B.E. (ELECTRONIC) DEGREE PROGRAMME

AT

NED UNIVERSITY OF ENGINEERING AND TECHNOLOGY, KARACHI

COURSES OF STUDIES

Detailed Syllabi

(2000-2001)

DEPARTMENT OF ELECTRONIC ENGINEERING
NED UNIVERSITY OF ENGINEERING AND TECHNOLOGY,
UNIVERSITY ROAD, KARACHI-75270.

B.E. (ELECTRONIC ENGINEERING)
Courses of Studies
(For 2000-2001 Batch & Onwards)

FIRST YEAR

S. No.	Course No.	Course Title	Marks Theory	Marks Practical/
1	EL-156	Electronic Engineering Drawing & Workshop	100	100
2	EL-182	Basic Electronics	100	50
3	EE-114	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-104	Applied Physics	100	50
8	MS-105	Applied Chemistry	100	50
9	MS-106	Mathematics-1	100	–
10	HS-101	English	100	–
11	HS-105	Pakistan Studies OR		
	HS-127	Pakistan Studies (For Foreigners)	100	–

SECOND YEAR

S. No.	Course No.	Course Title	Marks Theory	Marks Practical/
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-212	Mathematics-II	100	–
10	MS-213	Mathematics-III	100	–
11	HS-205	Islamic Studies OR		
	HS-206	Ethical Behavior	100	–

THIRD YEAR

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-385	Biomedical Engineering	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-318	Mathematics-IV	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	EL-472	Linear Control Systems	100	50
6	EE-492	Communication system-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-403	Numerical Methods	100	–

ANNEXURE - B

EL 182 BASIC ELECTRONICS

Historical Evolution of Electronic Devices.

Solid State Theory: 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 (BJTS) Junctions Transistors, Construction and Operation, Static characteristic, Transistors configurations, DC Biasing of a Transistor, Types of Biasing, Biasing Techniques, DC circuit analysis, Load Line, Operating Point and bias stabilization. Transistor as amplifier.

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.

EE 156 ELECTRONIC ENGINEERING DRAWING AND WORKSHOP

Mechanical Drawing : Drawing equipment and the use of instruments. Basic drafting techniques and standards, Geometrical curves including plan curves, Cycloid, Hypocycloid and the Involute. Intersection at various positions of geometrical bodies, Such as pyramids, Cylinders and Cones, Development of surfaces.

Computer Aided Drafting And Drawing: General and basic knowledge related to computer aided drafting, e.g. Co-ordinate systems, Drawing setup procedures, Basic draw commands, Basic edit commands, Hatching, Dimensioning and Plotting. Introduction to computer aided drawing, Isometric projection. Sectional drawing and Assembly Drawing.

Sections of Machines and Engine Components : Orthographic projections and standard practices, Isometric views with particular reference to piping and ducting.

PCB Design : PCB design and layout drawings will be done using PCB soft wares. Basic parameters and terms, types of pads and drills, IC sockets, PCB testing, Switches, PCB standards, Routing.

Workshop : Operations of Voltmeters, Ohmmeters, Power supplies, Function generators and Oscilloscopes. Measuring parametric values of discrete passive components.

Fabricating simple electronic circuits on breadboard, Fabricating PCB (drilling, etching etc), Assembling and soldering components on a PCB.

CS 101 INTRODUCTION TO COMPUTERS

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

Data Representation and data structures, Coding, Computer Arithmetic, Organization and 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 Low, 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 Low, 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 : Lows of dry friction, Angles of friction, Vedges, 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.

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 vapour curves, Phase diagrams, Phase roles, Processes of vapours, Mollier diagram, Rankine cycle, Boilers and anciliary 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 104 APPLIED PHYSICS

Fundamentals, Kinetics, Potential, Vibrational and Rotational energies.

Electricity and Magnetism : Charge, Ohm's Law, Direct and Alternating currents, Capacitance and inductance (self and mutual inductance), Kirchhoff's laws, Thermoelectricity, Sebeck and Peltier effects. Galvanometer, Ammeter and Voltmeter. Cathode-Ray Oscilloscope. Magnetic Properties (Permeability and susceptibility), Diamagnetism, Paramagnetism and Ferromagnetism. Induction coil and transformer.

Electronics : Semiconductors, P-type, N-type, Semiconductors, PN-diode and its characteristics, PNP and NPN transistors and their characteristics.

Optics and Laser Physics : Interference, Diffraction and polarisation phenomena. Laser, stimulated emission, Population inversion, Laser applications. Modern Physics : Atomic structure, Block body radiation, Photon, De-Broglie's Waves. Photoelectric effect, Compton effect, Mass-Energy conversion relation. Nuclear structure, Radioactivity, Alpha, Beta and Gamma particles and their properties. Radioactivity Decay Theorem, Half-life and Mean-life. X-rays, Characteristics and applications of X-ray. Liquid-drop model, Fission and Fusion processes, Nuclear Reactor. Nuclear Radiation. Hazards and safety.

Thermodynamics and Cryogenics : Heat, Temperature and internal energy. Law of thermodynamics (Zeroth, 1^{st}, 2^{nd} and 3^{rd} laws), Concept of Entropy. Cryogenics, Low temperature, Methods of production of low temperature joule-kelvin Effect, Adiabatic demagnetisation).

Practicals: Fequency of Tuning Fork by Sonometer, Value of H by Tangent Galvanometer, High resistance by leakage using ballistic galvanometer, Comparison of capacitiesw of condensors by ballistic galvanometer. Characteristic of Acceptor circuits, Characteristic of Rejector circuits, Value of J by electrical method, Value of J by constant flow method, Ratio of Cp and Cv by Clement and Desom's method, Intensities of light by photocell, Refractive Index of a glass prism by spectrometer, Specific ratation of sugar by Polarimeter, Value of K by Searle's apparatus, Value of K by Lee's apparatus.

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).

Theromochemistry : 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 : Sourvces 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.

MS 106 MATHEMATICS - I

General Mathematics : Basic Operation of complex numbers De'Moivre's Theorem with applications. Circular, Hyperbolic, Exponential Functions of complex numbers and their inverse functions.

Differential Calculus : Limits-Indeterminant forms. Continuity, Differentiability, Total differential with application to errors, Newton's method of approximating roots of non-linear equations. Tracing of simple curves in Cartesian and Polar Coordinates. Curvature and radius of curvature. Partial differentiation with applications. Homogeneous functions. Tangent and normal.

Integral Calculus : Review of basic integration methods. Reduction formulae. Elementary Beta and Gamma integrals. Rectification and Quadrature. Centre of gravity. Centre of pressure. Moment of inertia of plane areas. Approximate integration.

Vector Algebra : Scalar and Vector quantities, Physical and geometrical meanings. Algebra of vectors. Scalar and vector triple products.

HS 101 ENGLISH

Technical Report Writing.

Preparation of Short Speeches for various occasions.
Written Communication : Writing of formal letters and applications. Drafting of Memoranda, Contracts, Advertisements and tender notices. Preparation of Minutes of meeting. Writing short papers on technical subjects. Notes taking.

Oral Communication : Oral reporting. Conference Leading. Dictation, Interviewing.

Precis Writing.

Essays on technical and non-technical subjects.

Applied Grammer : General rules for writing correct English, Punctuation, Study of words, Construction and improvement of Sentences, Vocabulary Learning and use of Dictionary.

HS 105 PAKISTAN STUDIES

An Outline of Emergence of Pakistan : A brief historical survey of Muslim community in the sub-continent. War of Independent 1857 and Aftermatch. Sir Syed Ahmed Khan, Development of Two Nation Theory. Formation of Muslim League. Lucknow Pact. Khilafat and Non-cooperation Movement. Political Event from 1924 to 1937. Pakistan Resolution – Struggle for Pakistan from 1940 to 1947. Emergence of Pakistan.

Land of Pakistan : Geophysical conditions, Territorial situation and its importance, Nature 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 annualment. Constitutional and Political Crisis of 1971, The constitution of 1973. Recent constitutional development.

Post Independence Development : Education in Pakistan, Planning and Development in the field of Education. Development of Science and Technology with special reference to Engineering and Architecture. Brief survey of Pakistan Economy, Industrial and Agricultural Development. Internal and external trade. Economic planning and prospects.

Cultural Development in Pakistan : Definition, Contents and Contributing factors in culture. Development of Art, Philosophy and Literature.

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

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.

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.

Kirchhoff's Law: Basic definitions of branch, Loop and node, Statements of Kirchhoff'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 sinosoidal 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.

Nonsinusoidal 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, Photconductive, 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 262 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 281 ELECTROMAGNETIC FIELDS

Vector Analysis : Scalars and vectors, Vector algebra, The Cartesian coordinate system, Vector components and Unit vectors, The vectorfield, 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, Magnetisation 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 organisation 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 realisations, 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 minimisation 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, Minimisation of the number of states, Clocked Networks.

The Practical work will be based on the above course.

MS 212 **MATHEMATICS - II**

Infinite Series : Applications of simple convergence tests such as Comparison, Root, Ratio, Raabe's and Gauss' Tests on the behaviour of series.

Advanced Calculus : Taylor's Theorem for functions of two variables without proof. Maxima and minima of functions of two variables. Largrange's Method of multipliers.

Double integration, Change of order, Conversion to polar form. Applications in finding areas, Valumes, Centroids, Centre of pressure. Moment of inertia and principal axes. Theorems of Pappus and Guldinus. Surface areas and valumes of revolution.

Vector Calculus : Differentiation of vectors, Gradient, Divergence and curl. Laplacian and spherical harmonics. Vector integration. Theorems of Gauss, Green and Stokes. Simple applications.

Solid Geometry : Rectangular Coordinate Systems in three dimensions, Direction cosines, Plane (straight line) and sphere.

Fourier Series : Introduction, Euler-Fourier formulae, Even and odd functions.

MS 213 MATHEMATICS - III

Linear Algebra & Matrices : Linearity, Dependent and independent vectors, Bases and dimension, Vector spaces, Fields, Linear transformations, Matrix of a linear transformation.

Basic definitions and matrix operations, Adjoint and inverse of a 3 x 3 matrix. Rank of a matrix. Cayley-Hamilton Theorem, Eigen values. Applications in solving linear homogeneous and non-homogeneous equations in three unknowns. Cases of existence of solution, No solution, Infinite and unique solutions.

Ordinary Differential Equations : Definitions, Formation and solution. Boundary conditions. Homogeneous and Non-homogeneous linear differential equations with constant coefficients, Linear equations with variable coefficients. Cauchy's and Legendre's equations. Equations of second order. Systems of simultaneous linear equations with constant coefficients. Numerical approximation to solutions. Solution in series. Simple applications in Engineering. Orthogonal trajectories.

Partial Differential Equations : Formation of partial differential equations. Solution of first order linear and special types of second and higher order differential equations used in Engineering problems. Homogeneous partial differential equations of order one. Lagrange's solution. Various standard forms.

Laplace Transformations : Elementary transformations. Shifting Theorems. Heaveside's expansion formulae. Simple applications.

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

HS 205 ISLAMIC STUDIES

Thematic Study of Holy Quran

Basic Islamic Believes

1. Topics

i) <u>Tauheed</u>
Al-Ambiya-22, Al-Baqarah-163-164

ii) <u>Prophethood</u>
Al-Imran-79, Al-Hashr-7 Al-Madah-3

iii) <u>Here-After</u>
Al-Hajj-5, Al-Baqarah-48

*Two Hadith

2. Basic Islamic Practices

Al-Mu' minun-I-II

3. Amre-Bil-MA' Roof WA-Nahi Anil Munkar

The concept of Good & Evil.

i) Importance & necessity of DA' Wat-e-Deen
Al-Imran-110

ii) Method of DA' Wat-e-Deen
An-Nehl-125, Al-Imran-104

*Two Hadith

4. Unity of the Ummah

Al-Imran-103, Al-Hujurat-10 Al-Imran-64 Al-An'am-108

5. Kasb-e-Halal

Taha-81, Al-A'raf-32-33 Al-Baqarah-188

*Two Hadith

6. Huquq-ul-Ibad

i) Right to Property
Al-Maidah-32

ii) Right to Property
An-Nisa-29

iii) Right of Respect & Dignity
Al-Hujurat-11-12

iv) Freedom of Expression
Al-Baqarah-256

v) Right of Equality
Al-Hujurat-13

vi) Economic Security
Al-Ma'arij-24-25

vii) Employment Opportunity on Merit
An-Nisa-58

viii) Excession Right to Justice
An-Nisa-135

7. Women Rights

An-Nehl-97, Al-Ahzab-35 An-Nisa-07

8. 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 difficultis 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-contnent before Islam.

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

*N.B: As prescribed by UGC. The original Text & complete course plan may be obtained from the Department of Humanities.

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 and 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 of Power Electronics.

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, etc. Rectifiers with purely resistive, Highly inductive and RL loads. AC Voltage Controllers.

DC Chopper : Principle, Stepup operation, Stepdown operation, Buck regulator, boost regulator, Buck-boost regulator, Cuck regulator, Choppers using thyristors.

Inverters : Principles, Half bridge, Full bridge inverters, Constant phase width modulation, Variable PW modulation, Sinosoidal 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.

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.

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, Characterisation 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, Matric 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 fuctions.

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 Appearent gain, Amplifier Loading, Impedance Matching and Cascading.

Oscillators : Basic Theory of Oscillators. Tank Circuit, Damp and Un-dump Osicillations, Phase Shift Oscillator, Callpit Oscillator, Hartley Oscillator, Wein Bridge Oscillator.

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 Tempat, 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 Pheostat, 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, Isolaters & Transmitters.

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

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; Interconnective 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-Pipelinning

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; Popular Electromechanical memory Devices; Memory Hierarchy; Cache Memories; Associative memory Virtual memory and memory Management Concepts.

Input/ Output : Basic Concepts; Programe 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 : Parallelisation in conventional computers; General Classification of Computer Architectures; Array Processors - Systolic arrays, Wavefront array Processors; Pipeline Processing - Basic Concepts, Arithmetic pipelines, Instruction Pipelines; Multiprocessors - Single Bus, Multibus, Crossbar, Multiple Memory; Data-flow Computer Systems.

MS 318 MATHEMATICS - IV

Presentation of Data : Objects, Classification, Tabulation, Classes, Graphical representation, Histograms, Frequency polygons, Frequency curves and their types.

Measures of Central Tendency : Means : A.M., G.M.. H.M., Their properties, Weighted mean. Median, Quartiles, Mode; Their relations. Merits and demerits of averages.

Measures of Dispersion : Range, Moments, Skewness, Quartile deviation, Mean deviation, Standard deviation. Variance and its coefficients, Kurtosis.

Curve Fitting : Goodness of fit, Fitting a straight line. Parabola. Circle

Simple Regression : Scatter diagram, Linear regression and correlation

Probability : Definitions, Sample space, Events, Laws of probability, Conditional probability. Dependent and independent events.

Random Variable : Introduction. Distribution function, Discrete random variable and its probability distribution. Continuous random variable and its probability density function. Mathematical Expectation of a random variable. Moment Generating Functions.

Probability Distribution : Binomial, Poisson, Uniform, Exponential and Normal distribution functions and its approximation to Poisson distribution.

EL 385 BIO MEDICAL ENGINEERING

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 Biopotentials, 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.

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

The practical work will be based on the above course.

HS 303 EGINEERING ECONOMICS

Introduction : Basic concepts, Engineering economy defined, Measures of financial effectiveness, Nomonetary 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. Discret 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, Bareak-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 : Definition of code of ethics: Review of code of ethics of national and international engineering bodies. 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 Electronics 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 written report on work of their project to the Chairman, Preferably in the typed form. The students will be required to appear before a panel of examiners for oral examination.

The Project will be of the following scopes : 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 : Probablity and uncertainity principle, The Schordinger wave equation, Quantum Mechanical Tunnelling.

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, Voltampere relationship of MOSFET.

EL 484 OPTO-ELECTRONICS AND MICRO WAVE SYSTEMS

Light : Histroical 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 Fibre Waveguide. Wave Propagation in Optical Fibre, Types of Optical Fibre, Optical Fibre Bandwidth Calculation, Attenuation in Optical Fibre, Fibre Material and Fabre 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 : Photodetection 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 Sensivity.

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

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 standardised 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, Type 1 and type 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 M_m 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 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.

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 signalling.

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 Circuits : Microwave triode, Klystron types.

Semiconductor Microwave Devices : Transistors, Varactors, Gunn effect.

The practical work will be based on the above course.

CS 410 MICROPROCESSORS AND ASSEMBLY LANGUAGE

Introduction to the Microprocessor : The evolution of the microprocessor, Basic microprocessor architecture, Memory and 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 revisited, RUSH/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 : An introduction to data communications, Parallel I/O, Serial communications, The serial interface and the UART, Serial comminication lines modems. I/O port address decoding, The programmable peripheral interface, The 8279 programmable keyboard/display interface, 8251A programmable communication interface, 8254 programmable interval timer, Analog-to-digital (ADC) and digital-to- analog converters (DAC).

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

The Microcontroller : Single-chip microprocessor, An introduction to microcontrollers, The 8051 internal RAM and registers, The 8051 interrupts system, The 8051 instruction set, Other microcontrollers on the 8051 family.

Developing Microprocessor-Based Products : An introduction to the design process, Preparing the specification, Developing a design, Implementing and 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 queing theory. Open & closed networks of queues, Priority queueing. Scheduling. Performance models of communication networks. Network design, Protocols, Evaluating, Circuit and Data Flow Graph. Routing. Local Area Networks, Satellite Protocols, Broad-cast Networks, Ring-Networks.

The practical work will be based on the above course.

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

MS 403 NUMERICAL METHODS

Finitc difference, Collocation polynomials, Interpclation. Errors in computer and numerical methods. Numerical methods for the solution of linear algebraic equations, Iterative methods for calculating roots of equations, Determination of Eigen values and Eigen vectors.

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