FACULTY OF ENGINEERING & TECHNOLOGY

SCHOOL OF ELECTRONIC SCIENCES

B.- ELECTRONICS & COMMUNICATION ENGINEERING

PART TIME

AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY, PAIYANOOR

&

V.M.K.V. ENGINEERING COLLEGE, SALEM

CHOICE BASED CREDIT SYSTEM

2017 REGULATION

(Semester I & II)

I SEMESTER

S.No	Course Title	Offering Department	L	T	P	C
THEORY						
1	Engineering Mathematics	MATHS	3	1	0	4
2	Environmental Science & Engineering	CHEM	3	0	0	3
3	Electronic Devices	ECE	3	0	0	3
4	Signals & Systems	ECE	3	1	0	4
PRACTICAL						
5	Electronic Devices Lab	ECE	0	0	3	2
		TOTAL				**16**

II SEMESTER

S.No.	Course Title	Offering Department	L	T	P	C
THEORY						
1	Digital Signal Processing	ECE	3	1	0	4
2	Digital Electronics	ECE	3	0	0	3
3	Electromagnetic Fields	EEE	3	0	0	3
4	Electronic Circuits I	ECE	3	0	0	3
PRACTICAL						
5	Digital Electronics Lab	ECE	0	0	3	2
TOTAL						15

SEMESTER I	L	T	P	C
ENGINEERING MATHEMATICS	3	1	0	4

(COMMON TO THE BRANCHES MECH,ECE,CSE, CSSE,EEE,EIE,CIVIL,IT,MECHTRONICS,AERONAUCTICAL ,ETC,AUTOMOBILE)

UNIT I

MATRICES **09**

Characteristic equation – Eigen values and eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors (Without proof) – Cayley-Hamilton theorem (excluding proof) – Orthogonal transformation of a symmetric matrix to diagonal form.

UNIT II

ORDINARY DIFFERENTIAL EQUATIONS **09**

Solutions of First and Second order linear ordinary differential equation with constant coefficients – Method of variation of parameters –Simultaneous first order linear equations with constant coefficients.

UNIT III

MULTIPLE INTEGRALS AND VECTOR CALCULUS **09**

Double integration - Cartesian and polar coordinates –Area as a double integral – Triple integration – volume as a triple integral- Directional derivatives – Gradient, Divergence and Curl – Irrotational and solenoidal- vector fields – vector integration.

UNIT IV

LAPLACE TRANSFORMS **09**

Laplace transform – transform of elementary functions – basic properties – derivatives and integrals of transforms – transforms of derivatives and integrals – initial and final value theorems – Transform of periodic functions.

UNIT V

APPLICATIONS OF LAPLACE TRANSFORMS **09**

Inverse Laplace transform – Convolution theorem – Initial and Final value theorem-Solution of linear ODE of second order with constant coefficients and first order simultaneous equation with constant coefficients using Laplace transforms.

Total hours : 60
Lecture Hours: 45
Tutorial Hours: 15

TEXT BOOKS

1. **"**Engineering Mathematics**"** by Department of Mathematics, VMU
2. Veerarajan, T., "Engineering Mathematics", Tata McGraw Hill Publishing Co., NewDelhi, 2006.
3. Prof.Dr.A .Singaravelu , Engineering Mathematics Volume I & Volume II by Meenakshi Publications.

REFERENCE BOOKS

1. Grewal, B.S., "Higher Engineering Mathematics" (36th Edition), Khanna Publishers, Delhi 2001.
2. Kreyszig, E., "Advanced Engineering Mathematics" (8th Edition), John Wiley and Sons (Asia) Pvt Ltd., Singapore, 2001.
3. Kandasamy .P., Thilagavathy. K., and Gunavathy. K., "Engineering Mathematics", Volumes I & II (4th edition), S.Chand & Co., New Delhi., 2001.

SEMESTER I	L	T	P	C
ENVIRONMENTAL SCIENCE AND ENGINEERING	3	0	0	3

(Common to B.E all branches)

OBJECTIVE: It is the branch of science which deals with the effects of human activities &modern technology on environment. It creates awareness among the engineering students about environmental pollution and the role of the engineers in conservation of environment.

OUT COME: The students will get the knowledge about environment and they will work their corresponding field with eco friendly. It will protect our environment from pollution

UNIT – I INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES 10

Definition, scope and importance – need for public awareness- forest resources: use and over exploitation, deforestation, case studies. Timber extraction, mining, dams and their ground water, floods, drought, conflicts over water, dams-benefits and problems-mineral resources: use effects on forests and tribal people-water resources: use and over-utilization of surface and exploitation, environmental effects if extracting and using mineral resources, case studies-food resources: world food problems, changes caused by agriculture and overgrazing, effects of modem agriculture, fertilizer-pesticide problems, water logging, salinity, case studies-energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies –land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification –role of an individual in conservation of natural resources-equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets-river/forest./grassland/ hill/mountain.

UNIT – II ECOSYSTEMS AND BIODIVERSITY 14

Concept of and ecosystem –structure and function of an ecosystem-producers, consumers and decomposers-energy flow in the ecosystem-ecological succession-food chains, food webs and ecological pyramids-introduction, types, characteristic features, structure and function of the (a)forest ecosystem (b). grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)-introduction to biodiversity- definition: genetic, species and ecosystem diversity- biogeographical classification of India-value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values-biodiversity at global, national and local levels-India as a mega-diversity nation-hot-spots of biodiversity-threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts-endangered and endemic species of India –conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.

UNIT - III ENVIRONMENTAL POLLUTION 8

Definition-causes, effects and control measures of: (a) air pollution (b) water pollution (c) soil pollution (d) marine pollution (e) noise pollution (f) thermal pollution (g) nuclear hazards – solid waste management: caused, effects and control measures of urban and industrial wastes-role of an individual in prevention of pollution-pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site-urban / rural / industrial / agriculture

UNIT - IV SOCIAL ISSUES AND THEIR ENVIRONMENT 7

From unsustainable to sustainable development-urban problems related to energy- water conservation, rain water harvesting, watershed management –resettlement and rehabilitation of people, its problems and concerns, case studies – environmental ethics: issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies – wasteland reclamation-consumerism and waste products-environment protection act-air (prevention and control of pollution) act-water (prevention and control of pollution) act- wildlife protection act-forest conservation act-issues involved in enforcement of environmental legislation-public awareness.

UNIT – V HUMAN POPULATION AND THE ENVRONMENT 6

Population growth, variation among nations – population explosion – family welfare programme- environment and human health – human rights- value education- HIV/ AIDS – women and child welfare –role of information technology in environment and human health – case studies.

Total Hours : 45

TEXT BOOK:

1. Raman Sivakumar, Environmental Science and Engineering, Vijay Nicole imprints Pvt.Ltd.

REFERENCE BOOKS :

1. Bharucha Erach, The Biodiversity of India, publishing Pvt. Ahmedabad, India,
2. Trivedi R.K. Hand book of Environmental laws, Rules, Guidelines, Compliances and Standards, Vol. and II, Enviro Media.
3. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, jaicao., House, Mumbai, 2001.
4. Weger K.D., Environmental Management, W.B. Saunders, Co., Philadelphia, USA., 1998.

5. Gilbert M.Masters, Introduction to Environmental Engineering and science, pearson Education Pvt., Ltd., Second Edition, 2004
6. Miller `T.G. Jr., Environmental Science, Wadsworth Publishing Co.
7. Townsend C., Harper J and Michael Begon, Essentials of Ecology, Blackwell Science
8. Trivedi R.K And P.K. Goel, Introduction to air pollution, Techno-Science publications.

SEMESTER I	L	T	P	C
ELECTRONIC DEVICES	3	0	0	3

OBJECTIVES:

• To enable the student to learn the major components of a electronic system

• To know the correct and efficient ways of knowing various electronic gadgets

PROGRAMME OUTCOMES:

- The broad education necessary to understand the impact of engineering solutions in a global context.
- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

UNIT I: ELECTRON BALLISTICS AND INTRINSIC SEMICONDUCTORS 9

Force on charge in electric field - Motion of Charge in uniform and time varying electric fields - Force on a moving charge in a magnetic field - calculation of cyclotron frequency - calculation of electrostatic and magnetic deflection sensitivity.

Energy band structure of conductors, semiconductors and insulators - Density distribution of available energy states in semiconductors - Fermi- Diac probability distribution function at different temperatures - Thermal generation of carriers - Calculation of electron and hole densities in intrinsic semiconductors - Intrinsic concentration - Mass Action Law.

UNIT II: EXTRINSIC SEMICONDUCTOR AND PN JUNCTIONS 9

N and P type semiconductors and their energy band structures - Law of electrical neutrality - Calculation of location of Fermi level and free electron and hole densities in extrinsic semiconductors - Mobility, drift current and conductivity - Diffusion current - Continuity equation - Hall effect. Band structure of PN Junction - Current Component in a PN Junction - Derivation of diode equation - Temperature dependence of diode characteristics.

UNIT III: SWITCHING CHARACTERISTICS OF PN JUNCTION AND SPECIAL DIODES 9

Calculation of transition and diffusion capacitance - Varactor diode - charge control description of diode - switching characteristics of diode - Mechanism of avalanche and Zener breakdown - Temperature dependence of breakdown voltages - Backward diode - Tunneling effect in thin barriers Tunnel diode - Photo diode - Light emitting diodes.

UNIT IV: BIPOLAR JUNCTION TRANSISTORS AND FIELD EFFECT TRANSISTORS 9

Construction of PNP and NPN transistors - BJT current components - Emitter to collector and base to collector current gains - Base width modulation CB and CE characteristics - Breakdown characteristics - Ebers - Moll model - Transistor switching times.

Construction and Characteristics of JFET - Relation between Pinch off Voltage and drain current - Derivation. MOSFETS - Enhancement and depletion types.

UNIT V: METAL SEMICONDUCTOR CONTACTS AND POWER CONTROL DEVICES 9

Metal Semiconductor Contacts - Energy band diagram of metal semiconductor junction Schottky diode and ohmic contacts.Power control devices: Characteristics and equivalent circuit of UJT - intrinsic stand off ratio. PNPN diode - Two transistor model, SCR, Triac, Diac.

TOTAL HOURS: 60

TEXT BOOK:

1. Jacob Millman & Christos C.Halkias, "Electronic Devices and Circuits" Tata McGraw-Hill, 1991 .

REFERENCE:

1. Nandita Das Gupta and Amitava Das Gupta, Semiconductor Devices - Modelling and Technology, Prentice Hall of India, 2004.
2. Donald A.Neaman," Semiconductor Physics and Devices" 3rd Ed., Tata McGraw-Hill 2002.
3. S.M.Sze, Semiconductor Devices - Physics and Technology, 2nd edn. John Wiley, 2002.
4. Ben G.Streetman and Sanjay Banerjee, Solid State Electronic Devices, Pearson Education 2000.

SEMESTER I	L	T	P	C
SIGNALS AND SYSTEMS	3	1	0	4

OBJECTIVES:

- To introduce the concepts and techniques associated with the understanding of signals and systems.
- To familiarize with techniques suitable for analyzing and synthesizing both continuous-time and discrete time systems. To provide with an appreciation of applications for the techniques and mathematics used in this course.

PROGRAMME OUTCOMES:

- Apply engineering principles in solving problems relevant to electrical and electronics engineering.
- Apply critical thinking in designing and evaluating components, processes and systems related to electrical and electronics engineering.

UNIT I: CLASSIFICATION OF SIGNALS AND SYSTEMS 9

Continuous time signals (CT signals), discrete time signals (DT signals) - Step, Ramp, Pulse, Impulse, Exponential, Classification of CT and DT signals - periodic and aperiodic, random signals, CT systems and DT systems, Classification of systems - Linear Time invariant Systems.

UNIT II: ANALYSIS OF C.T. SIGNALS 9

Fourier series analysis, Spectrum of C.T. signals, Fourier Transform and Laplace Transform in Signal Analysis.

UNIT III: LTI-CT SYSTEMS 9

Differential equation, Block diagram representation, Impulse response, Convolution integral, Frequency response, Fourier Methods and Laplace transforms in analysis, State equations and Matrix.

UNIT IV: ANALYSIS OF D.T. SIGNALS 9

Z Transforms and Properties, Spectrum of D.T. signals, Discrete Time Fourier Transform (DTFT)

UNIT V: LTI-DT SYSTEMS 9

Difference equations, Block diagram representation, Impulse response, Convolution SUM, Frequency response, FFT and Z-transform analysis, State variable equation and Matrix.

TOTAL HOURS: 60

TEXT BOOKS:

1. Allan V. Oppenheim et al, “Signals & Systems ", Prentice Hall of India Pvt. Ltd., 1997.

REFERENCES:

1. Douglas K. Lindner, “Signals and Systems ", McGraw Hill International, 1999.
2. Simon Haykin and Barry Van Veen, “Signals and Systems ", John Wiley & Sons Inc., 1999.
3. Robert A. Gabel and Richard A. Roberts, “Signals & Linear Systems ", John Wiley, 3rd Edition, 1987.
4. Roger E. Zeimer et al, " Signals & Systems : Continuous and Discrete ", McMillan, 2nd Edition, 1990.

SEMESTER I	L	T	P	C
ELECTRONIC DEVICES LAB	0	0	3	2

OBJECTIVE

To provide exposure to the students with hands on experience on basic Engineering practices of Electronics Engineering.

List of Experiments

1. Diode Forward characteristics.

2. Zener Diode characteristics.

3. Input and Output characteristics of BJT.

4. Output characteristics of JFET.

5. Fixed Bias amplifier circuits using BJT.

6. Differential amplifier using BJT.

7. Power supply Full wave rectifier with simple capacitor filter.

8. Measurement of UJT Characteristics.

9. Measurement of SCR Characteristics

TOTAL HOURS: 45

SEMESTER II	L	T	P	C
DIGITAL SIGNAL PROCESSING	3	1	0	4

1. DISCRETE FOURIER TRANSFORMS & FAST FOURIER TRANSFORMS: 9

Introduction to DFT-Efficient computation of DFT properties of DFT -FFT algorithms-Radix-2 and Radix-4 FFT algorithms-Decimation in Time- Decimation in Frequency algorithms-Use of FFT algorithms in Linear Filtering and correlation.

2. IIR FILTER DESIGN: 9

Structure of IIR-System Design time IIR filter from continuous time filter-IIR filter design by Impulse Invarience.Bilinear transformation-Approximation derivatives-Design of IIR filter in the frequency domain.

3**. FIR FILTER DESIGN: 9**

Symmetric and Antisymmetric FIR filters – Linear phase FIR filters – Windowing technique-Rectangular, Kaiser windows-Frequency sampling techniques-Structure for FIR systems.

4. FINITE WORD LENGTH EFFECTS: 9

Quantization noise – derivation for quantization noise power – Fixed point and binary floating point number representations – Comparison – Overflow error – truncation error – coefficient quantization error – limit cycle oscillations- signal scaling – analytical model of sample and hold operations-Application of DSP-Model of speech Wave form-Vocoder.

5. DIGITAL SIGNAL PROCESSORS: 9

Introduction to DSP architecture-Harvard architecture-Dedicated MAC unit-Multiple ALUs Advanced addressing modes, Pipelining, Overview of instruction set of TMS320C5X and C54X.

TOTAL HOURS: 45

TEXT BOOK:

1. John G. Proakis and Dimitris G.Manolakis, 'Digital Signal Processing Principles, Algorithms and Applications ', PHI of India Ltd., New Delhi 3rd Edition 2000.
2. B.Venkataramani&M.Bhasker, Digital Signal processor, Architecture, Programming and Application, TMH 2002.

REFERENCES:

1. Alan V Oppenheim, Ronald W Schafer and John R Buck."Discrete time signal processing", PHI/Pearson Education, 2000, second Edition.
2. Jhony R.Johnson, "Introduction to Digital Signal Processing", Prentice Hall of India/Pearson Education, 2002.
3. Sanjit K.Mitra 'Digital Signal Processing', A Computer Based Approach, Tata McGraw-Hill, New Delhi, 1998, Second Edition.

SEMESTER II	L	T	P	C
DIGITAL ELECTRONICS	3	0	0	3

1. BASIC CONCEPTS AND BOOLEAN ALGEBRA 9

Number systems - Binary, Octal, Decimal, Hexadecimal, conversion from one to another, complement arithmetic, Boolean theorems of Boolean algebra, Sum of products and product of sums, Minters and Maxterms, Karnaugh map, Tabulation and computer aided minimization procedures.

2. LOGIC GATES 9

RTL, DTL, TTL, ECL, ICL, HTL, NMOS & CMOS logic gates, Circuit diagram and analysis characteristics and specifications, tri-state gates.

3. COMBINATIONAL CIRCUITS 9

Problem formulation and design of combinational circuits, Adder / Subtractor, Encoder / decoder, Mux / Demux, Code-converters, Comparators, Implementation of combinational logic using standard ICs, ROM, EPROM, EEPROM, Basics of PLD, PAL, PLA and their use in combinational circuit design.

4. SEQUENTIAL CIRCUITS 9

Flip flops - SR, JK, T, D, Master/Slave FF, Triggering of FF, Analysis of clocked sequential circuits - their design, State minimization, state assignment, Circuit implementation, Registers-Shift registers, Ripple counters, Synchronous counters, Timing signal, RAM, Memory decoding, Semiconductor memories.

5. FUNDAMENTAL MODE SEQUENTIAL CIRCUITS 9

Stable, Unstable states, Output specifications, Cycles and Races, Race free Assignments, Hazards, Essential hazards, Pulse mode sequential circuits.

TOTAL HOURS: 45

TEXT BOOKS:

1. Morris Mano, “Digital logic and Computer Design ", Prentice-Hall of India, 1998.
2.William I. Fletcher, “An Engineering Approach to Digital Design ", Prentice-Hall of India, 1980.
3.Floyd T.L., “Digital Fundamentals ", Charles E. Merrill publishing Company, 1982.
4.Tokheim R.L., “Digital Electronics - Principles and Applications ", Tata McGraw Hill, 1999.
5.Jain R.P., “Modern Digital Electronics ", Tata McGraw Hill, 1999.

SEMESTER II	L	T	P	C
ELECTROMAGNETIC FIELDS	3	0	0	3

1. STATIC ELECTROMAGNETIC FIELDS 9

Introduction to co-ordinate system, Gradient, Divergence, Curl, Divergence Theorem, Stroke's Theorem, Coulomb's Law, Electric field Intensity, Principle of superposition, Electric Scalar potential, Line charge distribution by Moment method, Electric flux Density, Gauss's Law and its applications, Field Computations and Problems.

2. STATIC MAGNETIC FIELD 9

Magnetic field of a current carrying element, Ampere's Force law, The Biot-Savart Law, Magnetic Flux density, Gauss law for magnetic fields, Torque on a loop, Magnetic moment, Ampere's Law and Magnetic field intensity, Magnetomotive force, Field cells and permeability, Vector potential, Field computation and problems.

3. ELECTRIC FIELD IN DIELECTRICS 9

Permittivity, Polarization, Boundary relation, Capacitance, Dielectric strength, Energy and energy density, Poisson's and Laplace equations and applications, Electric Current, Current Density, Ohms law at a point, Resistance and Conductance, Continuity relations for current problems.

4. MAGNETIC FIELD IN FERROMAGNETIC MATERIALS 9

Magnetic materials, Magnetic dipoles, Loops and Solenoids, Magnetization, Inductance, Energy in an Inductor and Energy Density, Boundary relations, Ferro magnetism, Hysteresis, Reluctance and Permeance, Problems.

5. TIME VARYING ELECTRIC & MAGNETIC FIELDS 9

Faraday's Law, Transformer and Motional Induction, Maxwell's equation from Faraday's Law, Self and Mutual inductance, Displacement current, Maxwell's equation from Ampere's Law and its in-consistency, Boundary relation, Poynting Vector, Comparison of field and circuit theory, Circuit Application of pointing Vector.

TOTAL HOURS: 45

TEXT BOOKS:

1. John D. Krauss, "Electromagnetics ", McGraw Hill, 1992.
2. David K. Chang, "Field and Wave Electromagnetics ", Second edition, Addison Wesley, New Delhi, 1999.
3. Hayt W.H., "Engineering Electromagnetics", McGraw Hill, 1995.

REFERENCES:

1. Narayana Rao N., "Basic Electromagnetics with applications ", Prentice Hall of India, 1988.
2. Harrington R.F., "Field computation by moment methods ", Macmillan, 1988.
3. Stanley V. Marshall, Richard DuBroff, Gabriel G.Skitek, "Electromagnetic Concepts and Applications", Fourth Edition, Prentice Hall International Inc., New Jersey, 1996.
4. Narayana Rao N., "Elements of Engineering Electromagnetics ", Fourth Edition,Prentice Hall of India Pvt. Ltd., New Delhi 1998.
5. David J. Griffiths, "Introduction to Electrodynamics ", Third Edition, Prentice Hall of India Pvt. Ltd., New Delhi, 1999.

SEMESTER II	L	T	P	C
ELECTRONIC CIRCUITS- I	3	0	0	3

1. BASIC STABILITY AND DEVICE STABILIZATION 9

Biasing circuits for BJT, DC and AC Load lines, Stability factor analysis, Temperature compensation methods, biasing circuits for FET's and MOSFET's.

2. SMALL SIGNAL LOW FREQUENCY ANALYSIS AND DESIGN 9

Transistor, FET and MOSFET Amplifiers, Equivalent circuit, input and output characteristics, calculation of midband gain, input and output impedance of various amplifiers, cascode amplifier, Darlington Bootstrapping, Differential amplifier, CMRR measurement, Use of current source in Emitter.

3. LARGE SIGNAL AMPLIFIERS 9

Class A, B, AB and C type of operation, efficiency of Class A amplifier with resistive and transformer coupled load, efficiency of Class B, Complementary Symmetry amplifiers, Thermal stability of Power amplifiers, heat sink design.

4. FREQUENCY RESPONSE OF AMPLIFIERS 9

High frequency equivalent circuits for BJT and FET amplifiers, Calculation of Lower and Higher cutoff frequencies, Bode plot of frequency response, relation bandwidth and rise time, HF amplifiers, Video amplifiers, Optocouplers, BJT modeling.

5. RECTIFIERS AND POWER SUPPLIES 9

Half and Full wave rectifiers, Ripple factor calculation for C, L, L-C and π section filters, Switch mode power supplies, Linear electronic voltage regulators, Power control using SCR.

TOTAL HOURS: 45

TEXT BOOKS:

1.Millman J. and Halkias C.C., “Integrated Electronics ", McGraw Hill.
2.Robert Boylestead and Louis Nashelsky, “Electronic Devices and Circuit Theory”, Pearson Education, Ninth Edition

REFERENCES:

1. David A. Bell, “Electronic Devices and Circuits ", Prentice Hall of India, 1998.
2. Donald L. Schilling Charles Beloue, “Electronic Circuits ", Third Edition, 1989.

SEMESTER II	L	T	P	C
DIGITAL ELECTRONICS LAB	0	0	3	2

List of Experiments:

1. Design and implementation of Adders and Subtractors using logic gates

2. Design and implementation of code converters using logic gates

    1) BCD to excess -3 codes 2) Binary to gray

3. Design and implementation of 4 bit BCD adder using IC 7483

4. Design and implementation of 2 Bit Magnitude comparator using logic gates 8 bit magnitude comparator using IC 7485

5. Design and implementation of Multiplexer and De-Multiplexer using logic gates and study of IC74150 and IC74154

6. Design and implementation of encoder and decoder using logic gates and study of IC7445 and IC74147

7. Design and implementation of 3 bit synchronous up/down counter

8. Implementation of SISO, SIPO, and PISO shift registers using flip flops