PROPOSED CURRICULA AND SYLLABI
FOR

(Third Year)
B. Tech. (EXTC)

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w.e.f.
Academic Year 2011-2012 and onwards

Department of Electronics and Telecommunication Engineering
Shri Guru Gobind Singhji Institute of Engineering & Technology
Vishnupuri, Nanded- 431606
[May 2011]

Shri Guru Gobind Singhji Institute of Engineering and Technology, Vishnupuri, Nanded- 431 606

SYLLABUS SCHEME for
Third Year (Electronics and Telecommunication Engineering) 2011-12 and onwards revised on 6 Aug 2012

Semester -1					
Code	**Course**	**C**	**L**	**T**	**P**
EC311	Microprocessor and Microcontroller - II	4	3	-	2
EC312	Control Systems	3	3	-	-
EC313	Electronic Circuit Design	4	3	-	2
EC314	Electromagnetic Engineering	4	4	-	-
EC315	Signals and Systems	3	3	-	-
EC316	Signals and Control Lab	1	-	-	2
EC317	Seminar	1	-	-	2
	Total	**20**	**16**	**-**	**8**
Semester -2					
Code	**Course**	**C**	**L**	**T**	**P**
EC321	Network Analysis and Synthesis	3	3	-	-
EC322	Digital Signal Processing	5	4	-	2
EC323A	Communication Systems	4	3	-	2
EC324	Digital Communication	3	3	-	-
	Elective-I (Institute Elective)	3	3	-	-
EC323	Digital System Design				
EC325	Physiology for Engineers				
EC326	System Software and Operating Systems				
EC327	Power Electronics				
EC328	Antenna and Wave Propagation				
EC329	Microelectronics				
EC320	Mini Project	2	-	-	4
	Total	**20**	**16**	**-**	**8**

SEMESTER I

EC 311:Microprocessor and Microcontroller - II (C_R-4, L-3, T-0, P-2)

1. **A Brief revision to 8051 Architecture**
2. **Programming of 8051**
   C Programming
3. **Interfacing of I/O devices and Memory with 8051**
   Interfacing of Data memory and program memory, Port Programming, PPI 8255 interfacing with 8051, 8 bit ADC and DAC ICs and applications, interfacing of key board, stepper motor, LCD display with 8051.
4. **Serial Communication using 8051**
5. **Timer programming in 8051 and Applications**
6. **Interrupts in 8051 and their Applications**
7. **The 8086/8088 Microprocessor:** 8086/8088 Architecture, Pin Diagram, Addressing Modes, Instruction Set and Interrupt Table
8. **The Pentium and Pentium Pro Microprocessor:** Introduction to Pentium Microprocessor, Special Pentium Registers, Pentium Memory Management, New Pentium Instructions, Introduction to Pentium Pro Processor, Special Pro Features.

Reference Books:

1. Muhammad Ali Mazidi and Janice Gillispe, The 8051 Microcontroller and embedded systems,Pearson Education Asia, Indian reprint 2002.
2. Kenneth J. Ayala, The 8051 Micro-controller– Architecture, Programming & Applications, Second Edition, Penram International & Thomson Asia.
3. Ajay V Deshmukh, Microcontrollers (Theory and Applications) The McGraw- Hill Companies Third reprint 2005.
4. B.B.Brey, Intel Microprocessor;8086/8088, 80186/188, 80286, 386, 486, Pentium And Pentium Pro-Processor, PHI.
5. James L. Antonakos, An Introduction To The Intel Family of Microprocessors, Pearson Education.
6. A K Ray, K M Bhurchandi, Advanced Microprocessors and Peripherals, Tata McGraw Hill.
7. Walter A. Tribal, The 80386, 486 and Pentium Processor, PHI

EC312: Control Systems (C_R-3, L-3, T-0, P-0)

1 **Introduction to Control Systems**
Definition, history, elements of control systems, examples of control systems, open loop and closed loop control systems, effect of feedback on overall gain, parameter variations, external disturbances or noise and control over system dynamics, regenerative feedback, linear versus nonlinear control systems, time- invariant versus time-varying systems, SISO and MIMO systems.

2 **Laplace Transform**
Properties, transfer function, poles and zeros.

3 **Mathematical Modeling of Dynamic Systems**

Introduction, canonical form of feedback control systems, transfer function and impulse response, differential equations and transfer functions of physical systems such as mechanical, electrical, electromechanical, thermal, pneumatic and liquid-level systems, analogous systems: force-voltage, force-current and torque-current analogies, linearization of nonlinear mathematical models, block diagram representation of control system, rules and reduction techniques, signal flow graph: elements, definition, properties, Masons gain formula, application of gain formula to block diagrams.

4 Time-Domain Analysis of Control Systems

Standard test signals, transient response, error and error constants, time response of first and second order systems and transient response specifications, effect of adding poles and zeros to transfer functions, dominant poles of transfer function, basic control actions and response of control systems, effects of integral and derivative control action on system performance. Control system compensators: elements of lead and lag compensation, elements of Proportional-Integral-Derivative (PID) control.

5 Stability of Linear Control systems

Concept of stability, BIBO stability: condition, zero-input and asymptotic stability, Hurwitz stability criterion, Routh-Hurwitz criterion in detail, relative stability analysis, Root-locus technique: introduction, basic properties of the root loci, general rules for constructing root loci, root-locus analysis of control systems.

6 Frequency Domain Analysis

Frequency response of closed loop systems, frequency domain specifications of the prototype second order system, correlation between time and frequency response, polar plots, Bode plots, phase and gain margin, stability analysis with Bode plot, Log magnitude versus Phase plots. Nyquist stability criterion: Mathematical preliminaries, stability and relative stability analysis.

7 State Variable Analysis and Design

Concept of state, state variable, and state model, state model for linear continuous time system, diagonalisation, solution of state equation, concept of controllability and observability.

Reference Books :

1. K. Ogata, Modern Control Engineering, Fourth edition, Pearson Education India, 2002.
2. B.C. Kuo, Automatic Control Systems, Seventh Edition, Prentice–Hall of India, 2000.
3. Norman S. Nise, Control systems Engineering, Third Edition, John Wiley and Sons Inc., Singapore, 2001.
4. R.C. Dorf and R.H. Bishop, Modern Control Systems, Eighth edition, Addison-Wesley, 1999.
5. I.J. Nagrath and M. Gopal, Control Systems Engineering, Third Edition, New age International Publishers, India, 2001.

EC313: Electronic Circuit Design (C_R-4, L-3, T-0, P-2)

1. Operational Amplifier

OpAmp (741), specifications, packaging, characteristics, ac and dc parameters and their measurements, noise and frequency compensation.

2. **Linear OpAmp Circuits**

   Inverting and non-inverting amplifiers, summing amplifier, differential amplifier, instrumentation amplifier and its applications, voltage to current converters and current to voltage converters, low voltage ac and dc voltmeter

3. **Nonlinear OpAmp Circuits**

   Differentiator, integrator, comparator and its characteristics, Schmitt trigger, window detector, peak detector, precision rectifier, log and antilog amplifier

4. **Voltage Regulators**

   Design of series voltage regulator using discrete components, protection circuits and pre-regulator, design of fixed voltage regulators (IC 78xx and 79xx), adjustable regulators (LM 317, 337), precision voltage regulators (IC 723), design of switching regulators (IC 78s40)

5. **Amplifier Design**

   Design of class A, class AB, and class C amplifiers, performance parameters, monolithic power amplifiers LM 380 and TBA 810.

6. **Waveform Generators**

   Square wave, triangular wave and sawtooth wave generator, phase shift and Wein bridge oscillators and its design, function Generator using ICL 8038.

7. **Specialized ICs and Their Applications**

   Design of IC 555 and its applications, PLL IC 565 and its applications, design of voltmeter using 7106/07.

Reference Books :

1. Ramakant Gaikwad, OPAMPS and Linear Integrated Circuits, PHI/Pearson Education.
2. S.N. Talbar and T.R. Sontakke, Electronic Circuit Design, SadhuSudha Prakashan, Nanded
3. K.R. Botkar, Integrated Circuits, Khanna Publishers, Delhi.
4. B.S. Sonde, Design using Integrated Circuits, Wiley Eastern.
5. Sedra and Smith, Microelectronic Circuits, Sixth Edition.

EC314 Electromagnetic Engg (C_R-4, L-4, T-0, P-0)

1. **Vector Analysis:** Dot product, cross product, **c**oordinate systems, and transformations
2. **Coulomb's Law and Electric Field Intensity** The experimental law of Coulomb, electric field intensity of point charge, field due to a continuous volume charge distribution, field of line charge, field of sheet of charge, streamlines and sketches of fields.
3. **Electric Flux Density, Gauss's Law, and Divergence** Electric flux density, Gauss's law, applications of Gauss's law, divergence, Maxwell's first equation, vector operator and divergence theorem.
4. **Energy and Potential** Energy expended in moving a point charge in electric field, line integral, definition of potential difference and potential, potential field of a point charge and system of charges, potential gradient, the dipole, energy density in the electrostatic field.
5. **Conductors, Dielectrics and Capacitance** Current and current density, continuity of current, conductor properties and boundary conditions, boundary conditions for perfect dielectric materials, capacitance .

6. **Poisson's and Laplace Equations:** Poisson's and Laplace's equations, example of the solution of Laplace's and Poisson's equation.
7. **Steady Magnetic Field:** Biot-Savart law, Ampere's circuital law, Curl, Stoke's theorem, magnetic flux and magnetic flux density, scalar and vector magnetic potentials.
8. **Magnetic Forces, Materials and Inductance:** Force on a moving charge, force between differential current elements.
9. **Time Varying Field and Maxwell's Equations:** Faraday's law, displacement current, Maxwell's equations in point form and integral form.
10. **Uniform Plane Wave:** The wave motion in free space and perfect dielectric.

Text/Reference Books:

1. W.H. Hayt, Engineering Electromagnetics, Tata McGraw Hill.
2. R. K. Shevgaonkar, Electromagnetic Waves, McGraw Hill, 2005
3. M.A. Wazed Miah, Fundamentals of Electromagnetics, Tata McGraw Hill.
4. N. Narayanrao, Basic Electromagnetic with Application, PHI.
5. J.D. Kraus, Electromagnetics, McGraw Hill.

EC315 Signals and Systems (C_R-3, L-3, T-0, P-0)

1. **Introduction**

Signals, transformation of the independent variable, basic continuous-time signals, basic discrete-time signals, systems, properties of systems

2. **Linear Time-Invariant Systems**

Introduction, the representation of signals in terms of impulses, discrete-time LTI systems: the convolution sum, continuous-time LTI systems: the convolution integral, properties of linear time-invariant systems, systems described by differential and difference equations, block diagram representations of LTI systems

3. **Fourier Analysis for Continuous-Time Signals and Systems**

Introduction, the response of Continuous-time LTI systems to complex exponentials, representation of periodic signals: the continuous-time Fourier series, approximation of periodic signals using Fourier series and the convergence of Fourier series, representation of aperiodic signals: the continuous-time Fourier transform, periodic signals and the continuous-time Fourier transform, properties of continuous-time Fourier transform, the convolution property, the modulation property, the polar representation of continuous-time Fourier transforms, the frequency response of systems characterized by linear constant-coefficient differential equations, first-order and second-order systems.

Reference Books:

1. A. V. Oppenheim, A. S. Willsky, and I.T. Young, Signals and Systems, 3rd Ed. Prentice Hall. 1997.
2. Simon Haykin, B.V. Veen, Signals and Systems, John Wiely and Sons, 1999.

EC 316 Signals and Control Lab (EC312+EC315) (C_r-1, L-0, T-0, P-2)

It should consist of study of at least 10 EXPERIMENTS based on above two subjects.

EC317 Seminar (C_R-1, L-0, T-0, P-2)

It should be based on latest topics in Electronics Engineering and related fields.

SEMESTER II

EC321 Network Analysis and Synthesis(C_R-3, L-3, T-0, P-0)

1. **Introduction** Basic Components and Electric Circuits, Voltage and Current Laws, Basic Nodal and Mesh Analysis, Useful Circuit Analysis Techniques, Capacitors and Inductors, Basic RL and RC Circuits, The RLC Circuit, Sinusoidal Steady State Analysis, AC Power Circuit Analysis, Poly-phase Circuits, Magnetically Coupled Circuits, Complex Frequency and Laplace Transform, Circuit Analysis in the s-Domain, Frequency Response, Two- Port Networks, An Introduction to Network Topology, Solution of Simultaneous Equations,
2. **Network Synthesis** Realisability of one port networks, positive real functions (PRFs), properties of PRF, Hurwitz polynomials, realization of RC, LC, and RL DP impedance and admittance functions, elements of two port network synthesis.
3. **Filter design** Low pass filter approximation, Butterworth and Chebyshev type I approximations, elements of active network synthesis
4. **Basics of active filter synthesis** Factored form of approximation function, cascade approach, bi-quad topologies, coefficient matching techniques for obtaining element values, impedance scaling, frequency scaling.

Text/Reference Books:

1. W. H. Hayt, Jack Kimmerly, Engineering Circuit Analysis, Mcgraw Hill, 6th Ed.
2. M.E. Van Valkenburg, Network Analysis, PHI.
3. M.E. Van valkenburg, Introduction to Modern Network Synthesis, Wiley Eastern Ltd.
4. Gobind Daryanani, Principles of Active Network Synthesis and Design, Wiley and Sons.

EC322 Digital Signals Processing (C_R-4, L-3, T-0, P-2)

1. **Signals and Signal Processing**
   Motivation, Characterization and classification of signals, signal processing operations, examples of signals, signal processing applications.
2. **Discrete Time signals in Transform domain**
   Discrete time Fourier transform, Discrete Fourier Transform, Relationship between the DTFT and the DFT and their inverses, Discrete Fourier Transform properties, Computation of the DFT of real sequences, Linear convolution using the DFT, The Z-transform, ROC of the rational Z-transform, Inverse Z-transform, Z-transform properties, Transform domain representation of random signals.
3. **LTI Discrete time systems in Transform Domain**
   Finite dimensional Discrete time systems, the frequency response, the transfer function, types of transfer functions, Simple digital filters, All pass Transfer function, Minimum phase and maximum phase transfer functions, Complementary transfer functions, Inverse systems, Systems identification, Digital two pairs.
4. **Digital filter structures**
   Block diagram representation, equivalent structures, Basic FIR structures, Basic IIR structures, all pass filters, IIR tapped cascaded lattice structures, FIR cascaded lattice structures.

5. **Digital Filter design**
   IIR filter design – Bilinear transformation, Impulse invariant transformation, Low pass IIR digital filters, Spectral transformations, FIR filter design using windowing techniques, Frequency sampling technique, Computer aided design.

6. **DSP algorithm implementation**
   Computation of DFT, FFT algorithms, Decimation in time, Decimation in Frequency, Different algorithms of FFT such as DIT and DIF where input and output is in order, radix-n algorithms.

7. **Applications of DSP**

Reference Books:

1. S. K. Mitra, Digital signal processing- A computer based approach, Tata McGraw Hill, 2002
2. A. V. Oppenheim, R, W, Schafer, Discrete time signal processing, PHI
3. J. G. Proakis, D. G. Manolakis, Digital signal processing –Principles, algorithms and applications, PHI
4. A. V. Oppenheim, R. W. Schafer, Digital signal processing, PHI
5. E. C. Ifeachor, B. W. Jarvis, Digital signal processing- A practical approach, Pearson Education.

EC323A Communication Systems(C_R-4, L-3, T-0, P-2)

Introduction: The communication process, Primary Communication resources, Sources of information, Communication networks, communication channels, modulation process, analog and digital types of communications, Shannon's information capacity theorem.

Random Processes: Mathematical definition of a random process, Stationary processes, mean, correlation and covariance functions, Ergodic processes, Transmission of a random process through a linear time invariant filter, power spectral density, Gaussian process, Noise, narrowband noise, representation of narrowband noise in terms of in-phase and quadrature components, representation of narrowband noise in terms of envelope and phase components, sine wave plus narrow band noise.

Continuous-Wave Modulation: AM, linear modulation schemes, frequency translation, FDM, Angle Modulation, frequency modulation, Non-linear effects in FM systems, Super-heterodyne receiver, Noise in CW modulation systems, noise in linear receivers using coherent detection, noise in AM receivers using envelope detection, noise in FM receivers.

Pulse Modulation: Sampling process, PAM, other forms of pulse modulation, bandwidth-noise trade off, quantization process, PCM, Noise considerations in PCM systems, TDM, digital multiplexers, virtues, limitations and modification of PCM, Delta modulation, Linear prediction, differential pulse code modulation, Adaptive DPCM, MPEG audio coding standard.

Baseband Pulse Transmission: Matched filter, error rate due to noise, inter-symbol interference, Nyqiest's criteria for distortionless baseband binary transmission, correlative-level coding, base band M-ary PAM transmission, digital subscriber lines, optimum linear receiver, adaptive

equalization.

Signal-Space Analysis: Geometric representation of Signals, conversion of continuous, AWGN channel into a vector channel, likelihood functions, coherent detection of signals in noise: maximum likelihood decoding, correlation receiver, probability of error.

Text/References:

1. Haykin S., "Communications Systems", 4th Ed., John Wiley and Sons, 2001.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
3. Taub H. and Schilling D.L., "Prnciples of Communication Systems", Tata McGraw Hill, 2001.

EC324 Digital Communication (C_R-3, L-3, T-0, P-0)

1. **Introduction** Elements of digital communication system, communication channels and their characteristics, mathematical models for communication channels, historical perspective in the development of digital communications, review of probability, random variables and stochastic processes, response of a linear time invariant system to a random input signal.
2. **Source coding** Mathematical models for information sources, a logarithmic measure of information, average mutual information and entropy, information measures for continuous random variables. Coding for discrete sources, Coding for discrete memoryless sources, discrete stationary sources, The Lempel-Ziv algorithm, coding for analog sources-optimum quantization, rate distortion function, scalar quantization, vector quantization, Coding techniques for analog sources. Temporal waveform coding, spectral waveform coding, model based source coding.
3. **Characterization of communication signals and systems** Representation of bandpass signals and systems, representation of band-pass systems, response of a band pass system to a band pass signal, representation of a band-pass stationary stochastic processes, orthogonal expansion of signals, representation of digitally modulated signals, memoryless modulation methods.
4. **Digital Modulation Techniques** Digital modulation formats, Amplitude shift keying, frequency shift keying, phase shift keying, DPSK, QPSK, Minimum shift keying.
5. **Channel capacity and coding** Channel models and channel capacity, random selection of codes.
6. **Block and convolutional channel codes** Linear block codes, generator matrix and parity check matrix, some specific linear block codes, cyclic codes, convolutional codes , transfer function , optimum decoding of convolutional codes-Viterbi algorithm distance properties of binary convolutional codes.
7. **Spread spectrum techniques** Introduction, PN sequences, direct sequence spread spectrum signals, processing gain, probability of error. Frequency hop spread spectrum signals, applications.
8. **Multiuser communication** Introduction to multiple access techniques, capacity of multiple access methods, Random access methods.

Text books:

1. J. G. Proakis, Digital Communication, Fourth Edition, McGraw Hill

Reference books:

1. Simon Haykin, Digital Communication, John Wiley & Sons Pvt. Ltd.
2. B. P. Lathi, Modern Analog and Digital Communication Systems, Prism Sounders.
3. K.S. Shanmugam, Digital and Analog Communication Systems, Wiley Int. Pub.

Elective-I (C_R-3, L-3, T-0, P-0)

EC323 Digital System Design (Elective-I)

1.Introduction

Introduction to digital design, analog Vs. digital, digital devices, electronic aspects of digital design, software aspects of digital design, programmable logic devices, ASICs, PCBs, digital design levels, PLDs, PLAs, Basic components and architecture of FPGA.

2.Combinational Component Design

Adders: Full adders, Ripple carry adders, carry look ahead adders, pipelined adders, Two's complement binary numbers, Subtractor, ALU, decoder, Encoder, multiplier, comparator, Barrel shifters, multiplier design and its VHDL implementation

Multi-operand addition, sequential multiplication with sign and magnitude, two's complement, partially combinational implementation, MAC, saturating multiplier, truncating multiplier, rectangular multiplier.

3. Sequential Circuit Design

Finite state machine (FSM) models, state diagram, analysis and synthesis of sequential circuits, VHDL implantation of sequential circuits. Registers, shift registers, counters: up/down, register files, SRAM, memory components: FIFO's, RTL design.

4. Data Path Design

Designing dedicated data path, general datapath design, timing issue, VHDL implementation of datapath.

5. Control Unit design

Constructing the control unit, stand alone controllers, ASM charts and state action tables, VHDL implementation of control unit. Examples of manual design of dedicated microprocessors.

Text books:

1. J. F. Wakerly, Digital design- Principles and Practices, Pearson India, Third edition.
2. J. Bhasker, VHDL Primer, Pearson Education Asia, Third edition.

Reference books:

1. W. I. Fletcher, An Engineering Approach to Digital Design, PHI.
2. Samual C. Lee, Digital Circuits and Logic Design, PHI.
3. C. H. Roth Jr., Digital System Design using VHDL, PWS Publishing Company.
4. Kevin Skahil, VHDL for Programmable Logic, Addison Wesley.
5. M.D. Ercegovac, Digital Arithmetic, Elsevier.
6. E.O. Hwang, Digital Logic and Microprocessor design with VHDL, Cengage Learning.

EC325 Physiology for Engineers (Elective-I)

Basic cell physiology; Biochemical cycles.

Systemic physiology: Neuromuscular system; Blood and lymph; Circulatory system; Gastro-intestinal system; Kidney and excretory system; Sensory systems- visual, auditory, vestibular; Endocrine- pituitary, adrenal, pancreatic, etc.

Reference books:

1. Arthur C. Guyton : Textbook of Medical Physiology, 8th ed, Prism Books (Pvt) Ltd & W.B. Saunders Company, 1991.
2. J.B.West. ed.: Best and Taylor's Physiological Basis of Medical Practice, 11th ed., Williams and Wilkins, Baltimore, 1985.
3. W.F.Ganong:Title: Review of Medical Physiology, 13th ed., Prentice-Hall, Connecticut, 1987.
4. D.S. Luciano, A.J. Vander & J.H Sherman : Human Anatomy And Physiology, 2nd ed., McGraw Hill, New York, 1983.

EC326 System Software and Operating Systems (Elective-I)

1. **Language Processors and Data Structures**
   Introduction, Language processing activities, Fundamentals of language processing and specifications, Language processor development tools, Search data structures, Allocation data structures, Scanning and Parsing
2. **Assemblers and Macroprocessors**
   Assemblers: Elements of assembly language programming, Simple assembly scheme, Pass structure of assemblers, Design of two pass assembler, Single pass assembler for PC
   Macroprocessor: Macro definition and call, Macro expansion, Nested macro calls, Advanced macro facilities, Design of macroprocessor
3. **Compilers, Interpreters and Linkers**
   Compilers and Interpreters: Aspects of compilation, Memory allocation, Compilation of expressions and control structures, Code optimization, Interpreters
   Linkers: Relocation and linking concept Design of a linker, Self-relocating programs, Linker for MS DOS, Linking for overlays. Loaders
4. **Software Tools**
   Software tools for program development, Editors, Debug monitors, Programming environments, User interfaces
5. **Evolution of OS Functions**
   OS functions and their evolution, Batch processing systems, Multiprogramming systems, time sharing systems, real time operating systems, OS structure
6. **Processes, Scheduling, and Deadlocks**
   Processes: Process definition, Process control, Interacting processes, Implementation of interacting processes, Threads
   Scheduling: Scheduling policies, Job scheduling, Process scheduling, Process management in

UNIX, Scheduling in multiprocessor OS

Deadlock: Definitions, Resource status modeling, Handling deadlocks, Deadlock detection and resolution, Deadlock avoidance, Mixed approach to deadlock handling

7. Process Synchronization and Interprocess Communication

Process Synchronization: Implementing control synchronization, Critical sections, Classical process synchronization problems, Evolution of language features for process synchronization, Semaphores, Critical reasons, Conditional critical reasons, Monitors

Interprocess Communication: Interprocess messages, Implementation issues, Mail boxes, Interprocess messages in Unix.

8. Memory Management

Memory allocation preliminaries, Contiguous and Noncontiguous memory allocations, Virtual memory using paging and segmentation.

9. I/O Organization and I/O Programming

I/O organization, I/O devices, Physical IOCS (PIOCS), Fundamental file organization, Advanced I/O programming, Logical IOCS, File processing in Unix

10. File Systems, Protection and Security

File Systems: Directory structures, File protection, Allocation of disk space, Implementing file access, File sharing, file system reliability, The Unix file system

Protection and Security: Encryption of data, Protection and security mechanisms, Protection of user files, Capabilities

11. Distributed Operating Systems

Definition and examples, Design issues in distributed operating systems, Networking issues, Communication protocols, System state and event precedence, Resource allocation, Algorithm for distributed control, File systems, Reliability, Security

Text Book:

1. Dhamdhere D. M., System Programming and Operating Systems, TMH Pub.

Reference Books:

1. William Stallings, Operating system: Internals and design principles, Pearson education.
2. Silberschatz and Galvin, Operating system concepts, Addison Wesley.

EC327 Power Electronics (Elective-I)

1. **Power Semiconductor Devices** Power diodes, power transistor, power MOSFET and IGBT – construction, operation, steady state and switching characteristics.
2. **Thyristor Families and Triggering Devices** SCR, TRIAC, GTO, LASCR, UJT, PUT and DIAC – construction, steady state and switching characteristics, performance parameters, SCR protection circuits.
3. **Triggering and Commutation of SCR** R and RC triggering, UJT triggering circuits, different commutation techniques – circuits and principles of operation.
4. **Controlled Converters** 1phase and 3phase fully and half controlled converters, their harmonic and power factor analysis, dual converters, effect of load and source inductance, power factor improvement techniques.

5. **AC Voltage Controllers** Principles of on/off control and phase control, 1phase ac voltage controllers with R and RL loads, cyclo-converters, reduction of output harmonics in cyclo-converters.
6. **DC Choppers** Principles of operation of step-down and step-up choppers, 2–Quadrant and 4–Quadrant choppers, voltage and current commutated choppers, use of source filter.
7. **Inverters** Parallel inverters, series inverters, 3phase inverters.
8. **Induction Motors and Control** General principle, construction, performance characteristics, starting torque, torque variation with different factors, speed control: stator voltage and V/f control.

Text/Reference Books:

1. M.H. Rashid, Power Electronics, PHI.
2. P.S. Bimbra, Power Electronics, Khanna Publishers.
3. M. Ramamoorthy, An Introduction to Thyristor and Their Applications, Affiliated East West Press.
4. P.C. Sen, Power Electronics, Tata McGraw Hill.
5. General Electric, SCR Manual, Prentice Hall.
6. Edward Hughes, Electrical Technology, ELBS/Longman.

EC328 Antenna and Wave Propagation (Elective-I)

1. **Introduction to Antenna:** Resonance of antenna, Types of antenna, radiation mechanism of antenna in single wire, two wire and dipole.
2. **Fundamental Parameters of Antenna :** Power density, radiation intensity, radiated power, radiation intensity, gain directivity, efficiency, effective aperture, effective length, band width, polarization, antenna temperature.
3. **Linear Wire and Loop Antennas:** Infinitesimal dipole, small dipole, finite length dipole, half length dipole, small circular loop, polygonal loop, ferrite loop.
4. **Antenna Arrays:** Types of arrays, two element linear arrays, *n*-element linear arrays, continuous array, planar arrays.
5. **Different Antennas:** Folded dipole, Yagi-Uda antenna, long wire antenna, V antenna, inverted antenna, log periodic antenna, Helical antenna, Horn antenna, lens antenna.
6. **Antenna Measurements:** Measurement of impedance, gain, radiation pattern, phase, polarization, directivity, beam width, radiation resistance.
7. **Wave Propagation:** Modes of propagation, structure of atmosphere, ground wave propagation, sky wave propagation, duct propagation.

Reference Books:

1. C. A. Balanis, Antenna theory: Analysis and design, Harper and Row Pow.(N.Y.)
2. J.D. Kraus and R. J. Marahefka, Antennas for applications, Tata Mc-Graw Hill Pub.
3. K. D. Prasad., Antenna and wave propagation, Satya Prakashan, New Delhi.

EC329 Microelectronics (Elective-I)

The crystal structure of solids, theory of solids, the semiconductor in equilibrium, carrier distribution in extrinsic semiconductors, carrier transport and excess carrier phenomena, carrier

drift, carrier diffusion, carrier generation and recombination, Hall effect.

The pn junction and metal semiconductor contact, basic structure of pn junction, metal semiconductor contact, doped pn junction, device fabrication techniques.

Fundamentals of MOSFET, MOSFET action, MOS capacitor, MOSFET operations, small signal equivalent circuit, MOSFET scaling, non-ideal effects, threshold voltage modifications, additional electrical characteristics,

Reference Books:

1. Donald Neamen, An introduction to semiconductor devices, McGraw Hill International Edition, 2006
2. Ben G. Streetman, S. Banerjee, Solid state electronic devices, Prentice Hall, 2000
3. R. F. Pierret, Semiconductor Device Fundamentals, Pearson Education, 2011

EC320 Mini-Project (C_R-2, L-0, T-0, P-4)

A student or a group of students should carry out a mini-project related to the field of electronics. It may be hardware or a software project.

Signature of DUGPC Members:

Name	Sign