
Internal combustion Engines
Compressors, Fans, Air cooled motors
Refrigeration, Air Conditioning
Cooling of electrical devices.

SECOND YEAR: 2ND SEMESTER
MATH 212-ENGINEERING MATHEMATICS IV

1. Finite and Divided differences
2. Interpolation
3. Newton's approximation to the roots of equations with numerical coefficients
4. Numerical integration
5. Numerals solution of o.d.e.
   - Euler's methods
   - Taylor's method
   - Runge-Kuffa methods

7. Statistical Methods
   - Sampling Theory
   - Estimation Theory
   - Test of significance
   - Simple regression analysis
   - Simple correlation analysis

2ND YEAR - 2ND SEMESTER

EEE 222 CONTROL SYSTEMS I (3, 0, 3)

This course introduces students to control systems, Topics includes, block diagram representation of a control system, transducers, amplifiers and actuators.
Introduction to control systems. Equation of physical power systems. Block diagram representation of a control system. Transfer function. Open-loop and close loop. Schematic representation of on/off and proportional systems.
Transducers for the measurement of displacement, velocity, force, temperature and heat flow. Amplifiers and Actuators; Operation of electronic, pneumatic, hydraulic, rotating and electrical performance and use of d.c., a.c. and hydraulic motors. Nyquist - Routh stability criteria, Bode plots.

2ND YEAR – 2ND SEMESTER

EEE 244 (C) ELECTRICAL ENGINEERING LAB IV (CONTROL SYSTEMS)

Students perform tests for obtaining the open-loop and closed-loop frequency response of a control system. Nyquist and Bode-diagrams are their plotted from the above.
Describe test methods for obtaining the open-loop and closed-loop frequency response.
Describe the use of the following in the above test: Low-frequency oscillator, variable phase oscillator, phase meter, transfer function analysis. Plot Nyguist, Bode diagrams from the above.

2ND YEAR – 2ND SEMESTER EEG 244 (M) ELECTRICAL ENGINEERING LAB IV (ELECTRICAL MACHINES III)

This laboratory course is on experiments on synchronous machines, indictor machines transformer. Synchhros and stepping motors.

The student attends this lab once a week and every class lasts 3 hours.

Experiments:

- -Synchronous machines
- -Induction machines
- -Reluctance motor
- -Permanent magnet motor
- -Synchros

2ND YEAR – 2ND SEMESTER

EEE 244 ELECTRICAL ENGINEERING LAB IV (POWER SYSTEMS II)

The objective of this course is to let the students perform experiments on synchronization of 3 phase supplies active and reactive power, phase shifts, and unbalanced load fault measurements on synchronous generator. The student attends this lab once a week and every class lasts 3 hours.

Experiments:- Synchronization of 3-phase supplies motor / generator set of machines power mains.

- Demonstrate active and reactive power, phase shifts.
- Unbalanced load measurements on synchronous generator.

2ND YEAR – 2ND SEMESTER

EEE 244 -ELECTRICAL ENGINEERING LAB IV (TELECOMMUNICATIONS)

Objective: This course enable students to perform experiments such as wave guide, aviate resonators, determination of radiation polar diagram of a simple half-wave dipole.

Experiment:- On wave guide and activity resonators

-Use of slots and screws for matching
-Measurement of VSWR (Voltage standing wave ratio)
-Determination of radiation polar diagram of a simple half-wave dipole
-Measurement of amplitude and phase response at IF of a microwave system

2ND YEAR – 2ND SEMESTER

EEG 242 POWER SYSTEMS II

System Analysis

Objectives: This course takes the students through systems analysis, power transfer and control.

System Analysis
Network: representation of power systems, per-unit values, load flow Gauss and Seidel and Newton –Rapson methods; Fault analysis : symmetrical, symmetrical components; asymmetrical faults, neutral grounding.

Power Transfer

Steady-state and transient limits, swing curves, equal area criterion, critical clearing angle, critical switching tine, d.c transmission.

Control
Voltage, frequency, and active and reactive power flow: shunt and series compensation, operation economics load prediction

Experiments:- Synchronization of 3-phase supplies M/G set of power mains
- Demonstrate active and reactive power shifts.
- Unbalanced fault measurements on synchronous generator.

2ND YEAR – 2ND SEMESTER

EEE 212 TELECOMMUNICATIONS II

Objective:

This course is intended to cover a slightly more advanced theory of the telecommunications systems and should enable students to understand some of the most important reasons behind the operation of communication. Network topics include FM wave in free space, microwave radios in communications, serial systems, receivers, wave guides and cavity resonators.

Propagation of frequencies between 1 and 10 GHz. Descriptive treatment of a plane FM wave in free space. Reflection, refraction, diffraction and polarization of plane wave. Aerials and radiation patterns. Field application of micro-wave radio in communications. The FM field associated with transmission lines. Voltage standing wave in free space. Boundary conditions.

Propagation in rectangular wave guide in dominant mode field patterns. Introduction of higher modes. Wave guide length and cut-off frequencies of energy in wave-guides. Matching, the use of slots and screws. Wave guide, cavity resonators – elementary treatment. Microwave aerial systems. Reflectors. Beam width, effect of side lopes. Microwave receiver types. Sensitivity, selectivity. Noise in microwave receivers. Test instruments for microwave and aerials.

2ND YEAR – 2ND SEMESTER

EEE 232 ELECTRICAL MACHINES III (3, 0, 3)

Objective:

This course imparts the students with a knowledge in synchronous machines and induction machines that covers the steady state and transient performance 3 phase transformers and special machines are also treated.

Synchronous Machines:
Steady-state performance equation, equivalent circuit phase diagrams and characteristics of polyphase uniform gap and salient pole machines; 2-axis representation power/load angle; synchronizing torque, natural frequency Load characteristic of isolated generator, and machines on infinite bus bars, excitation systems and voltage regulation. Transient performance; sudden short-circuit transients, transient and sub-transient reactance, field transient motor-run-up.

Induction Machines

Steady state performance equations, equivalent circuits, phase diagrams, characteristics of polyphase cage and slip-ring machines in generator, motor and brake modes. Starting methods.

Transformer : 3phase, 3-winding transformers. Tap changing.

Special Machines:
Awareness of single and two phase induction motors, reluctance motors shaded pole motors. Permanent magnet, universal, hysteresis , stepper motors synchros.

SEMESTER 1 HND 3

RESEARCH METHODS

General Objectives:

At the end of the module, students should :

1.0 understand and explain research process
2.0 understand and write a research proposal
3.0 understand and undertake a research design
4.0 understand and collect data
5.0 understand and use data analysis techniques
6.0 understand and write-up a research.

Performance Objectives:

1.0 Research Process

1.1 Explain research
1.2 Discuss the purpose of research.
1.3 Identify and explain the characteristics of research
1.4 Discuss the place of theory in research
1.5 Explain the importance of research.
1.6 Discuss and explain the research process

2.0 Research Proposal

2.1 Identify and outline research proposal and its parts.

3.0 Research Design.

3.1 Classify research as either quantitative or qualitative
3.2 Explain the terms sample and population.
3.3 Distinguish between random and non random sampling.
3.4 Explain the types of sampling

4.0 Data Collection

4.1 Distinguish between primary and secondary data.
4.2 Identify the sources of secondary data.
4.3 Understand the terms survey, sample survey and respondents.
4.4 Understand the basic methods of communicating with respondent.

5.0 Data Analysis Technique

5.1 Distinguish between descriptive and inferential statistics
5.2 Construct and explain tabular and graphic methods of displaying data.
5.3 Compute and explain measures of location and variation.
5.4 Calculate and explain the concept of simple correlation coefficient.
5.5 Compute and discuss the least squares methods of analysis

6.0 Writing-up the Research.

6.1 Outline the research report format and its parts.

3RD YEAR - 1ST S EMESTER

EEE 337 ELECTRICAL EQUIPMENT MAINTENANCE

The student goes through various maintenance principle as
well as preparation and use of maintenance schedules and records keeping.

Electrical machines maintenance

Maintenance Principles: preventing maintenance, unscheduled maintenance. Maintenance of equipment, motors, generators and exciters, switch gear, transformers, control panel etc. Motor, transformer and coil rewinding. Preparation and use of maintenance schedules and records keeping

Maintenance of instruments

Maintenance of**:**

-Analogue maters
-Digital meters
-Recorders
-Insulation testers
-Logic analyzer
-Spectrum analyzer
-Microprocessors

3RD YEAR 1ST SEMESTER

EEE 345 ELECTRICAL ENGINEERING PRACTICE (3, 0, 3)

OBJECTIVES: The student learns Electrical and Electronics symbols, wiring of Domestic and industrial premises: he should, as well as, know the Ghana Wiring Code.

Electrical Engineering Drawing
Electrical and Electronics symbols – wiring or connection diagrams – blocks diagrams – Printed circuits – electric power layout drawing.

Design and Installations – Domestic and Industrial wiring. Interpretation Design.

3RD YEAR – 1ST SEMESTER
SMS311 MANAGEMENT AND ORGANISATIION

General Objectives:
At the end of the module, students should:
1.0 understand some of the functions of management
2.0 understand the principles of work study
3.0 be familiar with labour relations
4.0 be aware of basic financial considerations

Performance Objective

1. Function of Management

1.1 Define planning, and describe some of its principles.
1.2 Distinguish between strategy and tactics
1.3 Give examples of strategy planning and tactical planning.
1.4 Distinguish between power and authority
1.5 Describe power and authority as the basis of the organisation function.
1.6 Identify departmentalisation ass the delegation of authority.
1.7 Discuss the issues implicit in line management and staff management.
1.8 Distinguish between the action of controlling events and reacting to events.
1.9 Compare the results of bureaucracy and ad-hocracy.
1.10 Explain the benefit of group organisation-formal and information.

2.0 Work Study

4.10 Describe the principles of work study
4.11 Identify the principal stages in the implementation of work study
4.12 Prepare an analysis of operations, given a description of a sequence of operations.
4.13 Relate working conditions to operational efficiency.
4.14 Discuss the effects of human intervention on the implementation of a work.
4.15 Prepare network analysis and critical path analysis, using a case study.
4.16 Justify the decisions made in 2.3 and 2.6.

3.0 Labour Relations

3.1 Write a job specification for a chosen position within the engineering manufacturing industry.
3.2 Specify conditions for the selection and training of personnel.
3.3 Devise a simple training programme to initiate trainees into safe working practice in a workshop.
3.4 Justify the decisions made in 3.3.
3.5 Participate in a role play interview as
(a) an interviewer
(b) an interviewee

3.6 Comment upon the performances in 3.5 during a feedback session.

3RD YEAR 1ST SEMESTER

EEE 325 COMPUTER APPLICATIONS (0, 6, 2)

Objectives: Students are taught the applications of software package in solving problems in industries a institutions.

Application of computer software in institutions and industries: eg, simulation packages, windows, excel, word etc

EEE 301 MICROCOMPUTERS

The objective is to lean about the organization and programming microprocessors.

Microprocessor classification (organization, word length, technology). Typical organizations of micro-processors with examples. Semi-conductor memories and interface devices. Programming micro-processor. Development aids for hardware and software. Multi-microprocessor systems.
Typical applications with design examples.

3RD YEAR - 1ST SEMESTER

EEE 343 (ELECTRICAL ENGINEERING LAB V (POWER ELECTRONICS I)

The objective of this laboratory course is to let the student perform experiments on the characteristics of scar's. TRIACS etc. to make them appreciate what they study in the class.

The student attends this lab once a week and every class lasts 3 hours.
Experiments:- Characteristics of S.C.R., triads

- Triggering circuits
- Phase angle a control circuits
- Protection

Circuits should be constructed and tested

3RD YEAR – 1ST SEMESTER

EEE 343 ELECTRICAL ENGINEERING LAB V (MICROCOMPUTER)

This Laboratory work is to provide the student with skills in micro processing techniques.
-Construction of a typical semi-conductor memories
-Exercises in microprocessor programming
-Exercises in fault location using

i) d.c. tests
ii) logic probe
iii) oscilloscope

3RD YEAR – 1ST SEMESTER

EEE 343 ELECTRICAL ENGINEERING LAB V (TELECOMMUNICATIONS III)

Operation of television camera in the Line-up of television camera.
Experiment with mixing of primary colours
Pulse renewration for NTSC, PAL and SECAM systems sound recording, Video Recording.

3RD YEAR – 1ST SEMESTER

EEE ELECTRICAL ENGINEERING LAB V (MEDIAL EQUIPMENT TECHNOLOGY)

The student is to learn calibration, trouble shooting and maintenance procedures for electro-medical equipment and X-ray equipment.
-calibration, Function checks, trouble shooting and repairs
-maintenance procedures for electro-medical equipment and X-ray equipment.

3RD YEAR - 1ST SEMESTER

EEE 343 ELECTRICAL ENGINEERING LAB V (POWER SYSTEMS III)

Objectives: The objective to this course is to perform experiments on the topics treated in the power system lectures.

The student attends this lab once a week and very class lasts 3 hours.

Experiments:- Overhead transmission line model
-Insulator string
-Non-Destructive testing of insulators.
At least one visit to a High Voltage sub station

3RD YEAR – 1ST SEMESTER

EEE 341 POWER SYSTEMS III

Objectives Students are to study planning of substations for economy and safety. Other topics includes transmission networks, overhead +lines, cables, over-voltage transients, insulation and breakdown.

Substation:

Supply System, operating voltages: high – medium – and low-voltage network: substations layouts and components, busbar arrangements(advantages and disadvantages).

Transmission networks: Parameters: Primary (RLCG) and general (ABCD) parameters, transmission line equations; shot line and long line charts; surge impedance.

Overhead Lines

Construction, Sag, tension, vibration, insulators, thermal electric stress; line and earth conductors.

Cables
Construction d.c and a.c electric stress, thermal characteristics, sheath currents.

Over voltage transients
Lighting; switching, reflection at discontinuity single-phase calculations.

Insulation and Breakdown
Breakdown process in solid and gaseous elements insulation of power plants, overall system insulation co-ordination. Lighting and long-are breakdown mechanism. High-voltage testing, non-destructive, testing techniques.

3RD YEAR - 1ST SEMESTER

EEE 331 - POWER ELECTRONICS I (3, 0, 3).

Objectives: The objective is to study the characteristics of devices, line commutated converters, principles and application of apt-couples as well as protection and components.

Switching devices

Heavy current and high voltage devices, characteristics of diodes, thyristors (including gate turn-off) triads, power bi-polar and MOS transistors, temperature effects and cooling; firing and drive circuitry.

Line Commutated Converters

Single and three-phase bridge converters, half and fully controlled, free wheel diode.
Characteristics with passive and active (motor) loads; rectification and inversion; continuous and discontinuous current. Commutation overlap; 12 and 24 pulse circuits. Transformer connections and ratings; influence on supply; harmonies.

Drive circuits
Opto couples – principles and application.
Uninjunction transistor principles, relaxation oscillator and phase angle controller.

Protection and Components
Over voltage and over-current protection; DI/DT and DV/DT limiting; snubber network, chokes and capacitors for power filters

3RD YEAR – 1ST SEMESTER

EEE 311 - TELECOMMUNICATIONS III (3, 0,3)

Objectives; It is intended to teach students the operation of Television Camera and production of pulses in NTSC, PAL and SECAM systems. It also covers sound and Television transmission. Television receivers and monitors and Test techniques in broadcasting stations.

Sound and Television Generation: The operation of the television camera for monochrome and colour, scanning circuits and generation of video wave-forms. Production of synchs. Pulses in NTSC, PAL and SECAM systems, coders and decoders. Sound and vision recording techniques in broadcasting studios. Power supplies to studio equipments.

Sound and Television Transmission: Frequency bands for sound and television broadcasting. Signal propagation in the LF, MF, HF, VHF, UHF and SHF regions.
Sound and television transmitters. Components, valves transistors, etc. Operation of transmitters in parallel. Suppression of harmonies, etc.
Modulation systems, linear and high level types. Broadcast transmission aerials and feeders.
Television receivers and monitors. Test techniques in television and sound broadcasting stations.

3RD YEAR – 1ST SEMESTER

EEE 323 - COMPUTER OPERATING SYSTEMS (3, 0, 3,)

The objective of this course is to introduce students to the types of operating systems, pal time clock management, file system and process concept.

Introduction:
Operating system types, hierarchical structures.
Process concept: data bases: process creation termination, suspension, resumption,
Coordination: message passing; context switch.

Main memory management; organization and realization. Interrupt processing: input / output interrupt, dispatcher, rescheduling while processing an interrupt. Exceptions, traps and illegal interrupts.

Real time clock management: organization and realization file system, disk and file servers, data structure for file system, and the directory structure.

Device: independent input / output. Device drivers. Disk drivers a data link communication driver. System initialization.

3RD YEAR – 1ST SEMESTER

EEE 315 MEDICAL EQUIPMENT TECHNOLOGY I (3, 0 ,3)

The aim is to be able to carry sophisticated repair and maintenance of equipment, including X-ray incubators, short wave dithering.

The basic knowledge of equipment needed to communicate with medical staff is also covered.

Electro-Medical Equipment

Basic principles of relevant human organs. Related electronics and electrotechnics principles.
Basic principles of ECG, EEG and EMG intensive care and monitoring, requirement.
Defibrillators, Spirometers. Audiometers, Dialysis machines, Infant incubators, water treatment, intensive care ventilators, short wave Diathermy, Patient safety.
Diagnostic X-ray Equipment

Diagnostic X-ray Equipment Theory which includes Radiation Physics, X-ray (Basic and measurement techniques). Radiography (body section, skill tables, serial techniques etc.). small capacity X-ray units.

Fluoroscopic equipment. Principles of image intensifier and television techniques.

3RD YEAR – 1ST SEMESTER

EEE 321 - CONTROL SYSTEM (3, 0, 3)

Objective: This course enables students to analyse control systems using graphical techniques.

Block Diagrams

Transfer functions:

Specification and performance criteria in time and frequency domain Feedback theory; feedback for improvement of stability property Feedback as suppressor of external disturbances Feedback as protector against parameter variations. Sensitivity function at zero frequencies and other frequencies.

Graphical Techniques for control system analysis use of the Nyquist criterion. Bode plots, Root locus plots, output-feedback and compensation network.

3RD YEAR – 2ND SEMESTER

EEE 328 - FAULTS DIAGNOSIS (0, 6, 2)

The course aims at suing measuring instruments in the fault diagnosis in electrical machines, power systems and electronic systems.

Electrical Machines

Interpretation of schematic diagrams use of measuring instruments in fault diagnosis, fault diagnosis in:

Motor: Open and short circuits in windings, Star-delta, auto transformer and direct on line starters.

Control Panels: Contactors, timers, limit switches etc.
Programmable logic control (PLC)

Power systems
Locating Faults in distribution networks

- Interpretation of network diagrams; normally open isolators or switches.
- Fault indicators on protective relays and switch gears
- Point to point switching within affected network.
- Visual examination of overhead lines damaged insulators, broken conductors.
- Pin-pointing of underground cable faults instruments such as surge generator, geophone, cable route locate etc.

3RD YEAR – 2ND SEMESTER

EEE 306 ELECTRONIC SERVICING (3, 0, 3)

Objectives:

The objective of this course is to enable students test and diagnose faults in power supplies, amplifiers, oscillators and basic digital circuits. It is also aimed at testing and fault finding in microprocessor based system, radio and television circuits and control systems.

01 Testing and diagnosing faults in power supplies.
02 Measuring, testing and diagnosing faults in (low frequency) amplifiers.
03 Basic measurement, testing of oscillators and multi-vibrators, and wave-form generators.
04 Testing and fault finding on basic digital circuits.
05 Testing adjustment and fault finding in radio and television circuits.
06 Testing and fault finding in basic control systems and associated sub-systems.

3RD YEAR – 2ND SEMESTER

EEE 344 ELECTRICAL ENGINEERING LAB VI (POWER ELECTRONICS II)

The objective is to let students build circuits to study investors, dc/dc converters, electronic machine drivers, speed control induction heating and switch mode power supplies.

The student attends this lab once a week and every class lasts 3 hours.

Experiments:- Inverters – single phase and 3-phase
- -Ac/Dc converters
- -Electronic machine drivers starting, speed control
- -Induction heating
- -Switch mode power supplies

circuits should be constructed and tested.

3RD YEAR – 2ND SEMESTER

EEE 344 ELECTRICAL ENGINEERING LAB VI (POWER SYSTEMS IV)

The student is to have experience in the laboratory energy and power meters, circuits breakers and protective relays.
The student attends this lab once a week and every class lasts 3 hours

Experiments:- Energy and power meters
-Circuits Breakers
-Protection Relays

3RD YEAR – 2ND SEMESTER

EEE 344 - ELECTRICAL ENGINEERING LAB VI (CONTROL SYSTEMS III)

Objective: In order to enable student gain better understanding of the control systems course, some of the experiments he will performance in serve motors, D.C tracking systems. AC serve systems and gyroscopes.

The student attend this lab once a week and every class lasts 3 hours.

Experiments: - Serve motors, D-C tracking systems. Simulation of tracking system on an analogue computer. PID controller. A-C serve system Gyroscopes.

3RD YEAR – 2ND SEMESTER

EEE 344 ELECTRICAL ENGINEERING LAB VI (TELECOMMUNICATIONS)

Students will perform experiments in the use of smith Chart, transmission is rectangular and restigial side band signals.

Use of Smith Chart
Experiments on effect of different types of filters, TT, T, L on signals.

Transmission of rectangular pulses by linear passive networks.

Generation of AM, DSB, SSB, ISB, Vestigial side-band signals operation of strogear and crossbar systems in telephony.

3RD YEAR – 2ND SEMESTER

EEE 344 ELECTRICAL ENGINEERING LAB VI (DIGITAL COMPUTER DESIGN)

The students is to perform experiments which will enable him to understand the theory better.

1. Instruction format in assembler language
2. Design a logic circuit from a given Boolean expression
3. Build and test D/KJ Flip-flops using logic gates
4. Construct (i) Serial Shift registers (ii) parallel shift registers
5. Build a divide by 4 synchronous counter.

EEE 344 - ELECTRICAL ENGINEERING LAB VI (MEDICAL EQUIPMENT TECHNOLOGY)

The objective is to learn maintenance procedures for operating theatre equipment and dental equipment.

Maintenance procedure for operating theatre equipment and dental equipment.

3RD YEAR – 2ND SEMESTER

EEE 342 POWER SYSTEMS IV (3, 0, 3)

Objectives; this is an advanced level studies on system operations, circuit breakers and projections.

System Operation:

Instrumentation: Voltage and current transformers, indicating and integrating meters. Central control, telemetry of data and control signals.

Circuit Breakers:

Are phenomena, are control, d.c and a.c interruption, recovery voltage transients, types of circuit breakers, rating, testing.

Protection:

Philosophy of power system protection current operated devices: Qualities required of protection:
Components of protection schemes; protection systems; distance protection; unit protection schemes; generator protection, transformer protection, feeder protection, busbar protection, protection using digital computers.

3RD YEAR – 2ND SEMESTER

EEE 332 - POWER ELECTRONICS II (3, 0, 3)

Objectives: The objective of this course is to let students know about force commutated converters, inverters and their applications.

Force Commutated Converters:

Commutation techniques; resonant turn-off, capacitor and auxiliary device, Thyristor bridge inverter; single and three phase, Operation with passive and active loads. Chopper Application to passive loads.
Transistor and GTO bridge inverters; current-fed and Voltage-fed characteristics. Modulation strategies. High frequency inverters.

Application

Electric; braking of Dc and Ac motors. Speed control. Variable speed on Dc and Ac drives
Induction heating. Switch mode power supplies.

Analogue Computers:

Methods of simulating control systems. Operation of the following units of an analogue computer in potentiometer, operational amplifier, summer, integrator circuit diagram to simulate in linearties such as saturation and backlash. Amplitude and Time scaling.

3RD YEAR – 2ND SEMESTER

EEE 312 TELECOMMUNICATIONS IV (3, 0, 3)

Objectives: this course networks, transmission lines and wave guides, filters, choice of carrier frequency, telegraphy transmission and testing techniques in telephony and telegraphy systems.

Networks, transmission line and wave guide. Advance treatment of characteristic impedance, propagation coefficient, attenuation and phase changes. Mismatch at different terminations. Use of the smith Chart. Filters, T and L types. Insertion loss, etc.

Balanced modulators. Transmission of rectangular pulses by linear passive networks. FDM, TDM Basic CCITT channel specifications. Assembly of basic groups. Choice of carrier frequency.

Assembly of super group. Generation of carrier harmonies for CCITT group and super group. Signal-to-noise ratio requirements for channels etc.

Telegraphy transmission. Codes, Principles and practice of multi-channel voice frequency telegraphy. Frequency shift telegraphy. The teleprinter.

The facsimile . The telephone, Strow gear step-by step system. Group and find selectors. Grade of service, DTD, non-director, director system. The crossbar systems. Basic features of carrier telephone system. Electronic exchanges. Testing techniques in telephony and telegraphy systems. Satellite transmission, cellular radio telephony, fibre optics.

3RD YEAR – 2ND SEMESTER

EEE 324 DIGITAL COMPUTER DESIGN (3, 0, 3)

Historical background, impact of technological advance. The classical model of a digital computer . Instruction format, addressing modes. Hardware description, languages.

Types of memory systems and their organization.
Accessing methods. Random, serial, direct and associative, secondary storage, bubble and CCD memory. Hierarchical structures.

Virtual storage, cache, DMA, channels remote access. Processing and input/output overlap. The control unit, micro-programming, stack computers, overlapping and pipeline, parallelism.

3RD YEAR – 2ND SEMESTER

EEE 316 MEDICAL EQUIPMENT TECHNOLOGY II (3, 0, 3)

The objective is to carry out repairs and maintenance of standard theatre equipment and Dental equipment.

Standard Operating Theatre Equipment.

Relevant circuitry for equipment: includes photometer, water distiller, softness, water baths, incubators, balances, pH-meters, electrophoresis equipment, centrifuges, hot air ovens etc.

Dental Equipment

Dental surgery layout, dental chair and unit.
Operating lights, dental X-ray and film processor, Amalgam mixer and shaker, dental air compressor, sterilizers, ultrasonic descaler, suction unit.

LIST OF RECOMMENDED TEXT BOOKS

1. **CIRCUIT DEVICES AND SYSTEMS (FOURTH EDITION BY R.J. SMITH)**
2. **HIGHER ELECTRICAL ENGINEERING BY SHEPHERED A. H MORTON AND L. F. SPENCE**
3. **OPERATIONAL AMPLIFIERS**

3RD YEAR – 2ND SEMESTER

EEE 322 CONTROL SYSTEMS III (3, 0, 3)

Objectives: The students is to gain knowledge in process control, analogous computer and logic systems.

Process Control:

Block diagrams for process control systems. Graphics to show response of a system to a step input following control actions, proportional plus derivatives, proportional plus integral, the three term controller.

The Ziegher – Nicholas method for setting up the parameters of a three-term controller.

2ND YEAR – 1ST SEMESTER

EEE 211 TELECOMMUNICATION I

Objective: This course is intended to provide students with sufficient background knowledge to understand the basic principle behind Radio Communication and Line Transmission. It includes propagation frequencies up to 300 MHz, AM and FM, the super-heterodyne principle, Noise and Cross talk, carrier telephone and Multi-channel Voice Frequency, Telegraphy Systems.

Radio Telecommunications

Propagation of frequencies up to 300MHz. Amplitude and Frequency Modulation, PM, PAM, PCM, PWM,. The superheterodyne principle. Single and double-sideband transmission. Block diagram of broadcast transmitter and receivers. Use of standard and FM-signal operators for test purpose.
Communication systems: quantization, sampling, coding and decoding.

Transmission

Simple treatment of the dc/ac transmission line. Statement of characteristic impedance and propagation coefficient. Reflection at impedance changes. Primary coefficients of overhead and underground lines. Noise and cross talk. Carrier telephone, digital hierarchy and multi-channel voice frequency telegraphy systems. Trunk, junction and local circuits, transmission requirements. Articulation, intelligibility and repetition rates. Design, construction, maintenance and routine mounting of plant. Mounting and cabling of audio and carrier transmission equipment. Power plant transmission equipment.

2ND YEAR – 1ST YEAR SEMESTER

EEE 243 ELECTRICAL ENGINEERING LAB III (TELECOMMUNICATIONS 1)

The students perform experiments on AM, FM signals

Experiments/Demonstration:

amplitude modulation using signal generators and a CRO
determine modulation factor and modulation index of amplitude-modulated wave
frequency modulation
standard and FM signal generators
voltage drop and power loss in lines and cables

2ND YEAR – 2ND SEMESTER

EEE 244 ELECTRICAL ENGINEERING LAB IV (TELECOMMUNICATIONS)

Objective: This course enables students to perform experiments such as wave-guide, cavity resonators, and determination of radiation polar diagram of a simple half-wave dipole.

Experiment:- On wave guide and activity resonators
- -Use of slots and screws for matching
- -Measurement of VSWR (Voltage standing wave ratio)
- -Determination of radiation polar diagram of a simple half-wave dipole
- -Measurement of amplitude and phase response at IF of a microwave system

3RD YEAR – 1ST SEMESTER

EEE 311 TELECOMMUNICATIONS III (3, 0,3)

Objectives; It is intended to teach students the operation of Television Camera and production of pulses in NTSC, PAL and SECAM systems. It also covers sound and Television transmission. Television receivers and monitors and testing techniques in broadcasting stations.

Sound and Television Generation:

The operation of the television camera for monochrome and colour, scanning circuits and generation of video wave-forms. Production of synchs. Pulses in NTSC, PAL and SECAM systems, coders and decoders. Sound and vision recording techniques in broadcasting studios. Power supplies to studio equipments.

Sound and Television Transmission:

Frequency bands for sound and television broadcasting. Signal propagation in the LF, MF, HF, VHF, UHF and SHF regions.

Sound and television transmitters. Components, valves transistors, etc. Operation of transmitters in parallel. Suppression of harmonies, etc.
Modulation systems, linear and high level types. Broadcast transmission aerials and feeders.
Television receivers and monitors. Testing techniques in television and sound broadcasting stations.

3RD YEAR – 1ST SEMESTER

EEE 343 ELECTRICAL ENGINEERING LAB V (TELECOMMUNICATIONS III)

Operation of television camera in the Line-up of television camera. Experiment with mixing of primary colors Pulse regeneration for NTSC, PAL and SECAM systems sound recording, Video Recording.

3RD YEAR – 2ND SEMESTER

EEE 312 TELECOMMUNICATIONS IV (3, 0, 3)

Objectives: this course introduces networks, transmission lines and wave-guides, filters, choice of carrier frequency, telegraphy transmission and testing techniques in telephony and telegraphy systems.

Networks, transmission line and wave-guide. Advance treatment of characteristic impedance, propagation coefficient, and attenuation and phase changes. Mismatch at different terminations. Use of the smith Chart. Filters, T and L types. Insertion loss, etc.

Balanced modulators. Transmission of rectangular pulses by linear passive networks. FDM, TDM Basic CCITT channel specifications. Assembly of basic groups. Choice of carrier frequency.

Assembly of super group. Generation of carrier harmonies for CCITT group and super group. Signal-to-noise ratio requirements for channels etc.

Telegraphy transmission. Codes, Principles and practice of multi-channel voice frequency telegraphy. Frequency shift telegraphy. The teleprinter.

The facsimile . The telephone, Strow gear step-by step system. Group and find selectors. Grade of service, DTD, non-director, director system. The crossbar systems. Basic features of carrier telephone system. Electronic exchanges. Testing techniques in telephony and telegraphy systems. Satellite transmission, cellular radio telephony, fibre optics.

3RD YEAR – 2ND SEMESTER

EEE 344 ELECTRICAL ENGINEERING LAB VI (TELECOMMUNICATIONS)

Students will perform experiments in the use of smith Chart, transmission in rectangular and vestigial side band signals.

Use of Smith Chart
Experiments on effect of different types of filters, TT, T, L on signals.

Transmission of rectangular pulses by linear passive networks.

Generation of AM, DSB, SSB, ISB, Vestigial side-band signals operation of strogear and crossbar systems in telephony.

3RD YEAR – 2ND SEMESTER

EEE 344 ELECTRICAL ENGINEERING LAB VI (DIGITAL COMPUTER DESIGN)

The students is to perform experiments which will enable him to understand the theory better.

6. Instruction format in assembler language
7. Design a logic circuit from a given Boolean expression
8. Build and test D/KJ Flip-flops using logic gates
9. Construct (i) Serial Shift registers (ii) parallel shift registers
10. Build a divide by 4 synchronous counter.

EEE 344 - ELECTRICAL ENGINEERING LAB VI (MEDICAL EQUIPMENT TECHNOLOGY)

The objective is to learn maintenance procedures for operating theatre equipment and dental equipment.

Maintenance procedure for operating theatre equipment and dental equipment.

3RD YEAR – 2ND SEMESTER

EEE 342 POWER SYSTEMS (3, 0, 3)

Objectives; this is an advanced level studies on system operations, circuit breakers and projections.

System Operation:

Instrumentation: Voltage and current transformers, indicating and integrating meters. Central control, telemetry of data and control signals.

Circuit Breakers:

Are phenomena, are control, d.c and a.c interruption, recovery voltage transients, types of circuit breakers, rating, testing.

Protection:

Philosophy of power system protection current operated devices: Qualities required of protection:
Components of protection schemes; protection systems; distance protection; unit protection schemes; generator protection, transformer protection, feeder protection, busbar protection, protection using digital computers.

3RD YEAR – 2ND SEMESTER

EEE 332 - POWER ELECTRONICS II (3, 0, 3)

Objectives: The objective of this course is to let students know about force commutated converters, inverters and their applications.

Force Commutated Converters:

Commutation techniques; resonant turn-off, capacitor and auxiliary device, Thyristor bridge inverter; single and three phase, Operation with passive and active loads. Chopper Application to passive loads.
Transistor and GTO bridge inverters; current-fed and Voltage-fed characteristics. Modulation strategies. High frequency inverters.

Application

Electric; braking of Dc and Ac motors. Speed control. Variable speed on Dc and Ac drives
Induction heating. Switch mode power supplies.

Analogue Computers:

Methods of simulating control systems. Operation of the following units of an analogue computer in potentiometer, operational amplifier, summer, integrator circuit diagram to simulate in linearties such as saturation and backlash. Amplitude and Time scaling.

3RD YEAR – 2ND SEMESTER

EEE 312 TELECOMMUNICATIONS IV (3, 0, 3)

Objectives: this course networks, transmission lines and wave guides, filters, choice of carrier frequency, telegraphy transmission and testing techniques in telephony and telegraphy systems.

Networks, transmission line and wave guide. Advance treatment of characteristic impedance, propagation coefficient, attenuation and phase changes. Mismatch at different terminations. Use of the smith Chart. Filters, T and L types. Insertion loss, etc.

Balanced modulators. Transmission of rectangular pulses by linear passive networks. FDM, TDM Basic CCITT channel specifications. Assembly of basic groups. Choice of carrier frequency.

Assembly of super group. Generation of carrier harmonies for CCITT group and super group. Signal-to-noise ratio requirements for channels etc.

Telegraphy transmission. Codes, Principles and practice of multi-channel voice frequency telegraphy. Frequency shift telegraphy. The teleprinter.

The facsimile . The telephone, Strow gear step-by step system. Group and find selectors. Grade of service, DTD, non-director, director system. The crossbar systems. Basic features of carrier telephone system. Electronic exchanges. Testing techniques in telephony and telegraphy systems. Satellite transmission, cellular radio telephony, fibre optics.

3RD YEAR – 2ND SEMESTER

EEE 324 DIGITAL COMPUTER DESIGN (3, 0, 3)

Historical background, impact of technological advance. The classical model of a digital computer . Instruction format, addressing modes. Hardware description, languages.

Types of memory systems and their organization.
Accessing methods. Random, serial, direct and associative, secondary storage, bubble and CCD memory. Hierarchical structures.

Virtual storage, cache, DMA, channels remote access. Processing and input/output overlap. The control unit, micro-programming, stack computers, overlapping and pipeline, parallelism.

3RD YEAR – 2ND SEMESTER

EEE 316 MEDICAL EQUIPMENT TECHNOLOGY II (3, 0, 3)

The objective is to carry out repairs and maintenance of standard theatre equipment and Dental equipment.

Standard Operating Theatre Equipment.

Relevant circuitry for equipment: includes photometer, water distiller, softness, water baths, incubators, balances, pH-meters, electrophoresis equipment, centrifuges, hot air ovens etc.

Dental Equipment

Dental surgery layout, dental chair and unit.
Operating lights, dental X-ray and film processor, Amalgam mixer and shaker, dental air compressor, sterilizers, ultrasonic descaler, suction unit.

LIST OF RECOMMENDED TEXT BOOKS

4. **CIRCUIT DEVICES AND SYSTEMS (FOURTH EDITION BY R.J. SMITH)**
5. **HIGHER ELECTRICAL ENGINEERING BY SHEPHERED A. H MORTON AND L. F. SPENCE**
6. **OPERATIONAL AMPLIFIERS**

3RD YEAR – 2ND SEMESTER

EEE 322 CONTROL SYSTEMS III (3, 0, 3)

Objectives: The students is to gain knowledge in process control, analogous computer and logic systems.

Process Control:

Block diagrams for process control systems. Graphics to show response of a system to a step input following control actions, proportional plus derivatives, proportional plus integral, the three term controller.

The Ziegher – Nicholas method for setting up the parameters of a three-term controller.

CVE 113ELECTRONICS/ELECTRICITY 1 (3, 0, 3)
ELECTRONICS
Objectives:

The objectives of this course is to introduce students to the basic physics and applications of diodes, resistors, and thyristors. It also serves on our introduction to the various types of amplifiers, switching device and power supplies.

Semi-conductor materials:
Intrinsic and extrinsic semi-conductors, p-n junction. Current/ voltage (V-I) characteristics, junction barrier, junction break-down, applicatiions of p-n diode, rectifiers.

Transistors:- The Bipolar junction and field effect transistors, current / voltage (V-I) characteristics of CE. CB and CC(CS,CD & CG) configuration,

Transistors as amplifiers: Introduction to electronics amplifiers, amplifier states, biasing, stability, load line techniques for transistor amplifiers. Design considerations for an AC/DC coupled amplifier.

Power supply: Rectifiers, power supplies, passive filters, multipliers, voltage regulation, AC/AD converters, thyristors – operation and characteristics, single-phase controlled rectifiers.

ELECTRICITY
Objective:

This is an introductory course in a.c. three – phase circuits and transformers. Calculation of losses and efficiency and other general characteristics are included.

Three phase systems, definitions, symmetrical and non-symmetrical load, active and reactive power, apparent power, power factor.

Single-phase and three-phase transformers, construction, principle of operation, equivalent circuit, phasor diagrams, voltage regulations, no-load, short-circuit operation, efficiency, all-day efficiency, parallel operation, methods of cooling, tap changing (non-off load).

Special transformers: Autotransformers, construction, and principle of operation, applications.

EEE 234 BASIC ELECTRONICS (3, 1, 3)
ELECTRONICS
Objectives:

The objectives of this course is to introduce students to the basic physics and applications of diodes, resistors, and thyristors. It also serves on our introduction to the various types of amplifiers, switching device and power supplies.

Semi-conductor materials:
Intrinsic and extrinsic semi-conductors, p-n junction. Current/ voltage (V-I) characteristics, junction barrier, junction break-down, applications of p-n diode, rectifiers.

Transistors:- The Bipolar junction and field effect transistors, current / voltage (V-I) characteristics of CE. CB and CC(CS,CD & CG) configuration,

Transistors as amplifiers: Introduction to electronics amplifiers, amplifier states, biasing, stability, load line techniques for transistor amplifiers. Design considerations for an AC/DC coupled amplifier.

Power supply: Rectifiers, power supplies, passive filters, multipliers, voltage regulation, AC/AD converters, thyristors – operation and characteristics, single-phase controlled rectifiers.

DIGITAL ELECTRONICS

Objective: Students are introduced to digital systems, A/D and D/A converters

Digital Systems: Basic logic families, basic logic gates, Boolean algebra, minimization of logic expressions by Karnaugh Maps, flip flops: JK, D- types, JK master –slave, latches shift registers, counter, introduction to general sequential techniques. Applications-digital circuit analysis, hard wired logic.

A – D and D – A converters and their principles of operation. Number system: binary, octa and hexa –decimals.

EEE 221 INTRODUCTION TO PROGRAMMING (1,2,2) (recommended)

OBJECTIVES: This course introduces the student to computer organization, Input/Output devices and computer programming. Students should be taken through lab. and program writing exercises. General format of verbs used, flow chart or pseudocode should be treated.

Computer organization C.P.U. function, memory devices and organization, executing a stored programmed, interrupt input/Output (I/O) devices,.

Computer programming
High level programming-BASIC –, constants, variables, statements, order of operation, control structures (repetition, selection, sequence) steps in writing programs, system commands, conditional and unconditional branching, system defined functions, user defined functions and subroutine.

EEE 301 MICROCOMPUTERS (3,0,3) (recommended)

The objective is to learn about the architecture, general structure and programming microprocessors.

Definitions, historical development of microprocessors
(SSI, MSI, LSI, VLSI)
Microprocessor classification: bit, byte, half word, word, double word, and long word, quad word Microprocessor chip nomenclature for various manufacturers.
Semi-conductor memory technology, interface accessories. Programming microprocessor.
RISC & CISC systems, pipelining
Design consideration page size, line size, cache size, associatively
General Structure
Memory hierarchy.
Architecture - instruction format, Data format, instruction set, Addressing modes.
Comparism of page & segment

Intel or Motorola Chip

2ND YEAR 1ST SEMESTER

MATHS 211 ENGINEERING MATHEMATICS 111

1. Ordinary Differential Equation (o.d.e.)	-	linear differential equations of 1st
	-	second order linear equations with constant coefficients
2. Laplace transform	-	application to o.d.e.
3.Series	-	convergency and Divergency theorem

MEMORIAL
University of Newfoundland

Office the Registrar

14 June 2005

#200552511
Mr. Eric Dankwa
University Post Office
Box UC3
Cape Coast GHANA

Dear Mr. Dankwa:

This is in reference to your Admission to Memorial University for the 2006 Winter Semester.

Please be advised that before we can commence with a Transfer Credit Evaluation of the courses you have completed at Cape Coast Polytechnic, it will be necessary for you to submit detailed course outlines for all courses you have taken there. This information should include topics covered, textbooks used, method of evaluation and laboratory hours, if applicable and should be sent directly from an appropriate official at Cape Coast Polytechnic.

Upon receipt of the above, we will begin an evaluation and you will be notified in writing shortly thereafter of the results of this evaluation.

Sincerely,

Barbara Adams
Evaluations Officer

BA/rmn

ELECTRICAL MACHINES

TITLE OF BOOK	NAME OF AUTHUR
1. Electrical Machines and Drive Systems	C. B. Gray
2. Alternating Current Machines	M. G. Say
3. The General Theory of Alternating Current Machine	B. Ahkins R. G. Harley
4. Electrical and Electronic principles and Technology	John Bird
5. Electrical Technology	Hughes
6. Direct Current Machines	M.G. Say & E.O. Taylor
7. Introduction to Circuit Analysis	Ron Walls and Wes Johnstone
8. Transformer Assembly	V.S Anshin, Z.I. Hudiakov
9. Transformer Design Calculations	A. I. Goncharuk
10. Electric Machines	B.F. Tokarev
11. Fractional Horse-power Electric Machines	E.V. Armensky, G. B. Falk
12. Designing Electric Machines 1 & 2	I. P. Kapilova

NETWORKS

1.	Electrical Technology	Hughes
2.	DC/AC Electricity	Victor F. Veley
3.	Electric Circuit Fundamental	Floyd
4.	A.C. and D.C. Network Theory	A.J. Point and H.M. Howarth

TITLE OF BOOK	**NAME OF AUTHUR**

TELECOMMUNICATIONS

1.	Telecommunications Technology	R. L. Brewster
2.	Modern Electronic Communication	Gary Muller
3.	Radio System Technology	D. C. Green
4.	Telecommunication	Warren Hioki
5.	Television Receivers	K. F. Ibrahim
6.	UnderstandingFibre Optics	Jeff Hecht

COMPUTER LITERACY / PROGRAMMING

1.	Data Processing and Computer Studies	G. Willmott
2.	Introduction to Computer	Peter Norton
3.	(Programming with Microsoft) BASIC	Wayne M. Zage
4.	Basic Programming (A complete Course text)	B. J. Holmes
5.	Programming in FORTRAN 90	I. M. Smith

FAULT DIGONOSIS

1.	Faults in electric machines	P.G. Gemke

TITLE OF BOOK	**NAME OF AUTHUR**

ANALOGUE AND DIGITAL ELECTRONICS

1.	Logic Circuit	Noel M. Morris
2.	Electronics (A course for Engineers)	R.J. Maddock M Calcutt
3.	Electronic Device & components	J. Seymour
4.	Digital Circuit Design	Nicklans Wirth
5.	Electronics 3	D.C Green
6.	Electronics 5	D.C Green
7.	Electronic Signal Conditioning	Bruce Newby
8.	Logic Design	M. Wharton
9.	The art of Electronics	Paul Horowitz and Winfred Hill

MICROPROCESSOR

1.	Introduction to 6800/68000 microprocessors	Fredrick F. Dricscoll
2.	Advanced Microprocessors	Tabak

INSTRUMENTS AND MEASUREMENTS

1.	Fundamentals of Electrical Measurements	C. T. Baldwin
2.	Applied Electronic Instrumentation & Measurement	David Buchla, Wayne Mclachlan
3.	An introduction to electrical instrumentation and measurement systems	B. A. Gregory
4.	Electrical Technology	Hughes

ELECTRONIC SERVICING

1.	Electronic Testing & Fault Diagnosis	G. C. Loveday
2.	Instrument & Automatic Test Equipment	K.F. Ibrahim
3.	Microprocessor based system for the Higher Technician	R Vears

MATHEMATICS

1.	Mathematics for electrical Technicians	J. O. Bird and May
2.	Mathematical Methods for Science Students	G. Stephenson
3.	A first Course in Probability Theory Volume I	Nicholas N. Nuamah

	TITLE OF BOOK	**NAME OF AUTHUR**

POWER SYSTEMS

1.	Electrical Power System Protection	A Wright and C. Christopoulos
2.	Repair of Power Transformers	Z. Khudyakor and S. Kittel
3.	Principles of Electric Machines and Power Electronics	P. C. Sen
4.	Electrical Installation and Workshop Technology	F. G. Thompson
5.	Electrical Power Equipment & Measurements	Alan Symonds
6.	Power Engineering Systems	C. M. Arora
7.	Power Systems	H. Cotton

CONTROL SYSTEMS

1. Modern Control Systems — Richard C. Dorf & Robert H Bishop
2. Industrial Motor Control — Stephen L. Herman and Walter N. Alerich
3. Introduction to control systems Technology — Robert N. Bateson
4. A system's approach to programmable controllers — Fred Swainsson
5. Control system Design & Simulation — Jack Golten and Andy Verwer

POWER ELECTRONICS

1. Thyristor Controlled Power for Electric Motors — Raymond Ramshaw
2. DC/AC Electronic operational amplifiers — Nigel P. Cock & George Clayton

ENGINEERING PRACTICE

1. Electronic project designed Fabrication — Ronald A. Reis

TITLE OF BOOK — **NAME OF AUTHUR**

THERMODYNAMICS

1. Basic Engineering Thermodynamics — Raynor Joel

OTHERS

1. Electrical Installation Technology — F.G. Thompson
2. Electrical engineering — V. Kitaev
3. Electric machines &micro machines
4. Electrical safety (general installation)
5. Electronics for engineers — R.J. Maddock and D.M. Calcutt
6. Electronics for Electrical Installation — R. D. Puckering
7. Electrical Technology
8. Linear Circuit Analysis — Chikeng Tse

DIGITAL COMPUTER DESIGN

1. Fundamentals of computer engineering — Herman Cann & John O'Malley

ET 210

1. Evolution and Nature of Entrepreneurship

   - Concepts of Entrepreneurship
   - Meaning of Entrepreneurship
   - Characteristics of Entrepreneurship
   - Entrepreneurship process

2. Identifying a business opportunity
3. Evaluating a new business opportunity
4. Developing a business plan

ET 220

1. Managing a new Business
   - Management structures
   - Recruitments and appointment
   - Cash control
   - Production Management
   - Stock control
   - Records Keeping
   - Buying and Selling
   - Customer service
   - Organization of Business office
   - Family and Business matters

2. Regulation convening business operations in Ghana

3. Problems of Entrepreneurship in Ghana

ENTERPRENEURSHIP SYLLABUS HND II 0R III (MECH. & ELECT)

A. NATURE OF ENTREPRENEURSHIP

- Evolution of Entrepreneurship
- Meaning of Entrepreneurship
- Characteristics of Entrepreneurship
- Environmental conditioning of Entrepreneurs

B. IDENTIFYING NEW VENTURE OPPORTUNITIES

- Sources of new Ideas for you Products/Services
- Pitfalls in Selecting New Venture Opportunities

C. EVALUATING NEW VENTURE OPPORTUNITIES

- Business Opportunities Screening
- Establishing the feasibility of a New Venture

    - Technical Aspect
    - Environmental Analysis
    - Marketing Analysis
    - Financial Analysis
    - Organizational Plan

D. DEVELOPING AND USING A BUSINESS PLAN

E. MANAGING THE NEW BUSINESS

- Management Structure
- Staff Appointments
- Buying and Selling
- Stock Control
- Production Management
- Costing and Pricing
- Cash Planning and Control
- Records Keeping
- Organization of Business office

F. BUSINESS DEVELOPMENT IN GHANA

- Regulatory Framework for Enterprise Development
- Government Assistance to Enterprise Development
- Problems of Entrepreneurs in Ghana.