B.E. (ELECTRONIC) DEGREE PROGRAMME

AT

NED UNIVERSITY OF ENGINEERING
& TECHNOLOGY, KARACHI

COURSES OF STUDIES
Detailed Syllabi
2006 - 2007 BATCH

DEPARTMENT OF ELECTRONIC ENGINEERING
NED UNIVERSITY OF ENGINEERING & TECHNOLOGY,
KARACHI-75270, PAKISTAN

Issued by the
Registrar

NED UNIVERSITY OF ENGINEERING & TECHNOLOGY,
KARACHI-75270, PAKISTAN
Tel : 9243261 - 68 Fax : (92-21) 9243255
E-mail: registrar@neduet.edu.pk
Website : http://www.neduet.edu.pk

B.E. (ELECTRONIC ENGINEERING)
Courses of Studies
(For 2006 2007 Batch)

FIRST YEAR

S. No.	Course No.	Course Title	Maximum Marks	
			Theory	Practical
1	EL - 101	Electronic Engineering Drawing & Workshop	100	50
2	EL - 102	Basic Electronics	100	50
3	EE - 113	Basic Electrical Engineering	100	50
4	CS - 101	Introduction To Computers	100	50
5	ME -101	Engineering Mechanics	100	50
6	ME -105	Applied Thermodynamics	100	-
7	MS -105	Applied Chemistry	100	50
8	MS -111	Calculus	100	-
9	MS -121	Applied Physics	100	50
10	HS - 101	English	100	-
11	HS - 105	Pakistan Studies OR	100	-
	HS - 127	Pakistan Studies (For Foreigners)		

SECOND YEAR

1	EL - 231	Electronic Devices & Circuits	100	50
2	EL - 236	Amplifiers & Oscillators	100	50
3	EL - 254	Programming With 'C' Language	100	50
4	EE - 211	Circuit Theory-I	100	50
5	EE - 221	Instrumentation	100	50
6	EE - 246	Electrical Machines	100	50
7	EE - 281	Electromagnetic Fields	100	50
8	CS - 205	Logic Design & Switching Theory	100	50
9	MS- 222	Linear Algebra & Ordinary Differential Equations	100	-
10	MS- 224	Complex Variables & Fourier Analysis	100	-
11	HS - 205	Islamic Studies OR	100	-
	HS - 206	Ethical Behavior		

THIRD YEAR

S. No.	Course No.	Course Title	Maximum Marks	
			Theory	Practical
1	EL – 332	Integrated Circuits	100	50
2	EL – 335	Digital Electronics	100	50
3	EL - 343	Power Electronics	100	50
4	EL - 383	Industrial Electronics	100	50
5	EL - 386	Biomedical Engineering, Introduction to	100	50
6	EE - 312	Circuit Theory-II	100	50
7	EE - 391	Communication Systems-I	100	50
8	CS - 305	Computer Architecture & Organization	100	50
9	MS -331	Applied Probability & Statistics	100	-
10	HS - 303	Engineering Economics	100	-
11	HS - 304	Business Communication & Ethics	100	-

FINAL YEAR

1	EL – 401	Electronic Engineering Project	-	200
2	EL - 433	Solid State Devices	100	50
3	EL - 484	Opto Electronics & Microwave Systems	100	50
4	EL - 486	VLSI Design	100	50
5	EE - 472	Linear Control Systems	100	50
6	EE - 492	Communication systems-II	100	50
7	EE - 493	Digital Signal Processing	100	50
8	CS - 410	Microprocessor & Assembly Language	100	50
9	CS - 418	Computer Communication Networks	100	50
10	MS -442	Numerical Methods	100	-

ANNEXURE - B

EL 101 ELECTRONIC ENGINEERING DRAWING AND WORKSHOP

Mechanical Drawing: Drawing equipment and ... se of instruments. Basic

Electronic Engineering Drawing & Workshop
Course No. EL 101

PCB design and layout drawings using PCB softwares: From Schematic & Layout to Machine File generation. PCB parameters in detail, PCB technologies, single layers and multi layer boards PCB testing, Switches, PCB standards, Routing.

Operations of Voltmeters, Ohmmeters, Power supplies, Function generators & Oscilloscopes. Measuring parametric values of discrete passive components. Fabricating simple electronic circuits on breadboard, Fabricating PCB , Assembling & soldering components on PCB. PCB processes : CNC Drilling, Electroplating, Photoplotting, Laminating, Developing and Exposing.

Basic Electronics
Course No. EL 102

Introduction. PN junction diode, Unbiased diode, Barrier potential, Diffusion & drift current, Forward & reverse bias, Minority carrier current. Diode models: Ideal, practical & complete, Diode characteristics, Load line, Diode current equation. Capacitive effect on diode operation at high-frequency, Transient current, Temperature effect on diode operation. Diode applications; Rectifier, Switch, Communication, Wave-shaping, Voltage multiplier etc. Breakdown diode, Voltage regulator, Power Supply.

Field effect transistor; Device, Structure & Physical operation of the MOSFET, Current-voltage characteristics. DC analysis of MOSFET circuits, MOSFET as an amplifier, MOSFET as a switch, Biasing in MOS amplifier circuits.

Physical structure & operation modes of BJT, operation in the active mode, Large-signal model. DC analysis of BJT. BJT as an amplifier, Small-signal equivalent circuit models, Biasing techniques for discrete-circuit design. BJT as switch: Operation of npn in the cut-off & saturation modes, Basic BJT inverter.

T [illegible] (BJT) : Bipolar Junction Transistors, Construction and Operation, Static characteristic, Transistor configurations, DC Biasing of a Transistor, Types of Biasing, Biasing Techniques, DC circuit analysis, Load Line, Operating [illegible] stabilization. Transistor [illegible]

F [illegible] (FET) : Introduction to Field Effect Transistor, JFETS and MOSFETS.

The practical work will be based on the above course.

EE 114 BASIC ELECTRICAL ENGINEERING

Electrical Elements and Circuits : Energy and energy transfer, Electric Charge, Electric current, Potential difference and voltage, Electric power and energy, Electric circuit sources and elements, Resistance, Ohm's law, Inductance, Capacitance, Fundamental circuit laws, Kirchhoff's Laws, Direct application of fundamental laws to simple resistive networks, Introduction to node voltage and loop current methods.

Steady State AC Circuits: An introduction to periodic functions, RMS or effective, Average and maximum values of current and voltage for sinusoidal signal wave forms. The Phasor method of analysis an introduction, Application of phasor methods to simple AC circuits, Power and reactive power, Maximum power conditions.

Magnetic Circuits and Transformers : Magnetic effects of electric current, Magnetic circuit concepts, Magnetization curves, Characteristics of magnetic materials, Magnetic circuits with DC excitation, Magnetically induced voltages, Self inductance magnetic circuits with AC excitation, Hysteresis and eddy current losses, Introduction to transformer, the ideal transformer.

Electromechanical Energy Conversion: Basic principles, Generated voltage, Electromagnetic torque, Interaction of magnetic fields, Alternating current generators, Commutator actions, DC machine, Direct current generators, Electric motors, Losses and efficiency, Machine application considerations.

The practical work will be based on the above course.

CS 101 INTRODUCTION TO COMPUTERS

Development of the Modern Computers: Basic Computer Structure and Operations.

Data Representation and data structures, Coding, Computer Arithmetic, Organization & operations of the processor, Memory and I/O of a Minicomputer.

Introduction to Computer Science: Programming and problem solving (a) Algorithms (b) Step-wise refinement. Basic High level programming languages, Basic construction of FORTRAN and PASCAL. Programming examples, Models of control, Grammar, Reasoning about program.

The practical work will be based on the above course.

ME 101 **ENGINEERING MECHANICS**

Statics of Particles: Forces in a plane : Newton's First Law, Freebody diagram, Forces in space (rectangular components), Equilibrium of a particle in space.

Kinematics of Particles: Rectilinear and curvilinear motion of particles, Components of velocity and acceleration, Motion relative to a frame in translation.

Kinetics of Particles: Newton's Second Law, Dynamic equilibrium, Rectilinear and curvilinear motion, Work and energy, Kinetic energy of particle, Principle of Work and Energy, Conservation of energy, Impulse and momentum, Impulsive forces and conservation of momentum, Impact, Direct and oblique, Conservation of angular momentum.

Rigid Bodies: Equivalent systems of forces, Principle of transmissibility, Moment of a force, Couple, Varignous Theorem. Centre of gravity of a three-dimensional body and centroid of a volume. Moments of inertia, Radius of gyration, Parallel axis theorem.

Equilibrium of Rigid Bodies: Free-body diagram, Equilibrium in two and three dimensions, Reaction of support and connections, Equilibrium of two-force and three-force bodies.

Kinematics of Rigid Bodies: General Plane motions, Absolute and relative velocity and acceleration.

Plane Motion of Rigid Bodies: Force and acceleration. Energy and momentum, Conservation of linear and angular momentum.

Friction: Laws of dry friction, Angles of friction, Wedges, Square- threaded screws, Journal and thrust bearings.

Analysis of Structures: Internal forces and Newton's Third Law, Simple and space trusses, Joints and sections, Frames and machines, Forces in cable.

The practical work will be based on the above course.

ME 105 APPLIED THERMODYNAMICS

Thermodynamic Properties : Introduction, Working substance, System, Pure substance, PVT surface, Phases, Properties and state, Zeroth Law, Processes and cycles, Conservation of mass.

Energy and its Conservation : Relation of mass and energy, Different forms of energy, Internal energy and enthalpy, Work, Generalized work equation, Flow and non-flow processes, Closed systems, First Law of Thermodynamics, Open systems and steady flow, Energy equation of steady flow, System boundaries, Perpetual motion of the first kind.

Energy and Property Relations: Thermodynamics equilibrium, Reversibility, Specific heats and their relationship, Entropy, Second Law of Thermodynamics, Property relations from energy equation, Frictional energy.

Ideal Gas: Gas laws, Specific heats of an ideal gas, Dalton's Law of Partial Pressure, Third Law of the Thermodynamics, Entropy of an ideal gas, Thermodynamics processes.

Thermodynamics Cycles: Cycle work, Thermal efficiency and heat rate, Carnot cycle, Stirling cycle, Reversed and reversible cycles, most efficient engine.

Consequences of the Second Law : Calusius's inequality, Reversibility and irreversibility, Steady flow system.

Two-phase Systems: Two-phase system of a pure substance, Changes of phase at constant pressure, Steam tables, Superheated steam, Compressed liquid, Liquid and vapor curves, Phase diagrams, Phase roles, Processes of vapors, Mollier diagram, Rankine cycle, Boilers and ancillary equipment.

Internal Combustion Engines : Otto cycle, Diesel cycle, Dual combustion cycle, Four-stroke and two-stroke engines, Types of fuels.

Reciprocating Compressors : Condition for minimum work, Isothermal efficiency, Volumetric efficiency, Multi-stage compression, Energy balance for a two-stage machine with intercooler.

The practical work will be based on the above course.

MS 105 APPLIED CHEMISTRY

Gases : Gas Laws, Kinetic Gas Equation, Van Der Vaal's Equation, Critical Phenomenon, Liquification of gases, Specific heat (molar heat capacity)

Properties of Solution and Liquids : Surface Tension, Viscosity, Osmosis, Osmotic Pressure, pH-Buffer Solution, Spectrophotometry, Basic concepts of Colloidal Chemistry, Classification purification (dialysis).

Thermochemistry : Chemical Thermodynamics, Hess' Law, Heat of reaction, Relation between H and U measurement of heat reaction, Bomb Calorimeter.

Electrochemistry : Laws of Electrolysis, E.M.F. series, Corrosion (Theories, Inhibition and Protection).

Water and Sewage : Sources of water, Impurities, Hardness, Water softening, Purification of water for potable and industrial purposes, Electrodialysis. Introduction to environmental pollution, Main sources and effects. Sewage treatment.

Fuels : Types of fuels, Classification of fossil fuels.

Metals and Alloys : Properties and General composition of metals and alloys such as Iron, Copper, Aluminum, Chromium, Zinc, Used in engineering field.

Engineering Materials : Inorganic Engineering materials, Cement, Glass, Organic Engineering Materials, Polymers, Rubbers, Plastics, Paints, Semiconductors and Dielectric materials.

Practicals : Determination of total alkalinity of a given sample, Determination of total acidity of a given sample, Determination of the amount of ferrous ion in a given sample, Determination of total hardness of a given sample of water, Determination of surface tension of a given sample, Determination of coefficient of viscosity of a given sample, determination of chloride ion in a given sample, Determination of Bicarbonate and Carbonate ions in a given sample, Determination of turbidity in a given sample by precipitation, Determination of turbidity in a given sample by spectrophotometer, Plotting of titration curve and determination of total alkalinity in a given sample, Plotting of titration curve and determination of acidity in a given sample, Plotting a calibration curve and determination of ions present in a given sample.

The practical work will be based on the above course.

MS-111 **Calculus**

Set and Function: Define rational, irrational and real numbers; rounding off a numerical value to specified number of decimal places or significant figures; solving quadratic and rational inequalities involving modulus with graphical representation ; Definition of set, set operations, Venn diagrams, DeMorgan's laws, Cartesian product, Relation, Function and their types (Absolute value , greatest integer and combining functions). Graph of some well-know functions. Limit of functions and continuous and discontinuous functions with graphical representation.

Propositional Logic: Definition of proposition, Statement and Argument. Logical operators. Simple and compound proposition, various types of connectives. Truth Table, Tautology, Contradiction, Contingency & Logical equivalence.

Boolean algebra: Definition, Boolean function, duality, some basic theorems & their proofs. Two value Boolean algebra. Truth functions. Canonical sum of product form. Digital logic Gates & Switching circuit designs

Complex Number: Argand diagram. De Moivre formula, root of polynomial equations, curve and regions in the complex plane, standard functions and their inverse (exponential, circular and hyperbolic functions)

Differential Calculus: Differentiation and successive differentiation and its application. Leibniz theorem. Taylor and Maclaurin theorems with remainders in Cauchy and Lagrange form. Power series. Taylor and Maclaurin series. L' Hospitals rule. Extreme values of a function of one variable using first and second derivative test, asymptotes of a function. Curvature and radius of curvature of a curve, partial differentiation. Exact differential and its application in computing errors. Extreme values of a function of two variables with and without constraints. Solution of non-linear equation using Newton Raphson method.

Integral Calculus: Indefinite integrals and their computational techniques. Reduction formulae. Definite integrals and their convergence. Beta and Gamma functions and their identities, application of integration. Centre of pressure and depth of centre of pressure.

Solid Geometry: Coordinate Systems in three dimensions. Direction cosines and ratios. Vector equation of a straight line . Plane and sphere. Curve tracing of a function of two and three variables. Surfaces of revolutions. Transformations (Cartesian to polar & cylindrical)

MS 121 APPLIED PHYSICS

Introduction : Scientific notation and significant figures. Types of errors in experimental measurements. Units in different systems. Graphical Techniques.

Vector: Review of vectors, Vector derivations. Line and surface Integrals. Gradient of a Scale.

Mechanics: The limit of Mechanics. Coordinate systems. Motion under constant acceleration. Newton laws and their applications. Galilean invariance. Uniform circular motion. Frictional forces. Work and Energy. Potential Energy. Energy Conservation. Energy and our Environment. Angular momentum.

Electrostatic and Magnetism: Coulombs Law. Electrostatic potential energy of discrete charges. Continuous charge distribution. Gauss's Law. Electric field around conductors. Dielectrics Dual trace oscilloscope with demonstration. Magnetic fields. Magnetic force on current. Hall effect. Biot-sevart Law. Ampere's Law Fields of rings and coils. Magnetic dipole. Diamagnetism, Para magnetism, ferromagnetism.

Semiconductor Physics: Energy levels in a semiconductor. Hole Concepts. Intrinsic and Extrinsic regions Law of Mass Action. P-N junction. Transistor. Simple circuits

Waves and Oscillations: Free oscillation of systems with one and more degrees of freedom. Solution for modes classical wave equation. Transverse modes of continuous strings. Standard waves. Dispersion relation for waves. LC network and coupled pendulums. Plasma oscillations.

Optics and Laser: Harmonic traveling waves in one dimension near and far fields. Two-slit interference. Huygens Principle. Single-slit diffraction. Resolving power of instruments. Diffraction Grating. Lasers, Population inversion. Resonant cavities. Quantum efficiency. He-Ne. Ruby and CO2 lasers, Doppler Effect and sonic boom.

Modern Physics: Inadequacy of classical physics. Planck's explanations of black body radiation. Photoelectric effect. Compton effect. Bohr theory of Hydrogen atom. Atomic spectra. Reduce mass. De-Broglic hypothesis Braggs law, Electron microscope. Uncertainly relations Model atomic models. Zeeman effect. Atomic nucleus. Mass energy relation. Binding energy. Nuclear forces and fundamental forces. Exponential decay and half-life radioactive equilibrium in a chain. Secular equilibrium. Nuclear stability. Radiation detection instruments. Alpha decay, Beta decay, Gamma decay attenuation nuclear radiation hazards and safety. Medical uses of nuclear radiation. Fission, Energy .Nuclear Reactors Breeder Reactor Nuclear Fusion.

The practical work will be based on the above course.

HS 101 **ENGLISH**

Study skill, Advanced reading Skills using variety genre and texts, Listening & Speaking, Skill, Oral communication Skills Development, Prècis Writing, Controlled & guided writing ,Essay writing, Writing book & informal Reports, Informal & formal Letters and memos, Creating advertisements, Applied Grammar, Sentence Correction Sentence Completion, Transformation of sentences, Question tags, Homonyms/Homophones, Sentence making, Punctuation, Extracts, Conversations etc., Use of idioms.

HS 105 **PAKISTAN STUDIES**

Historical and Ideological Perspective of Pakistan Movement: Two Nation Theory, Definition, Significance, Creation of Pakistan, Factors leading to the creation of Pakistan, Quaid-e-Azam and the demand of Pakistan.

Land of Pakistan: Geophysical conditions, Territorial situation and its importance, Natural Resources, Mineral and Water.

Constitutional Process : Early efforts to make constitution – Problems and issues. Constitution of 1956 and its abrogation. The Constitution of 1962 and its annulment. Constitutional and Political Crisis of 1971, The constitution of 1973. Recent constitutional development.

Contemporary Issues in Pakistan : A brief historical survey of Pakistan Economy, Agricultural and industrial development in Pakistan, Internal and external trades, Economic planning and prospects, Social issues, Literacy & education in Pakistan, State of science & Technology with special reference to IT Education, Pakistan society and culture, Environmental degradation & their causes & solutions, Pakistan's role in preservation of nature through international conventions/efforts.

Foreign Policy : Relations with neighbours, Super power and the Muslim World.

Human Rights: Conceptual foundation of Human rights, what are the human rights? Definition, significance and importance, Comparative analysis of Islamic and western perspectives of Human Rights, UN System for Protection of Human Right, An overview, UN Character, International Bill of Human rights, Implementation mechanism, Other important international treaties and conventions, The Convention on the elimination of all forms of discrimination against woman, International Convention on the rights of child (CRC), Convention against torture (CAT), Refugee Conventional Provisions, Pakistan's obligations to international treaties and documents, Minority rights in Pakistan, Pakistan's stand on violation of human rights in the international perspective.

HS 127 **PAKISTAN STUDIES (FOR FOREIGNERS)**

Land of Pakistan: Land & people-Strategic importance-Important beautiful sights, Natural resources.

A Brief Historical Background: A brief Historical survey of Muslim community in the sub-continents, British rule & its impacts, Indian reaction, Two nation theory, Origin & development ,Factor leading towards the demand of a separate Muslims state, Creation of Pakistan.

Government & Politics in Pakistan: Constitution of Pakistan, A brief outline, Governmental structural, Federal & Provincial, Local Government Institutes, Political History, A brief account

Pakistan & the Muslim World: Relations with the Muslim countries.

Language and Culture: Origins of Urdu Language, Influence of Arabic & Persian on Urdu Language & Literature, A short history of Urdu Literature.

EL 231 **ELECTRONIC DEVICES AND CIRCUITS**

The bipolar junction transistor structure, Transistor as amplifier, Transistor biasing, Small signal hybrid Pi model, Single stage BJT amplifier configurations, Single stage mid frequency amplifier, Analysis and design, Feedback in amplifiers, Multi stage amplifier, High frequency response of single stage amplifier, Bipolar transistor as switch. Structure and physical operation of MOSFET, Current-voltage characteristics of MOSFET. The junction field effect transistor, FET circuits at DC, FET biasing, FET as amplifier and basic configurations of single stage amplifiers, Frequency response of common source amplifier, FET switches. CMOS structure and characteristics.

The practical work will be based on the above course.

EL 236 **AMPLIFIERS AND OSCILLATORS**

Amplifier Analysis : Transistor as an Amplifier, Hybrid Model of a Transistor. Small Signal Analysis, Large Signal Analysis, Gain Calculation of Single Stage Amplifier. Cascading, Multistage Gain Calculations.

Classification Of Amplifier : Classification of Amplifier on the basis of Biasing. Class A, Class B, Class AB and Class C Amplifier. Push Pull Amplifier. Complementary Symmetry Amplifier.

Classification of Amplifiers on the basis of Coupling, RC Coupled Amplifier, Transformer Coupled Amplifier, Direct Coupled Amplifier. Classification of Amplifier on the basis of Frequency, Audio Frequency Amplifier, Radio Frequency Amplifier, Tuned Amplifiers.

Feed Back : Feed Back Concept, Feed Back Amplifiers, Voltage Feed Back Amplifier, Current Feed Back Amplifier, Effect of Feed Back on Frequency Response, Non Linear Distortion and Noise, Series and Shunt Feed Back Amplifier.

Practical Amplifiers Consideration : Input and Output Impedance, Real and Apparent gain, Amplifier Loading, Impedance Matching and Cascading.

Oscillators : Basic Theory of Oscillators. Tank Circuit, Damp and Un-damp Oscillations, Phase Shift Oscillator, Colpitts Oscillator, Hartley Oscillator, Wien Bridge Oscillator.

The practical work will be based on the above course.

EL 254 PROGRAMMING WITH 'C' LANGUAGE

The Turbo C Programming environment : Setting up the Integrated Development Environment, File used in C program Development, Use of Integrated Development Environment, The Basic Structure of C programs, Explaining the printf( ) Function.

C Building Blocks : Variables, Input/Output, Operators, Comments.

Loops : The for Loop, The while loop, The do while loop.

Decisions : The if statement, The if-else statement, The else-if construct, The switch statement, The Conditional operator.

Functions : Simple Functions, Functions that return a value, Using arguments to pass data to a function, Using more than one functions, External variables, Prototype versus classical K and R, Preprocessor directives.

Arrays and strings : Arrays, Referring to individual Elements of the Array, String, String functions, Multidimensional arrays.

Pointers : Pointer Overview, Returning data from functions, Pointers and Arrays, Pointers and Strings, Double Indirection, Pointers to Pointers. Structures, Unions, and ROM BIOS.

Turbo C Graphics Functions : Text-mode Functions, Graphics - Mode Functions. Text with Graphics.

Files : Types of Disk I/O, Standard, Input/Output Binary Mode and Text mode, Record, Input/Output, Random Access, Error Conditions, System-Level Input/ Output, Redirection.

Advanced Variables : Storage Classes, Enumerated data type, Renaming data type with typedef, Identifiers and Naming classes, Type conversion and casting, Labels and goto statement.

C++ and Object Oriented Programming : Object Oriented Programming, Some useful C++ features, Classes and objects, Constructors and memory Allocations, Inheritance, Function Overloading, Operator Overloading.

The practical work will be based on the above course.

EE 211 CIRCUIT THEORY- I

Introduction to Circuit Concepts: Basic two terminal circuit elements, Linear time invariant resistor, Linear time invariant capacitor, Linear time invariant inductor, Energy concepts in two terminal elements, Energy dissipated in a resistor, Energy stored in an inductor and capacitor, Ideal independent voltage and current sources.

Kirchoff's Law: Basic definitions of branch, Loop and node, Statements of Kirchoff's voltage and current laws, Linearly independent KCL and KVL, Equation of KVL and KCL laws, Series and parallel conceptions of two terminal one port circuit elements. Thevenin's theorem, Norton's theorem, Maximum power transfer theorem and Reciprocity theorem.

Elementary Transient Analysis: Differential and integral forms of circuit equation, Initial voltage on a capacitor, Initial current in an inductor, First order circuits, Solution of single first order differential equations, Particular and total solution of second order linear time
invariant differential equations.

Sinusoidal Steady State Analysis: Network response to sinusoidal driving functions, Complex impedance and admittance functions, Development of concept of phasors, Power consideration, Complex power, Maximum power transfer, Tuned circuits, Series and parallel RLC tuned circuits, Definition of quality factor.

Exponential Excitation and Transformed Network: Representation of excitations by exponential functions, Single element responses, Forced response with exponential excitation, Introduction to the transformed network, Driving point impedance and admittance.

Non-sinusoidal Periodic Analysis : Fourier Series and it's uses in Circuit Analysis, Evaluation of Fourier Coefficients, Waveform symmetries, Exponential form of Fourier series, Steady state response of periodic signals.

Magnetically Coupled Circuits : Mutual inductance, Dot conventions, Energy considerations, The linear transformer and ideal transformer.

The practical work will be based on the above course.

EE 221 INSTRUMENTATION

General Theory : Classification, Performance and characteristics, Absolute and secondary instruments, Indicating, Recording and integrating instruments, Controlling balancing and damping, Static and Dynamic characteristics.

Ammeter and Voltmeter : Classification, Moving iron, Moving coil, Thermal, Electrostatic and induction type, Errors extension of ranges, CTs and PTs their burden and accuracy.

Power and Energy Meters : Wattmeter types, Active and Reactive power measurement, Max. demand indicator, Calibration, Classification of energy meter, KWH meter and KVARH meters, P.F. meter.

Electronic Instruments : Electronic and digital voltmeters, Counters, Digital frequency meter, Time interval measurement, RLC meter, Power and energy meter, Oscilloscope and its use.

Basic Concepts : Basic concepts of measurement, Measurement of resistance, Inductance and capacitance, Potentiometer and bridge methods.

Magnetic Measurement : Measurement of field strength flux, Permeability, B-H curve and hysteresis loop, Magnetic testing of materials.

Transducers : Variable, Resistance and inductance transducers, Linear variable differential transformer (LVDT), Capacitive, Photoconductive, Piezo-Electric Transducers, Thermo electric transducers, Filtering, Instrument amplifiers, A/D conversion.

Measurement of Non-electrical Quantities : Measurement of temperature, Pressure, Flow, Strains, Thermal conductivity, Motion, Speed and Vibrations, Thermal and Nuclear Radiations.

High Voltage Measurement : Measurement of dielectric strength of insulators, High voltage surges.

The practical work will be based on the above course.

EE 246 ELECTRICAL MACHINES

Three Phase Circuits: Three phase voltages, Currents and power, Star and Delta connected circuits, Analysis of balanced three phase circuits, Line diagram, Power and power factor measurement in 3-phase circuits.

Transformer: Basic principles, Single and 3-phase transformers, Construction, General transformer equation, Voltage and current relations in transformer, Ratio of transformation, Loading a transformer, Equivalent circuits of a transformer, OC and SC tests, Regulations and methods of calculation of regulation, Efficiency and calculation of efficiency, Auto transformer, 3-phase transformer.

Direct Current Machines: Electric circuit aspects of DC machine, Magnetic circuit aspects, Types of DC generator, Performance, Types of motors, Performance, Motor speed control, Transient and dynamic responses, Transfer functions and frequency response.

Alternating Current Machines: Rotating magnetic field, Induction motor action, Induction motor characteristics and performance, Synchronous generator characteristics and performance, Synchronous motors, Induction motor, Speed control elementary AC two phase control motors, Constructional features of fractional horse power AC motors.

Direct Current Machines Winding: Gramme Ring winding, Simple lap and wave windings, Diagrams and developments and elementary calculations.

Control Systems: Motor drive systems, Introduction to feedback control systems, System aspects and classification, Elements of analysis of feedback control systems, Digital control systems.

The practical work will be based on the above course.

EE 281 ELECTROMAGNETIC FIELDS

Vector Analysis : Scalars and vectors, Vector algebra, The Cartesian coordinate system, Vector components and Unit vectors, The vector field, The dot product the cross product, Other coordinate systems, Circular cylindrical coordinates, The spherical coordinate system, Transformations between coordinate systems.

Coulomb's Law and Electric Field Intensity : The experimental law of coulomb, Electric field intensity, Field of a point charge, Field due to a continuous volume charge distribution, Field of a line charge, Field of a sheet of charges, Stream-lines and sketches of fields.

Electric Flux Density Gauss's Law and Divergence: Electric flux density, Gauss's law, Application of Guass's law, Some symmetrical charge distributions, Differential volume element, Divergence, Maxwell's first equation, Electrostatics, The vector operator and the divergence theorem.

Energy and Potential: Energy expanded in moving a point charge in an electric field, The line integral, Definition of potential difference and potential, The potential field of a point charge, The potential field of a system of charges, Conservative property, Potential gradient, The dipole, Energy density in the electrostatic field.

Conductor Dielectrics and Capacitances: Current and current density continuity of current metallic conductors, Conductor properties and bounded conditions, Semi conductors, The nature of dielectric materials, Capacitance, Several capacitance examples of a two wire lines. Curvilinear square, Physical modules, Current analogies, Fluid flow maps the iteration method.

Poission's and Laplace's Equations: Poison's and Laplace's Equations, Uniqueness theorem, Examples of the solution of Laplace's equation, Examples of the solution of poison, Product solution of Laplace's equation.

The Steady Magnetic Field : Biot Savart's Law, Amperes circuital law, Curl, Stoke's theorem, Magnetic flux and magnetic flux density, The scalar and vector magnetic potentials, Derivation of steady magnetic field laws.

Magnetic Forces Materials and Inductance : Force on a moving charge, Force on a differential current element, Force between differential current element, Force and torque on a closed circuit, The nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, The magnetic circuit, Potential energy and forces on magnetic materials, Inductance and mutual Inductance.

Time Varying Fields and Maxwell's equations : Faraday's Law, Displacement current, Maxwell's equation in point form, Maxwell's equation in integral form, The related potentials.

The Uniform Plane Wave: Wave motion in free space, Wave motion in perfect dielectric, Plane waves in loose dielectrics. The Pointing vector and power considerations, Propagation in good conductors, Skin effect, Reflection of uniform plane waves standing wave ratio.

CS 205 LOGIC DESIGN AND SWITCHING THEORY

Computer Operations : Evaluation of the computer, Basic organization of digital computer, Instruction formats, Some different types of computers, Special purpose and general purpose computers.

Number Systems : Conversion between bases, Arithmetic with bases other than ten, Negative numbers, Binary coded decimal numbers, Octal, and Hexadecimal number systems.

Truth Function : Binary connectives, Evaluation of truth functions, Many statement compounds, Physical realizations, Sufficient sets of connectives, A digital computer examples.

Boolean Algebra : Truth functional calculus as Boolean algebra, Duality, Fundamental theorems of Boolean algebra, Examples of Boolean simplifications, Remarks on Switching functions.

Switching Devices : Switches and relays, Logic circuits, Speed and delays in logic circuits, Integrated logic circuits.

Minimization of Boolean Functions : Standard forms of Boolean functions, Minterm and maxterm, Designation of Boolean functions, Karnaugh map representation of Boolean functions, Simplification of functions on Karnaugh maps, Map minimization of product of sums expressions, Incompletely specified functions.

Tabular Minimization : Cubical representation of Boolean functions, Determination of prime implicants, Selection of an optimum set of prime implicants, Design of Nand and Nor Networks and properties of combinational networks, Introduction to design and Nand and Nor Networks, Switching expressions for Nand and Nor Networks, Transient response of combinational Networks.

Introduction to Sequential Networks : Latches, Sequential Networks in fundamental mode, Introduction to the Synthesis of Sequential Networks, Minimization of the number of states, Clocked Networks.

The Practical work will be based on the above course.

MS 222 LINEAR ALGEBRA & ORDINARY DIFFERENTIAL EQUATION (B)

Linear Algebra & Matrices : Linearity and dependence of vectors, Basis, dimension of a vector spaces, Fields, Linear matrix and type of matrices (singular, non-singular, symmetric, non-symmetric , upper, lower, diagonal), Rank of linear matrix using row operations and special method, echelon and reduced echelon forms of matrix, determination of consistency of a system of linear equation using rank, Matrix of linear transformations. Eigen values and eigen vectors of a matrix. Diagonalization. Applications of linear algebra (scaling, translation, rotation and projection) with graphical representation.

Introduction to ODEs: The concepts & Terminologies, Order and Degree, Linearity & Non-linearity, A Brief classification of ODEs, Concrete examples, solutions, General & particular, Concrete examples & application ,Initial value problems (IVP) and boundary value problems (BVP), Introduction to issues related to existence & uniqueness of solutions.

The First Oder ODEs: Linear and Non-Linear: Variable Separable Cases & Application , Growth and decay Problems, Newton's law of Cooling. Torricelli's law. Simple kinematical dynamical Applications, exact and no-exact ODEs, Solution Procedures and integrating factors. The Standard linear Differential Equation of First order, Solution procedures and applications to RL-Circuits and RC-Circuits. Bernoulli's equations & Logistical growth models. Direction fields and Euler's and Picard's iterative schemes for 1st Order ODEs.

The Linear Second Order ODEs: Homogeneous and Non-homogeneous Cases: Linear second order Homogeneous and ODE with constant coefficients Solution procedures and the principle of linear superposition and application --- Mechanical systems & electrical systems. Undamped and Damped Harmonic Oscillators. Linear second order Non-homogeneous ODEs with constant coefficient , Solution procedures and the Principle of general linear superposition, complementary functions & particular solutions --- the method of undetermined coefficients & variation of parameters. Application spring mass systems--- Undamped and Damped Harmonic oscillators with forcing terms and theirs ODEs and solutions. RCL-Circuits and their ODEs and Solutions. The Physics and Mathematics of a phenomenon of Resonance in Mechanical systems & electrical systems, Cauchy-Euler ODEs and their Solution procedures.

Partial Differential Equations : Formation of partial differential equations. Solution of first order linear and special types of second and higher order differential equations. Homogeneous partial differential equations of order one. Lagrange's multiplier.

Advance Calculus & vector Calculus: Double and triple integral with application (area, centroid, moment of inertia) vector differential & vector integral with applications. Green & Stokes theorem with applications.

MS 224 COMPLEX VARIABLE & FOURIER ANALYSIS

Infinite Series : Applications of simple convergence, Root, Ratio, Raabe's and Gauss's Tests on the behavior of series.

Complex Variables : Limit, Continuity, Zeros and poles, Cauchy-Reimann Equations, Conformal transformations, Contour integration.

Laplace Integral & Transformations : Laplace transforms of some elementary functions, first translation or shifting theorem, second translation or shifting

theorem, change of scale property. Laplace transform of the nth order derivative, initial and final theorem. Laplace transform of integrals. Laplace transform of function t^n F(t) and F(t)/t. Laplace transform of periodic function, evaluation of integrals. Definition of inverse Laplace transform and inverse transform. Convolution theorem, Solutions of ordinary differential and partial differential equations using Laplace transform (I V P's & B V P's) Z and inverse Z transformations, properties of Z-transformation and applications.

Fourier Series : Introduction, Euler-Fourier formulae, Even and odd Functions, application of fourier series. Fourier transform and fast fourier transform and properties with applications.

HS 205 ISLAMIC STUDIES

Thematic Study of Holy Quran: Basic Islamic Belief, Topics, Tauheed,Al-Ambiya-22, Al-Baqarah-163-164, Prophethood, Al-Imran-79, Al-Hashr-7, Al-Madah-3, Here-After, Al-Hajj-5, Al-Baqarah-48, Two Hadith, Basic Islamic Practices, Al-Mu'minun-I-II, Amre-Bil-Ma' Roof WA-Nahi Anil Munkar, The concept of Good & Evil, Importance & necessity of Da' Wat-e-Deen, Al-Imran-110, Method of DA' Wat-e-Deen,An-Nehl-125, Al-Imran-104, Two Hadith, Unity of the Ummah, Al-Imran-103, Al-Hujurat-10 Al-Imran-64, Al-An'am108, Kasb-e-Halal, Taha-81, Al-A'raf-32-33, Al-Baqarah-188, Two Hadith, Huquq-ul-Ibad, Right to Property, Al-Maidah-32, Right to Property, An-Nisa-29, Right of Respect & Dignity, Al-Hujurat-11-12, Freedom of Expression, Al-Baqarah-256, Right of Equality, Al-Hujurat-13, Economic Security, Al-Ma'arij-24-25, Employment Opportunity on Merit, An-Nisa-58, Accession Right to Justice, An-Nisa-135, Women Rights, An-Nehl-97, Al-Ahzab-35, An-Nisa-07, Relations with Non-Muslims, Al-Mumtahanah-8-9, Al-Anfal-61, Last sermon of Hajj at Arafat on Ziqad 9th, 10th Hijra Translation & the important points of the sermon.

Serat Life of the Holy Prophet : Birth, Life at Makkah. Declaration of Prophethood, Preaching & its difficulties, Migration to Madina. Brotherhood (Mawakhat) & Madina Charter. The Holy War of the prophet (Ghazwat-e-Nabawi), Hujjat-ul-Wida.

Islamic Civilization: Impacts of Islamic civilization on the sub-continent. The civilization of sub-continent before Islam. The Political, Social & Moral Impacts of Islamic Civilization on sub-continent., Academic, Intellectual, Social & cultural Impacts of Islam on the World.

HS 206 ETHICAL BEHAVIOUR

Nature, Scope and methods of Ethics. Ethics and Religion teachings of world religions. Basic Moral concepts, Right and wrong, Good and evil. An outline of Ethical systems in philosophy, Hedonism, Utilitarianism, Rationalism and Kant. Self Realization Theories, Intuitionism.

Islamic Moral : Theory ,Ethics of Quran and its philosophical basis. Ethical precepts from Quran and Hadith and promotion of moral values in Society.

EL 332 INTEGRATED ELECTRONICS

Introduction to IC processing for Bipolar and MOS Circuit fabrication. The output stages. Analysis of class A, B and AB amplifiers. Power amplifiers, Push- Pull Operation. Differential amplifiers. Common and differential mode gains, Analysis of circuits containing ideal Op Amps, Non-ideal performance of OP Amps, The internal structure of general purpose IC OP Amp and its circuit analysis. Large signal operation of Op Amps, Practical Op Amp limitations, Stability and frequency compensation. Non-linear circuit applications like comparators, Schmitt Triggers. Signal generators, Oscillators and wave shaping circuits. Bipolar transistor inverter analysis, Noise margins, TTL gate circuit analysis, ECL gates, The NMOS and CMOS inverter analysis, MOS gate circuits, BICMOS Logic Circuits.

The practical work will be based on the above course.

EL 335 DIGITAL ELECTRONICS

Operational Amplifier : Analysis of OP amplifiers and OP amplifier applications.

Pulse and Digital Circuits : Design of wave shaping circuits, Sweep circuits, Electronic gates, Sample and hold circuits. Flip Flops, Counters, ADC and DAC, Principles of A to D and D to A Converters, Types, Charge couple devices.

Introduction to VLSI : Integrated circuit fabrication and circuit simulation.

The practical work will be based on the above course.

EL 343 POWER ELECTRONICS

Introduction and Scope : Solid State Devices used as switches in power electronics, Power diodes, Power transistors, Power MOSFETS, Thyristors, Triacs, Diac. Characteristics of GTO, RCT, etc. Series and parallel operation of SCR, LASCR. Thyristor turn on, Integral cycle control and phase angle control, Elementary and advanced firing schemes, Sequence and close loop control.

Thyristor Commutation : Self commutation, Impulse commutation, Series capacitor commutation, Parallel capacitor commutation.

Uncontrolled and Controlled Rectifiers : Single phase, Three phase, Semi converter, Full converter, Dual converter, Analysis and performance, Parameters as harmonic factor, Utilization factor, Power factor, Distortion factor, Rectifiers with purely resistive, Highly inductive and RL loads. AC Voltage Controllers.

DC Chopper : Principle, Step-up and Step-down operation, Buck regulator, boost regulator, Buck-boost regulator, Cuk regulator, Choppers using thyristors.

Inverters : Principles, Half bridge and Full bridge inverters, Constant, Variable and Sinusoidal PW modulation, Modified SPWM.

Protection Analysis : Over-voltage, Over-current, di/dt and dv/dt protection, Heat sinks.

Electronic Power Supplies : Design and analysis of regulated Power supplies, Switch mode power supplies and Uninterrupted Power supplies.

The practical work will be based on the above course.

EL 383 INDUSTRIAL ELECTRONICS

Temperature Transducer : T-to-F Conversion using Diodes, Direct T-to-F conversion with an IC, Absolute Temperature-to-Current Conversion, Simplest Readout, an Analog Meter, Voltage Readout, Measuring Differential Temp T-to-F Conversion using Diodes, Direct T-to-F conversion with an IC, Absolute Temperature-to-Current Conversion, Simplest Readout, an Analog Meter, Voltage Readout, Measuring Differential Temperature, Average, Minimum and Maximum Temperatures, Temperature-Control Circuits, High-Low Temperature Monitoring, Multiplexed Application, Isolation, 4-20mA Current Transmission, Sound Velocity Monitor.

Pressure Transducer Interfacing : Strain-Gage-Based Transducers, Rheostat Output, Pressure Transducer, Potentiometer-to-Frequency Transducer, Potentiometer-to-Frequency Transducer, Scanning, Pressure Meter, Interfacing High-Level Semiconductor Transducers, Isolated Pressure Transmitters, Pressure Control System.

Force-Transducer Interfacing : Spring Driven Rheostat, Strain-Gage Load Cell Interface, Strain Gage and Signal Conditioning, High Resolution Load-Cell Platform Interface, Piezoelectric Transducer, Strain Gage to Frequency Conversion, Scanning Strain Meter, Isolators & Transmitters.

Robotics : Fundamental of Robotics, Programming and application of Robots. Programmable Logic Controllers.

The practical work will be based on the above course.

EL 386 **BIO MEDICAL ENGINEERING, INTRODUCTION TO**

Bio-Chemistry : Physio-Chemical Phenomena of Importance in Biochemistry. Chemistry and Metabolism of Carbohydrates. Lipids, Protein, Vitamins, Hormones, Enzymes.

Bio-Physics : Biophysics of Neural Spike, Nervous System, Radiation and Radiobiology. Origin of Bio-potentials, Electrocardiograms and Electric Shocks. Bioenergetics.

Physiological Processes : Introduction to Physiology. Cardiovascular, Respiratory, Renal and Digestive Physiology, Nervous System and Muscle function. Special Senses.

Bio-Instrumentation : Introduction to Biomedical Instrumentation. Measurement of Cardiovascular System and Respiratory System, Noninvasive Diagnostic Instrumentation. Biotelemetry. X-ray and Radioisotope Instrumentation. Electrical Safety of Medical Equipment.

Bio-Materials : Properties of biological materials. Implant materials, Metal, Ceramic and Polymeric material, Corrosion, Biomechanics & bio-compatibility.

The practical work will be based on the above course.

EE 312 **CIRCUIT THEORY- II**

Matrix Analysis : Introduction and review of Matrix theory, Determinants and Matrix inversion, Systematic Formulation of network equations, Loop variable analysis, Node variable analysis, State variable analysis, Formulation of state equations, Source transformations, Duality.

Elementary Time Functions: Introduction to singularity functions, The impulse function and response. The unit step function and response, Ramp function, Exponential function and response. Analysis of Networks by Laplace transformations. Review of the laplace transformation, Application to network analysis.

Two Port Network : Introduction, Characterization of Linear Time Invariant, Two ports by six sets of parameters, Relationship among parameter sets, Interconnection of two ports.

Large Scale Network : Topological description of Networks, Basic definition and notations, Metric representation of a graph, State space representation, Tellegin's Theorem.

Networks Functions and Frequency Response : The concept of complex frequency, Transform impedance and transform circuits, Network functions of one and two ports, Poles and zeros of Network functions, Restrictions on poles and zeros of transfer function, Magnitude and phase, Complex Loci, Plots from the plane phasors.

Fourier Transform : Fourier transform applications in circuit analysis in relation to frequency and time domain functions.

The practical work will be based on the above course.

EE 391 COMMUNICATION SYSTEMS - I

Introduction : Fundamental terms and definitions, Information, Message, Signal, Analog and digital signals, Elements of communication systems, Modulation and coding, Need for modulation, Coding methods and benefits.

Signals and Spectra : Methods of signal representation, Time and frequency domain, Mathematical representation of signals, Fourier series and fourier transform, Power in a signal, Parseval's power theorem, Ray leigh energy theorem, Properties of fourier transform, Convolution of signals, Some specific signals types as impulse step and signum functions.

Signal Transmission and Filtering : Linear time invariant systems, Impulse response and superposition integral, Transfer function, Block diagram analysis, Distortion and equalizers, Transmission loss and repeater, Ideal and real filters quadrature filters and hilbert transform, Correlation and spectral density.

Probability and Random Variables : Probability functions, Probability models and distributions, Statistical averages.

Random Signals and Noise : Random process, Ensemble and time average, Stationary and ergodic process, Noise, Thermal noise, White noise and filtered noise, Noise equivalent BW, Analog base band transmission.

Linear Modulation : Band pass systems and signals, AM, DSB, SSB, VSB, Power in modulated signals modulator, Balanced modulator, Switching modulator, SSB generation (methods), Demodulators, Synchronous detection, Homodyne detection, Envelope detection.

Transmission Lines : Fundamentals of Transmission line, Theory at radio frequency, Basic theory of wave guide, Transmitting and receiving antennas, Channel characteristics.

The practical work will be based on the above course.

CS 305 COMPUTER ARCHITECTURE & ORGANIZATION

Introduction to Computers : Evaluation of Computers Hardware and Firmware; Computer Software - Computer Programming, Operating System, Organization and Architecture; Structure and Functions; Types of Computers.

Computer Interconnection Structures : Computer Components Computer Function; Inter-connective Structure, Bus Interconnection. Computer Instruction Set, Op-code encoding, Addressing Modes, Instruction types - Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Program Control Instructions System Control Instructions, I/O Instructions, Reduced Instruction Computers - RISC Assignment; Rise-Pipelining

Execution Unit : Register Sections - General Register design, Combinational shifter Design, Flag Register; Address; ALU design; BIT slice Processor; Multiplication of Signed and unsigned Integers; Division of Unsigned Integers; coprocessors; Intelligent Monitor Interface, Interface using special Bus Signals and Instructions, Coprocessor Interface using special instructions.

Control Unit : Basic concepts; Design Methods - Hardwired Control Design, Microprogrammed Control Unit.

Memory Organization : Characteristics of Memory Systems; Main Design; Electromechanical memory Devices; Memory Hierarchy; Cache Memories; Associative memory Virtual memory and memory Management Concepts.

Input/ Output : Basic Concepts; Programmed I/O; Standard I/O Versus Memory -Mapped I/O Unconditional and Conditional Programmed I/O; Interrupt I/O - Basic concepts, Main features of Interrupt I/O; Direct Memory Access (DMA); I/O Processor.

Operating Systems : Operating System Overview, Scheduling; Memory Management; Recommended Reading.

Fundamentals of Parallel Processing : Parallelization in conventional computers; General Classification of Computer Architectures; Array Processors - Systolic arrays, Wave-front array Processors; Pipeline Processing - Basic Concepts, Arithmetic pipelines, Instruction Pipelines; Multiprocessors - Single Bus, Multibus, Crossbar, Multiple Memory; Data-flow Computer Systems.

The practical work will be based on the above course.

MS 331 **APPLIED PROBABILITY & STATISTIC**

Statistic : Introduction ,Types of data & variables. Presentation of Data, Objects, Classification, Tabulation, Frequency distribution, Graphical representation, simple & Multiple Bar diagrams, Sartorial & Pie-Diagram, Histograms, Frequency polygons, Frequency curves and their types.

Measures of Central Tendency : Statistic Averages, Median Mode, Quartiles, Range Moments, Skewness, Quartile deviation, Mean deviation, Standard deviation, Variance & its coefficients, Practical Significance in related problems.

Curve Fitting : Introduction, fitting of a first and second degree curve, Fitting of a exponential and logarithmic curves, related problems, Principle of least squares. Second order Statistics & Time series not in bits details.

Simple Regression & Correlation : Introduction ,Scatter diagram, correlation & its Coefficient. Regression lines. Rank correlation & its Coefficient. Probable Error (P.E.), Related problems.

Sampling and Sampling Distributions: Introduction. Population, Parameter & Statistics, Objects of a sampling, Sampling Distributions of Mean, Standard error, Sampling & Non-Sampling Errors, Random Sampling, Sampling with & without replacement, Sequential Sampling, Central limit theorem with practical significance in related problems.

Statistical Inference and testing of Hypothesis: Introduction, Estimation, Types of Estimates. Confidence interval. Tests of Hypothesis. Chi-Square distribution/test. One tails & two tails tests. Application in related problems.

Probability : Basic Concepts, Permutation & Combination. Definitions of probability, Laws of probability, Conditional probability. Baye's rule. Related problems in practical significance.

Random Variable : Introduction, Discrete & Continuous random variables. Sequences and transformations. probability distribution. Probability density function. Distribution function. Mathematical Expectation, Moment Generating Functions (M.G.F.).Markove random walks chain/ related problems

Probability Distribution : Binomial, Poisson, Hyper geometric & Negative binomial distributions. Continuous probability distribution. Uniform, Exponential & Normal distributions & their practical significance.

HS 303 ENGINEERING ECONOMICS

Introduction : Basic concepts, Engineering economy defined, Measures of financial effectiveness, No monetary values.

The Economic Environment : Consumer and producer goods, Measures of economic worth, Price, Supply, Demand Relationship.

Selection between Alternatives : Present economy, Selection among materials, Techniques designs etc. A basic investment philosophy. Alternatives having identical lives. Alternatives having different lives.

Value Analysis : Important cost concepts, Cost-benefit analysis feasibility studies, Value analysis in designing and purchasing.

Linear Programming : Mathematical statement of linear programming problems. Graphic solution, Simplex procedure. Duality problem.

Depreciation and Valuation : Types of Depreciation economic life, Profit and interest. Returns to capital. Discrete and continuous compounding. Discounting sinking fund problems.

Capital Financing and Budgeting : Types ownership. Types of stock, Partnership and joint stock companies. Banking and specialized credit institution.

Theory of Production : Factors of production, Laws of Returns, Break-even charts and relationships.

Industrial Relationship : Labour problems, Labour organizations, prevention and settlement of disputes.

HS 304 BUSINESS COMMUNICATION & ETHICS

Business English : Writing formal and business letters and memos: Drafting notices and minutes; Theoretical knowledge and comprehension of contracts and agreements; Preparing proposals and conducting and writing research project reports. Participating in seminars and interviews, And writing and presenting conference papers; Solving IELTS type papers.

Engineering Ethics : Introduction, Objective of the course, Definition of code of ethics: Defining needs for a code of ethics, Need for a code of ethics, For whom and why, Review of code of ethics of national and international engineering bodies and other professional bodies of Pakistan,. Compare & contrast, Relationship between ethics and human rights and their importance in human settlements and societies.

EL 401 ELECTRONICS ENGINEERING PROJECT

The final year students will be required to consult the Chairman of Electronic Engineering Department regarding the offering of various projects in the department. The student or group of students will be assigned the project by teacher concerned and will carry out the assignment as required and directed by the teacher. At the end of the academic session, They will submit the type-written report on work of their project to the Chairman. The students will be required to appear before a panel of examiners for oral examination. The Project will be of the following scope : A detailed theoretical study of some problem in an area related to Electronic Engineering. This may be of investigative research nature or it may be laboratory research oriented.

EL 433 SOLID STATE DEVICES

Quantum Mechanics : Probability and uncertainty principle, The Schordinger wave equation, Quantum Mechanical Tunneling.

Semi conductor Materials and Crystal Properties : Energy bands and charge carriers in semi conductors, Carrier statistics, Drift, Excess carriers and diffusion.

The PN Junction and Junction Diodes : Equilibrium conditions, Forward and reverse biased junction, Reverse breakdown, Metal semiconductor junctions, Transient response, Hetero junctions, Switching diodes, Tunnel and photodiode.

Bipolar Junction Transistor : Charge transport in bipolar junction transistor, Minority carrier distribution and terminal currents, The coupled diode model.

Field Effect Transistors : JFET Pinch-off, Gate control and V-I characteristics GaAs MESFET, MOS capacitor, Threshold voltage, V-I relationship of MOSFET.

The practical work will be based on the above course.

EL 484 OPTO-ELECTRONICS AND MICRO WAVE SYSTEMS

Light : Historical Background, The nature of Light, Basic Laws of Light, Polarization, Interference, Diffraction, Units of Light.

Optical Fibre : Propagation of Light in Dielectric, Propagation of Light in Planar Dielectric Waveguide, Optical Fiber Waveguide, Wave Propagation in Optical Fibre, Types of Optical Fiber, Optical Fiber Bandwidth Calculation, Attenuation in Optical Fiber, Fiber Material and Fiber Material and Fabrication.

Semiconductor Light Sources : Light Emission in Semiconductor, Light Emitting Diodes and Types of Light Emitting Diodes (LEDs), Spectral Characteristics. Modulation Capabilities and Conversion Efficiency, LED Drive

Circuit, Stimulation Emission in Semiconductors, Lasing Conditions in Semiconductors, Semiconductors Laser Diodes (SLDs), Types of Semiconductor Laser Diodes, Spectral and output Characteristics, SLD Drive Circuits.

Laser : Emission and Absorption of Radiation, The Einstein Relation, Absorption of Radiation, Population Inversion, Optical Feedback, Threshold Condition, Laser Losses, Population Inversion and Pumping Threshold Conditions, Laser Modes, Classes of Lasers, Single mode Operation.

Optical Transmitter : Photo-detection in Semiconductors, Semiconductor Photodiodes, Responsivity of Photodiodes, PIN Photodiodes, Avalanche Photodiodes (APDs), Photodiode Noise Considerations. Optical Receivers and Receiver Design, Measurement and predirection of Receiver Sensitivity.

Microwave Devices : Transistors, Varactors, Step recovery diodes, Multipliers, Parametric Amplifiers, Tunnel diodes, Negative Resistance Amplifier, Gunn effect, Avalanche Effect Diode and other microwave diodes, Klystron and Magnetron and Traveling wave tube.

The practical work will be based on the above course.

EL 486 VLSI DESIGN

Digital Systems and VLSI Processing Layout and related issues for CMOS and Bipolar Processing. Device modeling for MOS Transistors and BJTs, MOS Design; NMOS inverter, Realization of NMOS gates, Transistor sizes, Power dissipation, CMOS gate design. CMOS Timings; Gate and other capacitances, Delays in CMOS logic gates. Combinational Logic design principles Architectural design Memory, CPLDs and FPGAs. Chip design examples and project using Verilog HDL/VHDL.

The practical work will be based on the above course.

EE 472 LINEAR CONTROL SYSTEMS

Introduction : Introduction to control systems, Examples and classifications, Feedback and its characteristics. Nature and representation of control system problem, Block diagram fundamentals, Terminology of block diagram for a feedback control system, Block diagram representation of various control systems.

Linear Systems and Differential Equations : Methods of writing differential equations of various physical systems such as static electric circuits, Mechanical translational and rotational systems, Thermal systems, Hydraulic linear and

rotational transmission systems, Electromechanical dynamic systems DC and AC speed control systems.

Time-Response of Linear Systems : Types of standardized inputs to linear systems, Steady state response and transient response of systems to standard inputs, Response of second order systems time response specifications.

Laplace Transforms : Definition, Derivation of Laplace transforms of simple functions, Laplace transform theorems, Transformations of differential equations of physical systems, Inverse transformation techniques, Stability, Routh's stability criterion.

Block Diagram Algebra : Transfer functions of physical systems, Canonical and unity feedback forms of control system block system block diagram, Block diagram reduction techniques, Signal flow graph algebra, Block diagram reduction using signal flow graphs.

Control System Characteristics : Classification of feedback systems by type, Analysis of system types, Error coefficients, Error constants, Sensitivity.

Root Locus : Introduction, Rules for construction of root locus, Qualitative analysis of root locus, The spirule, Analysis of performance characteristic of systems in time domain, Dominant pole zero approximations, Gain margin and phase margin, Root locus compensation. Phase & gain compensation, Root locus compensation, PID controller.

Frequency Response : Introduction, Transfer function of systems in frequency domain magnitude and phase angle frequency response of plots of closed loop control systems, Correlation of response in frequency and time domain.

Bode Analysis : Introduction to logarithmic plot, Bode plots of simple frequency response functions, Bode plots of type 0, 1 and 2 systems, Phase margin, Gain margin and stability, Closed loop frequency response, Gain factor compensation.

Nyquist Analysis : Introduction to polar plots, Direct and inverse polar plots of type o, 1 and type 2 systems, Nyquist stability criterion, Phase margin, Gain margin and stability on direct and inverse polar plots.

Performance Analysis of Systems on Polar Plots : M_m and W_w of simple second order system, Correlation of frequency and time responses. Construction of Mm and W_w contours for performance analysis on Direct and Inverse polar plots, Gain adjustments on direct and inverse polar plots.

Nicholes Chart Analysis : The Nichols chart, Decibel magnitude and phase angle plots of type 0, Type 1 and type 2 systems, Phase margin, Gain margin.

The practical work will be based on the above course.

EE 492 COMMUNICATION SYSTEMS - II

Exponential CW Modulation : Frequency and phase modulation, Bandwidth criteria, Generation methods, Receivers, De-emphasis and pre-emphasis filtering.

Pulse Modulation and Digital Modulation : Sampling Theory, Ideal sampling and reconstruction, Aliasing, PAM, PWM, PPM, TDM, PCM, DPCM, ASK, PSK, FSK. Multi level signaling.

Telephony : Modern telephone systems, Transmission aspects, System organization, Distribution system, Electromechanical and electronic exchanges, EPABX, Mobile phones.

Television : Scanning Format of video signal, Block diagram of B/W receiver, Transmitter, Color TV fundamentals, PAL and NTSC systems.

Satellite Communication : Introductory remarks and historical C background, Orbital mechanics, Locating, Satellite in orbit and w.r.t. earth, Look angles and their determination, Effect of earth's oblateness, Sun and moon, Orbital effect in communication system performance, Transponders, Reliability. Low orbit earth satellites. Multi access formats.

Information Theory : Information contents in message, Units of information, Source coding, Entropy and information rate, Compact codes and channel capacity. Error Detection and Correction : Linear block encoding. Hemming codes pulse code, Pre codes and huffmon codes etc. Automatic repeat request system (ARQ).

Microwave Tubes and Circuitsand Semiconductor Microwave Devices: Microwave triode, Klystron types. Transistors, Varactors, Gunn effect.

The practical work will be based on the above course.

EE 493 DIGITAL SIGNAL PROCESSING

Relationship between sampling frequency and Shannon's theorem, Continuous time and discrete time signals, Z-transform, Inverse Z transform, Discrete fourier transform, Fast fourier transform, Elements of FIR and IIR filter design, Filter structures, FFT techniques for high speed, Convolution, Windowing process, Aliasing error its reduction, Quantization effects.

The practical work will be based on the above course.

CS 410 MICROPROCESSORS AND ASSEMBLY LANGUAGE

Introduction to Microprocessor : Basic microprocessor architecture, Memory & the microprocessor, The programming model, Real mode memory addressing, Protected mode memory addressing, Data formats, The instruction set.

Addressing Modes : Data-addressing modes, Register addressing, Immediate addressing, Direct data addressing, Base-pulse-index addressing, Register relative addressing, Base relative plus index addressing, Scaled index addressing, Program memory addressing modes, Stock memory addressing.

Data Movement Instructions : MOV, PUSH/POP, Load-effective address, String data transfers, Miscellaneous data transfer instructions, Segment override prefix, Assembler details.

Arithmetic and Logic Instructions : Addition, Subtraction, And comparison, Multiplication and division, BCD and ASCII arithmetic, Basic logic instructions, Shifts and rotates, String comparisons.

Program Control Instructions : The jump group, Procedures, Introduction to interrupts, Machine control and miscellaneous instructions.

Programming the Microprocessor : Modular Programming, Using the keyboard and video display, Data conversion, Disk files, Hooks.

Memory Interface : Memory devices, Address decoding, Memory interface of microprocessors, Dynamic RAM.

Basic I/O Interface : Introduction to data communications, Parallel I/O, Serial communications, Serial interface & UART, Serial communication lines, Modems. I/O port address decoding & PPI, The 8279 programmable keyboard/display interface, 8251 - PCI, 8254 - programmable interval timer, ADC and DAC converters.

Basic Interrupts : Basic interrupt processing, Hardware interrupts, Expanding & interrupt structure, 8259A programmable interrupt controller, Real time clock.

Microcontroller : Single-chip microprocessor, Introduction to microcontrollers, 8051 - internal memory, registers and interrupts, 8051 - instruction set, Other microcontrollers of the 8051 family.

Developing Microprocessor-Based Products : Introduction to design process, Preparing specification, Developing, Implementing & testing the design, Regulatory compliance testing, Design tool for microprocessor development.

The practical work will be based on the above course.

CS 418 COMPUTER COMMUNICATION NETWORKS

Markov Chains and queuing theory. Open & closed networks of queues, Priority queuing. Scheduling. Performance models of communication networks. Network design, Protocols, Evaluating, Circuit and Data Flow Graph. Routing. Local Area Networks, Satellite Protocols, Broadcast Networks, Ring-Networks.

Investigative practical laboratory work of research nature in the area of Electronic Engineering.

The practical work will be based on the above course.

MS 442 NUMERICAL METHODS

Error Analysis: Types of errors (relative, Absolute, inherent, round off, truncation), significant digits and numerical instability, flow chart. Use of any Computation tools to Analyses the Numerical Solutions.

Linear Operators: Functions of operators, difference operators and the derivative operators, identities.

Difference Equations: Linear homogeneous and non homogeneous difference equations.

Solution of Non-Linear Equations: Numerical methods for finding the roots of transcendental and polynomial equations (Secant, Newton-Raphson, Chebyshev and Graeffe's roots squaring methods), rate of convergence and stability of an iterative method

Solution of Linear Equations: Numerical Methods for finding the solutions of linear equations (Gauss Elimination, Gauss- Jordan Elimination, triangularization, Cholesky, Jacobi and Gauss- serdel)

Interpolation & Curve Fitting: Lagrange's Newton Hermit, Spline least squares approximation(Linear and non-linear curves)

Numerical Integrations & Differentiation: Computation of integrals using Trapezoidal rules 1/3th Simpson's rule 3/8 th ,Simpson's rules. Composite Simpson's and Trapezoidal rules.Computation of solutions of differential equation using (Eular method. Eular modified method, Runge Kutta method of order 4). Numerical solutions of partial differential Equations. Optimization problem)Simplex Method). Steepest Ascent and Steepest Descent Methods.

Inter Disciplinary Courses

Following courses are offered by the Department of Electronic Engineering to other disciplines in NED University of Engineering and Technology.

EL 133 ELECRONICS-I

Conduction in Solids: Introduction, Mechanics of conduction, Mobility, Bohr's model for the elements, Energy level diagrams for solids, Conductors, Intrinsic and extrinsic semiconductors, Electron hole pairs in an intrinsic semiconductor, Distribution of electrons and holes in conduction and valence bands, Recombination and lifetime.

Semiconductors and Diodes: Donor and acceptor impurities, Zero biased, Forward biased and reverse biased junction diodes, Junction diode current equations, Depletion barrier width and junction capacitance, Zener and avalanche breakdown, Hall effect, Fabrication of p-n junction diodes.

Electron Emission Devices: Type of electron emission, Thermionic diodes, Volt ampere characteristics, Child Langmuir power law, Gas filled diode, Thermionic Triode, Parameters and characteristics, Tetrode, Pentode and beam power tubes, Parameters and characteristics.

Simple Diode Circuits and Applications: Mathematical and graphical analysis of diode circuits, The ideal and non ideal diodes, Piecewise linear models, Analysis of piecewise linear models of vacuum tube and junction diodes, The half wave rectifier, The inductance filter, The inductance capacitance filter circuits, Zener and gas diode, Voltage regulator circuits, Clipping and limiting circuits, Clamping and DC restorer, Voltage doubler circuits.

Bipolar and Field Effect Transistors: Transistor biasing and thermal stabilization, The operating point, Bias stability, Collector to base bias, Fixed bias, Emitter feedback bias, Stabilization for the self biased circuits, Field effect transistors, Basic principles and theory, Types, FET characteristics, Different configurations, Common gate, Common source and common drain, The FET, Small signal model, Parameters, Biasing of the FET.

Amplifier Circuits: Introduction to "h" parameters, Hybrid model for transistor, Elementary treatment, Low frequency transistor amplifier circuits, Stage cascade LF amplifier, The high frequency transistor amplifier circuits, H-F-H model, Common base, Short circuit frequency response, Field effect, Transistor used as an amplifier, Un-tuned amplifiers, Low frequency response of an RC coupled stage, Cascade CE transistor stage, Large signal power amplifier, Class A operation, Transformer coupled AF amplifiers, Push pull amplifiers, Tuned amplifier, Single tuned and double tuned, Introduction to wideband amplifier.

Feedback Amplifiers and Oscillators: Basic principles of feedback, Positive and negative feed back, General characteristics of negative feedback amplifiers, Voltage series feedback, Current series feedback, Current shunt and voltage shunt feedback, A general form of oscillator circuit, Crystal oscillator, Frequency stability, Negative resistance in oscillator.

The practical work will be based on the above course.

This course is offered in B.E. (Computer & Information Systems) degree program.

EL 134 BASIC ELECTRONICS

Semiconductors and Diodes: Donor and acceptor impurities, Zero biased, Forward biased and reverse biased junction diodes, Junction diode current equations, Depletion barrier width and junction capacitance, Zener and avalanche breakdown, Hall effect, Diffusion Capacitance.

Power Supply Circuits: Half wave and full wave .rectification, Smoothing capacitor and filters, Ripple, Regulation and regulated power supplies. Bipolar and Field Effect Transistors: Bipolar and FET principles, Basic circuit configuration, Voltage, Low frequency and high frequency small signal models, h-pattern bandwidth, Introduction to amplifier coupling and feedback:

Oscillators: Oscillation principle, Transistor & IC oscillators, Oscillation stability.

The practical work will be based on the above course.

This course is offered in BCSIT degree program.

EL 182 BASIC ELECTRONICS

Solid State Theory: Evolution of Electronics, Atomic Structure of elements; Energy Band diagram for Solids, Intrinsic and Extrinsic Semi-conductors, Electron Hole Pairs, Distribution of Electrons and Holes in a Semi-conductor.

Diode & Its Applications: Diode, PN junction Diode, Forward, Reverse characteristics of a Diode. Ideal Diode, Practical Diode, Equivalent circuit of a Diode, Current Equation of a Diode, Diode as a switch, Diode as a rectifier, Diode as Clipper, Diode as Clamper, Diode in gating circuits, Breakdown Diodes, Voltage Regulator.

Transistor : Bipolar Junctions Transistor, Construction & Operation, BJT configurations, Static characteristic, BJT DC Biasing, Types of Biasing, Biasing

Techniques, DC circuit analysis, Load Line, Operating Point & bias stabilization, BJT as Amplifier, Introduction to Field Effect Transistor, JFETS & MOSFETS.

The practical work will be based on the above course.

This course is offered in B.E. (Telecommunication) degree program.

EL 231 ELECTRONIC DEVICES AND CIRCUITS

The PN Junction Diode : Diode Models, Terminal characteristics, Small signal model, Analysis of diode circuits, Diode Applications.

The Bipolar Junction Transistor: Structure, Transistor as amplifier, Transistor biasing, Small signal models, Single stage BJT amplifier configurations, Single stage mid frequency amplifier, Analysis and design, Feedback in amplifiers, Multistage amplifiers, High frequency response of single stage amplifier, Bipolar transistor as switch.

The Field-Effect Transistor : Structure and physical operation of MOSFET, Current voltage characteristics of MOSFET, The depletion type MOSFET, The junction field effect transistor, FET circuits at DC, FET biasing, FET as amplifier and basic configuration of single stage amplifiers, Frequency response of common source amplifier, FET switches.

The practical work will be based on the above course.

This course is offered in B.E. (Electrical) degree program.

EL 232 ELECTRONICS

Conduction in Solids: Introduction, Mechanics of conduction, Mobility, Bohr's model for the elements, Energy level diagrams for solids, Conductors, Intrinsic and extrinsic semiconductors, Electron hole pairs in an intrinsic semiconductor, Distribution of electrons and holes in conduction and valence bands, Recombination and lifetime.

Semiconductors and Diodes: Donor and acceptor impurities, Zero biased, Forward biased and reverse biased junction diodes, Junction diode current equations, Depletion barrier width and junction capacitance, Zener and avalanche breakdown, Hall effect, Fabrication of p-n junction diodes. Electron Emission Devices: Type of electron emission, Thermionic diodes, Volt ampere characteristics, Child Langmuir power law, Gas filled diode, Thermionic Triode, Parameters and characteristics, Tetrode, Pentode and beam power tubes, Parameters and characteristics. Simple Diode Circuits and Applications: Mathematical and graphical analysis of diode circuits, The ideal and non ideal

diodes, Piecewise linear models, Analysis of piecewise linear models of vacuum tube and junction diodes, The half wave rectifier, The inductance filter, The inductance capacitance filter circuits, Zener and gas diode, Voltage regulator circuits, Clipping and limiting circuits.

Bipolar and Field Effect Transistors: Transistor biasing and thermal stabilization, The operating point, Bias stability, Collector to base bias, Fixed bias, Emitter feedback bias, Stabilization for the self biased circuits, Field effect transistors, Basic principles and theory, Types, FET characteristics, Different configurations, Common gate, Common source and common drain, The FET, Small signal model, Parameters, Biasing of the FET.

Amplifier Circuits: Introduction, "h" parameters, Transistor Hybrid model, Elementary treatment, Low frequency amplifier circuits, Stage cascade LF.

The practical work will be based on the above course.

This course is offered in B.E.(Mechanical); B.E.(Textile) and B.E.(Industrial and Manufacturing) degree programs.

EL 235 ELECTRONICS –II

Basic Single and Two Stage Amplifiers: Small signal analysis of CE, CB, CE configuration and CC-CE, CC-CC, CE-CB configuration using hybrid model.

Differential Amplifiers: Emitter coupled pair, DC transfer characteristics of differential amplifier pair, Emitter degeneration, Small signal analysis of differential amplifier.

Current Sources in ICs: Diode biasing scheme, Widler current source, Wilson current source.

Integrated Circuits: Monolithic and hybrid ICs, Basic processes in IC fabrication, Epitaxial growth, Masking and etching, Diffusion of impurities, Metallization, Packaging, Active devices passive components in IC, Introduction to large scale integration.

Operational Amplifier: Ideal operational amplifier, Elementary analysis of monolithic operational amplifiers.

Logic Families and Gate Circuits: BJT and FET inverters noise margins, Fan out base driver factor, Worst case design, Circuit analysis and input output characteristics of saturating logic gate circuits including RTL, DTL, TTL, ECL, and MOSFET, Specifications and comparison of various families, Introduction to merged transistor logic (IIL).

The practical work will be based on the above course.

This course is offered in B.E.(Computer and Information Systems) degree programs.

EL 236 AMPLIFIERS AND OSCILLATORS

Amplifier Analysis: Transistor as an amplifier, Hybrid model of a transistor, Small signal analysis, large signal analysis, Gain calculation of single stage amplifier, cascading, multistage gain calculations.

Classification of Amplifier: Classification of amplifier on the basis of biasing, Class A, Class B, Class AB and Class C amplifier. Push Pull amplifier, Complementary symmetry amplifier. Classification of amplifiers on the basis of coupling, RC coupled amplifier, Transformer coupled amplifier, Direct coupled amplifier. Classification of amplifier on the basis of frequency, Audio frequency amplifier, Radio frequency amplifier, Tuned amplifiers.

Feed Back: Feedback concept, Feedback amplifiers, Voltage feedback amplifier, Current feedback amplifier, Effect of feedback on frequency response, Non linear distortion and noise, Series and shunt feedback amplifier. Practical Amplifiers Consideration: Input and output impedance, Real and apparent gain, Amplifier loading, Impedance matching and cascading.

Oscillators: Basic theory of oscillators, Tank circuit, Damp and un-damp oscillations, Phase shift oscillator, Colpitt oscillator, Hartley oscillator, Wien Bridge oscillator.

The practical work will be based on the above course.

This course is offered in B.E.(Telecommunications) degree program.

EL 237 DIGITAL ELECTRONICS

Operational Amplifier : Analysis of OP amplifiers & OP amplifier applications.

Pulse and Digital Circuits: Design of wave shaping circuits, Sweep circuits, Electronic gates, Sample and hold circuits, Flip Flops, Counters, ADC and DAC, Principles of A/D and D/A converters, Types of charge couple devices.

Introduction to VLSI: Integrated circuit fabrication and circuit simulation.

The practical work will be based on the above course.

This course is offered in B.E. (Telecommunication) degree program.

EL 238 DIGITAL ELECTRONICS

RTL and DTL circuits, Transistor-transistor logic, Integrated injection logic, MOS and CMOS, Fan in and fan out, Open collector TTL Gates, Tri state TTL gates, Schottky TTL and emitter coupled logic, Combinational circuit design, A/D and D/A conversion.

The practical work will be based on the above course.

This course is offered in BCSIT degree program.

EL 332 INTEGRATED CIRCUITS

Introduction to IC processing for Bipolar and MOS circuit fabrication, The output stages, Analysis of class A, Band AB amplifiers, Power amplifiers, Push-Pull operation, Differential amplifiers, Common and differential mode gains, Analysis of circuits containing ideal Op Amps, Non-ideal performance of Op Amps, The internal structure of general purpose IC Op Amp and its circuit analysis, Large signal operation of Op Amps, Practical Op Amp limitations, Stability and frequency compensation, Non-linear circuit applications like comparators, Schmitt Triggers, Signal generators, Oscillators and wave shaping circuits, Bipolar transistor inverter analysis, Noise margins, TTL gate circuit analysis, ECL gates, The NMOS and CMOS inverter analysis, MOS gate circuits, BICMOS logic circuits.

The practical work will be based on the above course.

This course is offered in B.E. (Electrical) degree program.

EL 335 DIGITAL ELECTRONICS

Operational amplifiers, Analysis and applications, Design of wave shaping circuits, Sweep circuits, Electronic Gates, Multi-stable circuits, Negative resistance circuits, Integrated circuit implementation and fabrication, Circuit simulation, Structured chip design, MOS logic..

The practical work will be based on the above course.

This course is offered in B.E.(Computer and Information Systems) degree program.

EL 343 POWER ELECTRONICS

Introduction and Scope : Solid State Devices used as switches in power electronics, Power diodes, Power transistors, Power MOSFETS, Thyristors, Triacs, Diac. Characterstics of GTO, RCT, etc. Series and parallel operation of SCR, LASCR. Thyristor turn on, Integral cycle control and phase angle control, Elementary and advanced firing schemes, Sequence and close loop control.

Thyristor Commutation : Self commutation, Impulse commutation, Series capacitor commutation, Parallel capacitor commutation.

Uncontrolled and Controlled Rectifiers : Single phase, Three phase, Semi converter, Full converter, Dual converter, Analysis and performance, Parameters as harmonic factor, Utilization factor, Power factor, Distortion factor, Rectifiers with purely resistive, Highly inductive and RL loads. AC Voltage Controllers.

DC Chopper : Principle, Step-up and Step-down operation, Buck regulator, boost regulator, Buck-boost regulator, Cuk regulator, Choppers using thyristors.

Inverters : Principles, Half bridge and Full bridge inverters, Constant, Variable and Sinusoidal PW modulation, Modified SPWM.

Protection Analysis : Over-voltage, Over-current, di/dt and dv/dt protection, Heat sinks.

Electronic Power Supplies : Design and analysis of regulated Power supplies, Switch mode power supplies and Uninterrupted Power supplies.

The practical work will be based on the above course.

This course is offered in B.E. (Electrical) degree program.

EL 433 SOLID STATE DEVICES

Quantum Mechanics : Probability and uncertainty principle, The Schordinger wave equation, Quantum Mechanical Tunneling.

Semi conductor Materials and Crystal Properties : Energy bands and charge carriers in semi conductors, Carrier statistics, Drift, Excess carriers and diffusion.

The PN Junction and Junction Diodes : Equilibrium conditions, Forward and reverse biased junction, Reverse breakdown, Metal semiconductor junctions, Transient response, Hetero junctions, Switching diodes, Tunnel diode and photodiode.

Bipolar Junction Transistor : Charge transport in bipolar junction transistor, Minority carrier distribution and terminal currents, The coupled diode model.

Field Effect Transistors : JFET Pinch-off, Gate control and V/I characteristics the GaAs MESFET, MOS-capacitor, Threshold voltage, Volt-ampere relationship of MOSFET.

The practical work will be based on the above course.

This course is offered in B.E.(Electrical) degree program.

BASIC ELECTRONICS

PROGRAMMING WITH 'C' LANGUAGE

SOLID STATE DEVICES

The following courses to be taught in Bioengineering and Medical Engineering, course number and course syllabi of which to be finalized.

Printed at Khwaja Printers & Publishers, Karachi.
Telephone: 6684363, 6606776, Fax: 6684363