

Proceedings Of The Sixth
Board Of Studies
Meeting
of the
Department Of
Electronics and Communication Engineering



ISLAMIC UNIVERSITY OF SCIENCE AND TECHNOLOGY
AWANTIPORA, J&K, INDIA-192122

7th December, 2018

*Vetted Course Outline for B. Tech. Electronics and Communication Engineering, Batch 2018
Onwards*

Semester-III

S. No	Course Code	Course Title	Hours Per Week			Total Contact Hours	Credits
			L	T	P		
1.	ECE201C	Electronic Devices	3	0	0	3	3
2.	ECE202C	Digital Electronics and Logic Design	3	0	0	3	3
3.	ECE203C	Signals and Systems	3	0	0	3	3
4.	ECE204C	Network Theory	3	0	0	3	3
5.	MTH203C	Applied Mathematics for Engineers	3	0	0	3	3
6.	ECE205C	Electromagnetic Waves	3	0	0	3	3
7.	ECE210C	Electronic Devices Lab	0	0	2	2	1
8.	ECE211C	Digital Electronics and Logic Design Lab	0	0	2	2	1
9.	ECE212C	Basic Electrical and Electronics Lab	0	0	2	2	1
10.	-	Open Elective	-	-	-	-	-
Total Credits							21

Semester-IV

S. No	Course Code	Course Title	Hours Per Week			Total Contact Hours	Credits
			L	T	P		
1.	ECE250C	Analog Circuits I	3	0	0	3	3
2.	ECE251C	Analog Communication	4	0	0	4	4
3.	ECE252C	Electronic Instruments and Measurements	3	0	0	3	3
4.	ELE250C	Control Systems	3	0	0	3	3
5.	STA253C	Probability and Statistics	3	0	0	3	3
6.	ECE253C	Microprocessors and Microcontrollers	3	0	0	3	3
7.	ECE260C	Analog Circuits I Lab	0	0	2	2	1
8.	ECE261C	Analog Communication Lab	0	0	2	2	1
9.	ELE260C	Control Systems Lab	0	0	2	2	1
10.	ECE262C	Microprocessors and Microcontrollers Lab	0	0	2	2	1
11.	-	Open Elective	-	-	-	-	-
Total Credits							23

Electives (Discipline Centric)

S. No.	Course Code	Course Title	Hours Per Week			Credits
			L	T	P	
1.	ECE301E	EDA Tools	3	0	0	3
2.	ECE302E	VLSI Technology	3	0	0	3
3.	ECE303E	Computer Organization and Architecture	3	0	0	3
4.	ECE350E	Op Amps and Linear Integrated Circuits	3	0	0	3
5.	ECE351E	Optical Fiber Communication	3	0	0	3
6.	ECE352E	CMOS Analog Design	3	0	0	3
7.	ECE450E	Information Theory and Coding	3	0	0	3
8.	ECE451E	System Design	3	0	0	3
9.	ECE452E	Radar Systems	3	0	0	3

Note:

1. *Discipline Centric electives are offered to the students of the Department of Electronics and Communication Engineering only.*
2. *The students of the Department of Electronics and Communication Engineering have to choose Discipline Centric Electives from the above list.*

Electives (Generic)

S. No.	Course Code	Course Title	Hours Per Week			Credits
			L	T	P	
1.	ECE350G	Electronic Devices*	3	0	0	3
2.	ECE351G	Optimization Techniques	3	0	0	3
3.	ECE352G	Process Control Instrumentation	3	0	0	3
4.	ECE353G	Advanced Microcontroller Programming	2	0	2	3
5.	ECE354G	Computer Networks	3	0	0	3
6.	ECE401G	Advanced Computer Architecture	3	0	0	3
7.	ECE402G	IoT and Multimedia Technology	2	0	2	3
8.	ECE403G	Image Processing	2	0	2	3
9.	ECE404G	Photovoltaic System Design	3	0	0	3
10.	ECE405G	Machine Learning	3	0	0	3
11.	ECE450G	Artificial Neural Networks and Fuzzy Logic	3	0	0	3
12.	ECE451G	Mobile Adhoc Networks	3	0	0	3
13.	ECE452G	Wireless Sensor Networks	3	0	0	3
14.	ECE453G	Cyber Forensics	3	0	0	3
15.	ECE454G	Network Security	3	0	0	3

Note:

1. *Generic electives are offered to the students of the School of Engineering and Technology including the students of the Department of Electronics and Communication Engineering.*
2. *The students of the Department of Electronics and Communication Engineering have to choose Generic Electives from the list of courses offered by all the Departments of School of Engineering and Technology.*
3. *The courses marked with a * cannot be offered to the students of Electronics and Communication Engineering as they are a part of the professional core courses of their B.Tech curriculum.*

Open Electives

S. No.	Course Code	Course Title	Hours Per Week			Total Contact Hours	Credits
			L	T	P		
1.	ECE001	Emerging Technologies in ICT	3	0	0	3	3
2.	ECE002	e-Waste Management	3	0	0	3	3
3.	ECE003	Introduction to Computer Networking	3	0	0	3	3
4.	ECE004	Introduction to Electronic Devices and Circuits	2	0	2	4	3
5.	ECE005	Introduction to Digital Logic Design	2	0	2	4	3
6.	ECE006	Special Topics in Electronics and Communication Engineering	3	0	0	3	3
7.	ECE007	Cyber Laws	2	0	0	2	2
8.	ECE008	Wireless Home Solutions	2	0	2	4	3

Note:

- Open electives are offered to the students of all Departments of the university other than the Department of Electronics and Communication Engineering.*
- The students of the Department of Electronics and Communication Engineering have to choose Open Electives offered by the departments other than the Department of Electronics and Communication Engineering.*

Annexure-IV
Vetted Syllabus for B. Tech. Electronics and Communication Engineering,
Batch 2018 Onwards

ECE201C

Electronic Devices

3-0-0

Semiconductor Physics: Review of quantum mechanics and review of crystal structure of semiconductors, Intrinsic and Extrinsic semiconductors, carrier statistics and thermal equilibrium carrier concentration, energy bands in intrinsic and extrinsic semiconductors, carrier transport by drift and diffusion, carrier generation and recombination, Poisson and Continuity equation

pn Junction: Basic structure, pn junction under zero, forward and reverse bias, built-in potential barrier, electric field and space charge width, junction capacitance, charge flow in a pn junction, current-voltage relationship, minority carrier distribution, dynamic behaviour under small and large signals, breakdown mechanisms (qualitative), metal-semiconductor junctions, ohmic contacts

Bipolar Transistor: Basic structure and principle of operation, modes of operation, static IV characteristics in active and saturation modes, amplification, minority carrier distribution, emitter efficiency, transport factor, current gain, non-ideal effects, small signal model and frequency limitations

MOS Field Effect Transistor: MOS structure, energy band diagrams, static IV characteristics, analysis of MOS structure and C-V characteristics, short channel effects, small signal model and frequency limitations

Special Semiconductor Devices: Photodiodes, pn Junction Solar Cell, Light Emitting Diodes, Laser Diodes, Power Semiconductor Devices

Text/Reference Books:

1. Neamen D. A. and Biswas D., Semiconductor Physics and Devices, *McGraw Hill Education*
2. Streetman B. G. and Banerjee S. K., Solid State Electronic Devices, *Pearson Education*

Number System and Boolean Algebra: Number Systems and Codes: Binary, octal, and hexa decimal number systems, binary arithmetic, binary codes, excess-3 code, gray code, error detection and correction codes. Boolean algebra: Postulates and theorems, logic functions, minimization of Boolean functions using algebraic, Karnaugh map and Quine–McClusky methods, realization using logic gates.

Combinational Circuits: Introduction to combinational circuits, realization of basic combinational functions like Adder, Subtractor, Encoder/Decoder, Multiplexer, Comparators, delays and hazards in combinational circuits, Code converters – Implementation using MUX and ROM

Sequential Circuits: 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, inter-conversion of shift registers, Counters.

Programmable Logic Devices and Memory: PLAs, PALs and their applications; Sequential PLDs and their applications; State-machine design with sequential PLDs; Introduction to field programmable gate arrays (FPGAs). Read-only memory, read/write memory - SRAM and DRAM.

Logic Families: TTL NAND gate, Specifications, Noise margin, Propagation delay, fan-in, fan-out, Tristate TTL, RTL, DCTL, HTL ECL, CMOS families and their interfacing

Text/Reference Books:

1. Mano M., Digital logic and Computer Design ,*Prentice Hall India*
2. Floyd T.L., Digital Fundamentals , *Charles E. Merrill Publishing Company*
3. Jain R. P., Modern Digital Electronics, *Tata McGraw Hill*
4. Popov E. P., Mechanics of Materials, *Prentice Hall India, New Delhi.*

Introduction to signals and Systems Representation: Classification of signals and systems: Introduction to signals and systems, Continuous time and discrete time signals, Classification of CT and DT signals - periodic and non-periodic, Even and Odd, Power and Energy, Invertible and Non-invertible, Deterministic and Random. Elementary signals - exponential, sine, step, impulse and its properties, ramp, rectangular, sine, triangular, signum, Operations on signals: Amplitude scaling, addition, multiplication, differentiation, integration (Accumulator for DT), time scaling, time shifting and folding. System: definition, classification – Linear and Non-Linear, Time Variant and Time Invariant, Causal and Non-causal, Stable and Unstable (BIBO stability), Static and Dynamic.

Fourier Analysis: Analysis of continuous time signals: Definition and necessity of CT and DT Fourier series and Fourier transforms, Fourier series representation of continuous time and discrete time periodic signals - properties of continuous time and discrete time Fourier series. Continuous Time Fourier Transform (CTFT), amplitude and phase spectra of CT signals, Properties of CTFT, convolution and multiplication property of CTFT, systems characterized by Linear Constant Coefficient Differential Equations, Limitations of FT and need of LT and ZT. Laplace Transform – ROC and pole zero, Properties of Laplace Transform, inverse Laplace transform, relation between Laplace transform and Fourier transform

Analysis of Continuous time LTI Systems: Laplace Transform: Linear time invariant –continuous time systems: Differential equation and Block diagram representation of LTI systems, Impulse response and properties of LTI systems, Convolution integral, properties of convolution, frequency response, State variable equations and matrix representation of systems, Analysis and characterization of LTI systems using Fourier and Laplace transform, Computation of impulse response, transfer function, causality and stability using Laplace Transform

Analysis of Discrete Time Systems: Z-Transform: Analysis of discrete time signals and systems: Sampling of CT signals and aliasing, DTFT and properties, Introduction to Z transform.

Introduction to random waveforms and Sequences: Introduction to probability, Bayes Theorem- concept of random variable-probability density and distribution functions, function of a random variable, Moments, Independence of a random variable. Introduction to random process and random sequences, concept of stationarity.

Text/Reference Books:

1. Oppenheim A. V., Wilsky A. S. and Nawab S. H., Signals and Systems, *Pearson Education*
2. Haykin S. and Veen B. V., Signals and Systems, *John Wiley and Sons*
3. Roberts M. J., Signals and Systems: Analysis Using Transform Method and MATLAB, *Tata McGraw Hill*

Development of the circuit concept: Active element convention, dot convention for coupled circuits, source transformation, duality, dependent sources, network graph theory, tree, co tree and loops, incidence matrix, tie set, cut set matrix

Initial Conditions in Networks: Evaluating initial conditions in networks, first order differential equations as applied in solving networks, solution of network problems with Laplace transformation, initial and final values, steady state and transient response, DC response and sinusoidal response of RLC circuits

Network Functions: Complex frequency, transform impedance and transform circuits, series and parallel combinations of elements. Network Functions: poles and zeros, network functions for one port and two port networks (ladder and general networks), poles and zeros of network functions, restriction on pole and zero locations for driving point and transfer functions, time domain response from pole zero plot

Two Port Parameters: Relationship of two port parameters, admittance, impedance, transmission and hybrid parameters, relationship between parameter sets, condition for symmetry and reciprocity, interconnections of two port networks, input and output impedances

Filter Fundamentals: Symmetrical two port reactive networks as filters, classification and characteristics of filter networks, pass and stop band filters, constant K and m derived filters, behaviour of characteristic impedance over pass and stop bands, design of filters

Text Books:

1. Van Valkenberg M. E., Network Analysis, *Prentice Hall*.
2. Roy Chowdhary, Networks and Systems, *New Age International Publishers*.
3. Edminister, Schaums Outlines on Electric Circuits, *McGraw Hill*.

MTH203C

Applied Mathematics for Engineers

3-0-0

Laplace Transform: Shifting theorem, Laplace transforms of derivatives and integrals, Heaviside's unit function. Dirac Delta function and its Laplace transforms. Laplace transforms of periodic functions, Heaviside's expansion theorem.

Inverse Laplace Transforms: Initial and final value theorems. Convolution theorem and its applications, use of Laplace transforms in the solution of linear differential equations.

Complex analysis: Complex variables, analytic functions, Cauchy Riemann equations. Complex integration, Cauchy's fundamental theorem, Cauchy's integral formula, Cauchy's inequality and Liouville's theorem on integral function.

Expansions and Series in Calculus: Taylor's & Laurent's expansions, Zeros & poles of analytic functions, Residues. Fourier series, Harmonic analysis.

Fourier Transform: Fourier sine and cosine transform. Fourier integral formula and its applications to solution of boundary value problems.

Text Books/Reference Books:

1. Saff E. B., Snider A. D., Fundamentals of Complex Analysis for Mathematics, Science, and Engineering, *Prentice Hall India, New Delhi*.
2. Spiegel, Laplace Transforms, *Schaum Series*.
3. Churchill R. V., Complex variables and applications, *McGraw Hill Education (India)*.
4. Snedden N., The use of Integral Transforms, *McGraw Hill Education (India)*.

Coordinate Systems, Transformation and Vector Calculus: Basics of vectors, addition, subtraction and multiplication, Cartesian, Cylindrical and Spherical Transformation, Vector calculus; differential length, area and volume; line, surface and volume integrals, del operator; gradient, divergence of a vector, Divergence Theorem, Curl of a vector, Stoke's Theorem, Laplacian of a scalar

Electrostatic Fields: Coulomb's Law and Field Intensity, Electric field due to charge distribution, electric flux density, Gauss's Law, Maxwell's Equations, electric dipole and flux line, energy density in electrostatic fields, Electric Field in material space: Properties of materials, convection and conduction currents, conductors, polarization in dielectrics, dielectric constants, continuity equation and relaxation time, boundary conditions, Electrostatic boundary value problems: Poisson's and Laplace's equation, methods of images

Magnetostatics: Magnetostatic fields, Biot Savart's Law, Ampere's Current Law, Maxwell's equations, application of Ampere's Law, magnetic flux density, Maxwell's equation for static fields, magnetic scalar and vector potential.

Magnetic Forces: Materials and devices, forces due to magnetic field, magnetic torque and moment, magnetic dipole, magnetization in materials, magnetic boundary conditions, inductors and inductances, magnetic energy

Waves and Applications: Maxwell's equation, Faraday's Law, transformer and motional electromotive forces, displacement current, Maxwell's equation in final form, Green's Theorem, Lorentz Gauge, Electromagnetic Wave Propagation: Wave propagation in loss dielectrics, plane waves in lossless dielectrics, plane waves in free space, plane waves in good conductors, power and the Poynting vector, reflection of a plane wave in a normal incidence

Text/Reference Books:

1. Sadiku M. N., Elements of Electromagnetics, *Oxford University Press*
2. Hayt W. H. and Buck J. A., Engineering Electromagnetics, *McGraw Hill Education*

List of Experiments

1. Steady State Characteristics of pn junction under different bias conditions
2. Small signal and large signal behavior of diodes
3. Static IV characteristics of bipolar transistors
4. Small signal behavior of bipolar transistors
5. Static IV characteristics of MOSFETs
6. Small signal behavior of MOSFETs
7. Characteristics of LED with different wavelengths
8. Simulation experiments using PSPICE or Multisim

List of Experiments

1. To realize the truth table of different logic gate
2. To realize half adder and verify its truth table
3. To realize full adder and verify its truth table
4. To realize half subtractor and verify its truth table
5. To realize full subtractor and verify its truth table
6. To design multiplexer using 2 input NAND gates
7. To design demultiplexer using 2 input NAND gates
8. To realize flip flops
9. To realize ripple counters

List of Experiments

1. Familiarity with lab equipments like multimeter, ammeter, voltmeter, breadboard, CRO, power supplies, etc.
2. Familiarity with electrical/electronic components like resistors, inductors, capacitors, diodes, LEDs, etc.
3. Colour coding of resistors
4. Series and parallel combination of resistors.
5. Verification of Ohms Law, Kirchoff's Laws.
6. Voltage divider and current dividers.
7. Verification of Superposition Theorem.
8. Verification of Thevenin and Norton Theorems.
9. Verification of Maximum Power Transfer Theorem.
10. Hands on soldering and desoldering techniques

Basic Diode Circuits: Circuit models, graphical and iterative analysis, load line analysis, rectifier circuits, voltage regulation, limiting circuits, level shifters

Basic BJT and MOSFET circuits: Brief review of structure and operation, IV characteristics, Equivalent circuit models, Analysis of BJT circuits at DC, Analysis of MOSFET circuits at DC

Single Stage Transistor Amplifiers: Basic principles of amplifier design, Voltage Transfer Characteristics (VTC), Linear Amplification, Transistor Biasing, Small Signal Operation and equivalent models, analysis of basic amplifier configurations (CE, CB, CC for BJT and CS, CG, CD for MOSFET), CE amplifier with emitter resistance, CS amplifier with source degeneration, emitter follower

Frequency Response of Transistor Amplifiers: Brief overview of poles and zeros in transfer functions and Bode's rules, low frequency response of CE and CS amplifiers, internal capacitive effects and high frequency models for transistors (BJT and MOSFET), high frequency response of CS and CE amplifiers, Miller's Theorem, open circuit time constants for determining cutoff frequencies

Output Stages: Classification of output stages, Class A, Class B, Class AB and Class D output stages; circuit operation, transfer characteristics, power conversion efficiency and power dissipation of each output stage.

Text/Reference Books:

1. Sedra A.S. and Smith K.C., Microelectronic Circuits, *Oxford University Press*.
2. Razavi B., Fundamentals of Microelectronics, *John Wiley & Sons*.
3. Boylestad R. and Nashelsky L., Electronic Devices and Circuits, *Prentice Hall*
4. Neamen D. A., Microelectronics: Circuit Analysis and Design, *McGraw Hill Publications*

ECE251C

Analog Communication

4-0-0

Communication Systems: Elements of communication systems and its fundamental limitations need for modulation. Random Processes, Stationary Processes, Ergodic Processes, Transmission through LTI, Power Spectral Density, Gaussian Process. Noise: External and internal sources of noise, thermal noise, calculation of thermal noise, Shot Noise, Noise Figure, Noise Temperature, Equivalent Noise Bandwidth.

Amplitude (Linear) Modulation: Generation and detection of AM, DSB, SSB, VSB, carrier acquisition, concept of FDM, AM transmitter and receiver.

Angle (Exponential) Modulation: Types of Angle Modulation, Concept of Instantaneous frequency, Wideband and Narrowband FM, Generation and detection of FM, Generation and detection of PM, FDM

Noise Performance of CW modulation systems: Noise in DSB-SC, SSB-SC and AM system, Noise in FM and PM FM threshold and its extension, Pre-emphasis and De-emphasis in FM

Sampling Theory and Pulse Modulation: Sampling process, sampling theorem, signal reconstruction, flat top sampling of band pass signals, Analog Pulse Modulation: Types of analog pulse modulation, Method of generation and detection of PAM, PWM, PPM, Spectra of pulse modulation, concept of time division multiplexing.

Text/Reference Books:

1. Haykin S., Communication Systems, *John Wiley and Sons*
2. Lathi B. P., Modern Digital and Analog Communication Systems, *Oxford University Press*
3. Taub H., Schilling D., Saha G., Taub's Principles of Communication Systems, *Tata McGraw Hill*

ECE252C

Electronic Instruments and Measurements

3-0-0

Errors, Standards and Bridge Measurements: Units, dimensions and standards, errors in measurement, systematic errors, propagation of errors, significant figures, rules for rounding off. Wheatstone Bridge, Kelvin Bridge, AC Bridge and their applications, Maxwell Bridge, Hay's Bridge, Unbalance Conditions, Wein Bridge, Anderson's Bridge, De Sauty's Bridge, Schering Bridge

Analog Indicating Instruments: Permanent Magnet Moving Coil (PMMC) instruments, Moving Iron (MI) instruments, electrostatic type meters, electrodynamic type wattmeter, induction type energy meter

Digital Methods of Measurement and the CRO: Counter Timer, Analog to Digital Converters: Flash, Successive Approximation Type, Dual Slope ADC, Digital Multimeter. Introduction to CRO, Oscilloscope block diagram, Cathode Ray Tube, Delay Line, Multiple Trace, Digital Storage Oscilloscope

Transducers: Electrical transducers selection and considerations, resistive, strain gauges, temperature transducers, platinum resistance type, thermistor, thermocouples, LVDT, piezoelectric, photoelectric transducers

Data Acquisition: Introduction to Data Acquisition Systems, various DAS configurations, data acquisition in PLC, SCADA

Text/Reference Books:

1. Cooper W. D. and Helfrick A. D., Electronic Instrumentation and Measurement Techniques, *Prentice Hall*
2. Sawhney A. K., A Course in Electronic Measurements and Instrumentation, *Dhanpat Rai and Co.*

ECE253C

Microprocessors and Microcontrollers

3-0-0

Microprocessors: Evolution of microprocessors and microcontrollers, Internal architecture of 8085/8086(ALU, Register Array, Timing and Control Unit), flags, different addressing modes, instruction set, arithmetic and logic operations, 8085 assembly language programming

Microcontrollers: Overview of 8051 Microcontroller family, Architecture, Basic assembly language programming concepts, The program Counter and ROM Spaces in the 8051, Data types, 8051 Flag Bits and PSW Register, 8051 Register Banks and Stack

Microcontroller/Microprocessor Programming: Assembly language programming and Embedded C. Timer programming, Time delay generations and calculations, I/O port programming, Counter Programming, Interrupt Programming, Serial communication programming

Microcontroller/Microprocessor Interfacing: Interfacing of I/O Devices like, LEDs, LCD, Keyboard, Motors, ADCs, Sensors, and External Memory with microprocessors/microcontrollers.

Arduino and Raspberry Pi Board: Introduction to ATmega microcontrollers and Arduino Boards. Interfacing of various I/O devices with Arduino boards. Introduction to Raspberry Pi Board.

Text/Reference Books:

1. Goankar R. S., Microprocessor architecture, programming and Applications with 8085, *Penram International Publishing*
2. Mazidi M.A. and Mazidi J. G., The 8051 Microcontroller and Embedded Systems: Using Assembly and C, *Pearson Publications*.
3. Mazidi M.A. and Naimi S., AVR Microcontroller and Embedded Systems: Using Assembly and C, *Pearson Publications*.

Introduction to Linear Control Systems: Control systems – examples and classification, open loop and closed loop control systems and their differences, transfer functions, block diagram representation of systems, signal flow graphs – reduction using Mason’s gain formula, models of some industrial control devices and systems

Continuous Time System Response and Stability: Standard test signals, time domain performance of first and second order control systems, time domain specifications of these systems, steady state and transient response, steady state errors and error constants, concept of stability, BIBO stability, relation between characteristic equation roots and BIBO stability, Routh Hurwitz stability criterion, relative stability analysis

Root Locus and Frequency Response Analysis: Root locus technique and its construction principles, frequency response and frequency domain specifications, Bode diagrams – determination of stability, phase margin and gain margin from the Bode diagrams, Nyquist methods – determination of stability, phase margin and gain margin from Nyquist diagrams

Classical Control System Design Methods: Control system design using root locus methods, relationship between root locus and time domain – Cascade (lag, lead, lag-lead, PI, PID) and feedback (PD) compensation using root locus plots, compensator design using Bode plots – Cascade (lag, lead, lag-lead, PI, PID) and feedback (PD) compensation

Control System Analysis using State Variable Analysis: Introduction to state variable representation, conversion of state variable models to transfer functions and vice versa, eigen values and eigen vectors, solution of state equations, properties of state transition matrix – computation of state transition matrix by Laplace transformation and Cayley Hamilton theorem, concepts of controllability and observability

Text/Reference Books:

1. Nise N. S., Control Systems Engineering, *John Wiley and Sons*
2. Gopal M., Control Systems – Principles and Design, *Tata McGraw Hill*
3. Stefani R., Savant C., Shahian B and Hostetter G., Design of Feedback Control Systems, *Saunders College Publishing*
4. Ogata K., Modern Control Engineering, *Prentice Hall India*

STA253C

Probability and Statistics

3-0-0

Statistics: Measures of central tendency and Measures of variations (Dispersions), Moments, Measures of Skewness and Kurtosis. Moment generating functions, problems.

Standard Distributions: Binomial, Poisson and Normal Distributions, Beta and Gamma Distribution, t Distribution, F-Distribution, Chi-square Distribution and their applications.

Method of Least Squares & Correlation: Methods of least squares, fitting of straight line and parabola of degree 'p'. Regression and Correlation. Multiple and Partial Correlation.

Probability: Random experiment, sample space, events, classical, statistical and axiomatic definitions of probability. Statements and proof of theorems on addition and multiplication of probabilities, problems.

Conditional Probability: Bayes theorem on conditional probability. Random variables, Derivation of formulae for mean, variance and moments of random variables for discrete and continuous cases. Laws of expectation problems.

Text Books/Reference Books:

1. Gupta S. C., Kapoor V. K., Fundamentals of Mathematical Statistics, *S. Chand & Sons*.
2. Brownlee, Statistical Theory and Methodology in Science & Engineering, *John Wiley & Sons*.
3. Walpole R. E., Introduction to Mathematical Statistics, *Macmillan publications*.
4. Meyer, Data Analysis for Scientists & Engineers, *John Wiley & Sons*.

List of Experiments

1. Diode rectifier circuits (half wave and full wave)
2. Limiter circuits and level shifters using diodes
3. Voltage regulation using zener diodes
4. Design of a DC power supply
5. DC characterization of transistors
6. Design of simple transistor amplifiers
7. Introduction to SPICE design environment

List of Experiments

1. To realize Amplitude Modulation (AM DSB-FC) and demodulation.
2. To realize Amplitude Modulation (AM DSB-SC) and demodulation.
3. To realize Amplitude Modulation (AM SSB-FC) and demodulation.
4. To realize Frequency Modulation (FM) and demodulation.
5. To realize Amplitude Modulation (AM DSB-FC) and demodulation.
6. To realize Pulse Amplitude Modulation (PAM) and demodulation.
7. To realize Pulse Width Modulation (PWM) and demodulation.
8. To realize Pulse Position Modulation (PPM) and demodulation.
9. To realize Pulse Code Modulation (PCM) and demodulation.

List of Experiments

1. Familiarity with 8085 microprocessor kits and writing simple arithmetic programs
2. Introduction to Keil simulator/Atmel Studio
3. ALP/C Program to read/send data from/to ports
4. To simulate timer and counter programs
5. Interfacing of LEDs and 7 segment display with microcontrollers
6. Interfacing of LCD with microcontrollers
7. Interfacing of keyboard with microcontrollers
8. Interfacing of motors
9. Familiarity with Arduino boards and Arduino shields
10. Interfacing of sensors and actuators with Arduino
11. Familiarity with Raspberry Pi board

List of Experiments

1. Study the performance of relay control combination of P, I and D control schemes in a temperature control system
2. Study the torque-speed characteristics of an AC servomotor and determine its parameters and evaluate its transfer function
3. Study the open loop and closed loop step response of first, second and third order simulated linear systems
4. Study DC motor angular position control system, step response studies for various values of forward gain
5. Study the effect of velocity feedback on the transient and steady state performance of DC motor speed control system
6. Control system analysis and design using MATLAB