B.TECH. 4 YEAR PROGRAMME

ELECTRONICS AND COMMUNICATION ENGINEERING

SYLLABUS 2020-21

(1st, 2nd, 3rd, 4th, 5th, 6th , 7th & 8th Semester)

Detailed Syllabus for B.Tech. ECE

B.Tech. –ECE (First Semester)

MTH 101 Engineering Mathematics I

Calculus of Functions of One Variable: Linear and Quadratic approximations, Error estimates, Taylor's Theorem, Infinite series, Tests of convergence, Absolute and Conditional convergence, Taylor and Maclaurin series.
Calculus of Functions of Several Variables: Partial derivatives, Chain rules, Implicit differentiation, Gradient, Directional derivatives, Total differential, Tangent planes and Normal's, Maxima, Minima and Saddle points, Constrained maxima and minima, Curve sketching, Geometric applications of Integrals, Double Integrals, Applications to areas and volumes, Change of variables.
Ordinary Differential Equation: Differential Equation of First Order and Higher Degree, Linear Differential Equation. with Constant Coefficient of Higher Order, Cauchy's Differential Equation, Method of Variation of Parameter, Simultaneous Differential Equation.
Graph Theory: Introduction, terminology, representation, isomorphism, connectivity, Wars hall's algorithm, Euler and Hamilton path, and shortest path tree.

REFERENCES:

1. Higher Engineering Mathematics : - **B.S. Grewal**
2. Advanced Engineering Mathematics : - **H.K. Das**
3. Differential calculus :- **Schaum's series**
4. Graph Theory with Applications :- **Narsingh Dev**
5. Higher Engineering Mathematics : - **B. V. Ramana**

PHY 101 Engineering Physics-I

Part A:
Electrostatic: Coulomb's Law, Electric field & electrostatic potential, Work and Energy in electrostatic field, Gauss law & its applications, Curl of E, Laplace's and Poisson's equations, Dipoles & multipoles, Force and torque on dipoles, Polarization, Bound charges & electric displacement.

Magnetostatics: Electric Current, Magnetic field & Current density, Ampere's law & its applications, Biot-Savart law, Curl and divergence of **B,** Magnetic dipoles, Magnetization, Magnetic susceptibility, Ferro-, para- and dia- magnetism, Faraday's law, Energy in magnetic field.

Electrodynamics: Lorentz force, Maxwell's equations. Poynting theorem, Electromagnetic potentials, Electromagnetic (EM) waves & their propagation in different media.

Part B:
Introduction to quantum mechanics, Planck"s theory, Thermal radiation (Black bodies, Stefen Boltzmann etc), Photoelectric effect, Compton effect, Dual nature of EM radiation, matter waves, de Broglie waves, wave-particle duality, Uncertainty principle, Heisenberg microscope, Properties of matter (phase and group velocity). Schrodinger equation,

probabilistic interpretation of wave function, admissibility conditions for wave function. One dimensional problems: particle in a box, potential well, potential barrier and quantum tunneling. Periodic potential in one dimension.

REFERENCES:

1. INTRODUCTION TO ELECTRODYNAMICS: D.J. GRIFFITHS
2. APPLIED ELECTRODYNAMICS THEORY: ANALYSIS, PROBLEMS AND APPLICATIONS: NAIR AND DEEPA
3. QUANTUM PHYSICS: EISBERG & RESNICK
4. CONCEPT OF MODERN PHYSICS: BEISER

CS 101 Fundamentals of Computer Programming

Concept of Programming Languages, A quick overview of OS-Windows/Linux, Writing, compiling and running the program on Linux/Windows, The Compiler, Program Builder, Debugging: types of errors and debugging techniques, Problem solving aspects, Introduction to Algorithms and flow charts, C programming Data structures , Variables, Variables names, I/O, The standard Input/output file, Formatted inputs/Output, Expressions and Operators, connectors, control statements, Functions: Scope of Function variable, Modifying function arguments, Pointers, Array, String, Structures and Unions, file handling, File redirection, file pointers, advantages of using multi files, Organization of data in each file, compiling multi-file programs, The Preprocessor, Library Functions and Low level programming.

Textbooks:

1. Balgurusamy,Programming in ANSI C,Mc Graw Hi11,2015
2. Rajaraman V.,COMPUTER PROGRAMMING IN C,Printice Hall of India, 2004.
3. The C Programming language, Kernigham & Ritchie
4. Herbert Schildt,C: The Complete Reference,Mc Graw Hill, 2004

EE 101 Fundamentals of Electrical & Electronics

D.C. Circuits and AC Fundamentals:
Ohm's law, Kirchoff's laws, Nodal Analysis, Mesh Analysis, Superposition Theorem, Source Transformations, Thevnin"s and Norton's Theorems, star/delta transformation, maximum power transfer theorem, transients.

A.C. Fundamentals: Single phase EMF generation, average and effective values of sinusoids, Solution of series and Parallel Circuits, power and power factor, Resonance in series and parallel circuits, steady state analysis for sinusoidal excitation: Sinusoids, Three phase connections: star and delta.

Magnetic Circuit:
Mmf, Magnetising force, Magnetic flux and flux density, permeability, Reluctance and permeance, B-H curve, Simple magnetic circuits, Hysteresis and eddy current loss.

Transformer:
Single-phase transformer Construction, principle of operation, EMF equation, phasor diagram on no-load and full-load, losses and efficiency, open and short circuit test, auto transformer.

D. C. Machines:
D. C. Generator: Construction, EMF equation, various types and characteristics
D. C. Motor: Principle, torque and speed formula, types and their characteristics, Speed control

Semiconductor Diode and BJT
Semiconductor Diode and its V-1 characteristics, Rectifier circuit, Various types of diodes, Zener diode, PIN Diode, Light emitting diode, gun diode ,Working principle, Transistors in CC, CE, and CB configurations, transistor biasing, V-I characteristics and load line concept with Quiescent point, Transistor H-parameter.

Textbooks:
1. Toro, Del V., Electrical Engineering Fundamentals, Printice Hall of India, 1994.

2. Millman, Jacob and Halkias, Christos C., Integrated Electronics: Analog and Digital Circuits and Systems, Mc Graw Hill, 2004

3. Boylestad, Robert L., and Nashelsky, Louis, Electronics Device and Circuit Theory, Ninth Edition, Printice Hall of India, 2005

HUM 101 Effective Communication and soft skills

Concept of communication, communication cycle, barriers of communication, verbal v/s non-verbal communication, 7 Cs of Communication, Concept of word formation, introduction to colloquial language, Common Errors in Writing**,** Writing Practices: Reading and comprehension, Summary Writing, Business Letter Writing (Inquiry, Complaint)**,** Critical thinking and analysis, Technical writing (definition and description), Listening Comprehension: Pronunciation Intonation Stress and Rhythm, Public speaking; Non-verbal aspects of speaking: Accent, Pronunciation, Intonation etc, Preparation of Curriculum Vitae/Resume; Interviews; Essentials of Group Discussions /Presentation.

IT 101 Engineering Workshop

E1: Study of Cathode Ray Oscilloscope (CRO) – Measuring Voltage and Current
E2: Study of Function Generator – Configure Output for Varying Signals
E3: Study of Digital Multi-Meter – AC/DC Voltage, Current, Resistance, Parameters of Diode & Transistor
E4: Study of Programmable DC Power Supply – Ripple and Noise, Setting Resolution and Accuracy
E5: Introduction and identification of basic electronic components.
E6: Calculation and verification of equivalent resistance using bread board and multi-meter.
E7: Calculation and verification of equivalent capacitance using bread board and multi-meter.
E8: Testing of pn junction diode and LED using multimeter.
E9: Testing of pnp and npn transistor using multimeter.
E10: Design and construction of half wave and full wave rectifiers.

Detailed Syllabus for B.Tech. ECE

B.Tech. –ECE (Second Semester)

MTH 102 Engineering Mathematics II

Linear Algebra: Review of Matrices Algebra, Solution of Matrices Equation, Row reduced Echelon form,Vector spaces, subspaces, basis, Orthogonal basis, Gram-Schmidt, orthogonalization, Linear Operators, Matrix representation, Rank, Solution of Linear equations using matrices (invertibility, null space etc.), Eigenvalues, eigenvectors.

Complex Analysis: Functions of a Complex Variable, Analytical functions, Cauchy-Reimann equations, Elementary functions, Contour integrals, Cauchy's Theorem, Residue Theorem, Power series, Taylor and Laurent series, zeros, poles, essential singularities, evaluation of integrals.

Vector Calculus: Vector fields, Divergence and Curl, Line Integrals, Green's Theorem, Surface Integrals, Divergence Theorem, Stoke's Theorem and applications.

Partial Differential Equation: Linear & Non-Linear P.D.E of First Order, Homogeneous & Non-Homogeneous Linear P.D.E with constant coefficient of Higher Order, Separation of Variables.

REFERENCES:

1. Higher Engineering Mathematics : - **B.S. Grewal**
2. Advanced Engineering Mathematics : - **H.K. Das**
3. Linear Algebra :- **Schaum's series**
4. Complex Analysis :- **Schaum's series**
5. Higher Engineering Mathematics : - **B. V. Ramana**

PHY 102 Engineering Physics II

Laser and Fiber Optics:

Laser: Stimulated and Spontaneous processes, Einstein's A & B Coefficients, Transition probabilities, Characteristics of laser, Optical Resonators, Principles and Working of Ruby and He-Ne laser with energy level diagram and applications.

Fiber Optics: Fundamental idea about optical fiber, Types of fibers, Acceptance angle & cone, Numerical Aperture, V-number, Propagation of Light through step index fiber, Pulse dispersion, Attenuation, Loses and applications.

Solid State and Semi Conductor Physics:

Semi Conductor Physics: Effective mass**,** Energy bands in solids, Electron and hole mobility, Fermi level for intrinsic and extrinsic semiconductors, Zenor diode, PN junction transistor, Transistor parameters, Photo diode, solar cell and Hall effect.

Superconductivity: Meissner effect, Type I and Type II superconductors, Dielectric polarization and Dielectric losses.

Wave Optics:
Interference: Interference in Thin Films (due to reflected and transmitted light), Newton's ring and Michelson's Interferometer.
Diffraction: Diffraction at single, double and n-slit

Applied Nuclear Physics: Properties of Nucleus, Nuclear Forces, Fission & Fusion, Particle accelerators (Cyclotron and Betatron), Geiger- Muller (GM) Counter.

Theory of Relativity: Frame of reference, Postulates of Special Theory of Relativity, Lorentz Transformation, Length Contraction, Time Dilation, Einstein's Mass Energy Relation.

REFERENCES:

1. OPTICS: GHATAK
2. PRINCIPLES OF OPTICS: BRIJLAL SUBRAMANYAM
3. CONCEPT OF MODERN PHYSICS: BEISER
4. ENGINEERING PHYSICS: M.N. AVADHANULU and P.G. KSHIRSAGAR
5. MODERN PHYSICS: MANI & MEHTA

EG 101 Engineering Graphics

Lines, Lettering, Sketching, Principle of Dimensioning, Orthographic Projection: Projection of Points, Lines, Planes, Auxiliary Views, Projection of Solids, Sections of Solids, Intersections of solids and development of lateral surfaces of simple solids, Isometric Projections, Oblique and Perspective Projection.

CS 102 Data Structures and Algorithms

Notion of Algorithm, Space and Time Complexity, Analyzing algorithms Static & Dynamic Memory Management, Arrays, Stacks, Queues, Linked Lists Trees, Binary Trees, Tree Traversals, Applications of Binary Trees Graphs and their representations, Graph Traversal Algorithms, Minimum Spanning Tree, Shortest Paths

Searching Algorithms: Sequential Search, Binary Search

Sorting Algorithms: Quick sort, Merge sort, insertion sort, Selection sort, Heap & Heap sort Binary Search Tree, Balanced Tree, AVL Tree Files

Indexing: Hashing,

Tree Indexing: B-tree

Basic Algorithm Design Paradigms: Divide & Conquer, Greedy method, Dynamic Programming, Back tracking, Branch and Bound [Discussion with the help of some example which are already discussed].

Text/ References Book:

1. Horowitz, Sahni, Fundamentals of Data Structures, Computer Science Press-2013.
2. Cormen et al., Introduction to Algorithms, Second Edition, Printice Hall of India 2014.
3. Fundamentals of Computer Algorithms by Ellis Horowitz, Sartaj Sartaj Sahni, Rajasekaran-Universities Press-2008.

4. Data Structures Using C And C++, 2 Edition, Augenstein Moshe j., Tenenbaum Aaron M., Langsam Yedidyah, Publisher: Prentice-Hall India-2009

HUM 102 Culture & Human Values

The syllabus comprises of excerpts from the writings of great masters like Swami Vivekananda, Mahatma Gandhi, Chanakya, Rabindranath Tagore, Dr. S. Radhakrishnan, H.E. Dr. APJ Kalam, Carl Sagan, Gurunanak Dev, Wordsworth, 0. Henry, Maupassant and many others. The wisdom of the philosophical texts would be brought to them through the Reading Material prepared specifically for the students. It is expected that their English communication and general awareness would improve through this discursive and interactive method.

IT 102 Programming Lab

AutoCAD:

Introduction to 3D Wireframe/Solid Modeling, Modeling of Primitive 3D Solids, Modeling of unique 3D Solids by Extrusion, Revolution, Sweeping and Lofting, 3D Operations and Solid Editing

Matlab:

Basics: Mathematics, Data Analysis, Programming, Graphics, Creating GUI
Toolboxes - Curve Fitting: Data fitting, Preprocessing data, post processing data, Using library functions for Data fitting, Symbolic Math: Calculus, Linear Algebra, Simplifications, Solutions of Equations, Matlab Compiler: Programs involving control statements, data structure etc., User defined functions, Simulink: building a model, run.

Detailed Syllabus for B.Tech. ECE

B.Tech. - ECE (Third Semester)

Course Name: Mathematics-III Code: MTH 211

Numerical Methods: Solution of algebraic and transcendental equations, Solution of linear Simultaneous Equations.

Finite Differences, Interpolation formula for equal and unequal intervals, Central Difference formula, Inverse Interpolation, Numerical Differentiation.
Numerical Integration, Numerical solution of Ordinary & Partial Differential Equations.

Statistics: Curve fitting, Correlation and Regression Analysis Probability Statistics: Curve fitting, Correlation and Regression Analysis Discrete and Continuous Random Variables, Probability Density Functions.
Theoretical Distributions, Binomial, Poisson Normal Distributions etc. Hypothesis Testing-Testing of Statistical Hypothesis and its Significance (Chi-Square, t, z and F Tests).

Text/ Reference Books:

1. Numerical Analysis	S S Sastry
2. Numerical Analysis	B S Garewal
3. Numerical Analysis	Jain Ayenger Jain
4. Mathematical Statistics	M. Ray
5. Head first Statistics	Gujarati

Course Name: Electronic Devices and Circuits Code: EC 211

Modeling devices: Static characteristics of ideal two terminal and three terminal devices; Small signal models of non-linear devices. Introduction to semiconductor equations and carrier statistics: poisson's and continuity equations, Fermi-Dirac statistics and Boltzmann approximation to the Fermi-Dirac statistics.

Semiconductor Diodes: Barrier formation in metal semiconductor junctions, PN homo-and hetero- junctions; CV characteristics and dopant profiling; IV characteristics; Small signal models of diodes; Some Applications of diodes.

Field Effect Devices : JFET/HFET, MIS structures and MOSFET operation; JFET characteristics and small signal models; MOS capacitor CV and concept of accumulation, depletion and inversion; MOSFET characteristics and small signal models.

Bipolar transistors : IV characteristics and elers-Moll model; small signal Charge storage and transient response. Discrete transistor amplifiers: emitter and common source amplifiers; Emitter and source followers.

Text/ Reference Books:

1. D. A. Neamen, Semiconductor Physics and Devices (IRWIN), Times Mirror High Education Group, Chicago) 1997.
2. E.S. Yang, Microelectronic Devices, McGraw Hill, Singapore, 1988.
3. B.G. Streetman, Solid State Electronic Devices, Prentice Hall of India, New Delhi, 1995.
4. J. Millman and A. Grabel, Microelectronics, McGraw Hill, International, 1987.
5. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991.
6. R.T. Howe and C.G. Sodini, Microelectronics : An integrated Approach, Prentice Hall International, 1997.

Electronics Circuit Lab Experiments

1. Study of BASIC ELECTRONICS COMPONENTS
2. Study of CRO, FUNCTION GENERATOR, MULTIMATE, D.C. POWER Supply
3. Study and plot Diode Characteristics of Si.
4. Study and plot Diode Characteristics of Ge.
5. Study and plot Bipolar Junction Transistor (BJT) Characteristics in CE configuration.
6. Study and plot Bipolar Junction Transistor (BJT) Characteristics in CB configuration.
7. Study and plot Bipolar Junction Transistor (BJT) Characteristics in CC configuration.
8. Study and plot Field Effect Transistor (FET) Characteristics**.**
9. Study and plot Metal Oxide Field Effect Transistor (MOSFET) Characteristics**.**
10. Study and plot Uni-Junction Transistor (UJT) Characteristics**.**
11. Design Half wave rectifier using diode.
12. Design Full wave rectifier using diode.
13. Design Clipper using diode.
14. Design Clamper using diode.
15. Study of PCB and layout.

Course Name: Digital Logic Design Code: EC 212

Number system & Boolean algebra, number systems: Binary, Arithmetic, octal, Hexadecimal & radix conversion. Binary codes: BCD, excess three, gray display ASCII, EBDCIC, Parity check codes, code conversion, Boolean algebra: theorems, Introduction to logic gates, NAND,NOR realization, Boolean laws & theorems. Simplification of Boolean expression, sum of product & product of sum forms, concept of min terms & max terms, minimization techniques, karnaugh's MAP method, Tabulation method.

Combinational circuits & flip flops half adder, full adder, substractor, BCD adder, multiplexer & demultiplexer, encoder & decoder ckts. FLIP-FLOPS: RS, clocked RS, T, D. JK, master slave JK. Sequential ckts, elements of sequential switching ckts, synchronous & asynchronous systems, binary ripple, counter, BCD counter, up-down counter, Shift Registers, series parallel shift registers shift left & shift right operation, Johnson & ring counter.

Design of sequential ckts. State diagram, state table, state assignment, characterizing equation & definition of synchronous sequential machines, Mealy & More model machines, state table & transition diagram, Introduction to logic families, RTL, DTL, TTL, ECL, NMOS, NCMOS, logic, etc.

References:

1. Digital Logic and Computer Design — M.Morris Meno, Pearson Education
2. Digital Fundamentals — Floyd and Jain, Pearson Education
3. Digital Electronics Principles and integrated Circuits — A.K.Maini, Wiley India.
4. Modern Digital Electronics — RP Jain
5. Fundamentals of digital circuits — A Anand Kumar, PHI

Digital Electronics - Lab Experiments

1. Experiment to study and implement all the logic gates and to verify their outputs.
2. Experiment to study and implement NAND gate as universal gate.
3. Experiment to study and implement NOR gate as universal gate.
4. Experiment to study and implement XOR gate.
5. Experiment to study and implement binary code conversion to grey code conversion.
6. Experiment to study and implement grey code to binary code conversion.
7. Experiment to study and implement HALF-ADDER circuit.
8. Experiment to study and implement FULL-ADDER circuit.
9. Experiment to study and implement HALF –subtractor circuit.
10. Experiment to study and implement JK-Flip Flop.
11. Experiment to study about the working of multiplexer and its operation as a logic level generator.
12. Study of logic gates using ICs and discrete components.
13. Verify 8:1 MUX and 1:8 DEMUX
14. Study of RAM using IC 7489
15. Study of CMOS Inverter
16. Interface CMOS to TTL and vice versa
17. Study of FFs – RS, D, T and JK
18. Study of decade counter IC 7490
19. Study of 4-bit ripple counter IC 7493
20. Study of shift register IC 74194/195
21. Study of 4-bit comparator IC – 7485
22. Working project made by the student at the end of Lab.

Course Name: Network Analysis Code: EC 213

Circuit elements, fundamental laws, Maxwell's loop and nodal analysis, Network theorems with independent and dependent source, Effect of mutual inductance, coupled circuit, Graph theory, Time response analysis by time domain and frequency domain methods, calculation of initial conditions, Wave synthesis, Fourier Series representation, Two port network, Network function, Positive real function, Hurwitz polynomial, Network Synthesis using Foster and Cauer first and second forms.

Reference Books:

1. Network Analysis by M. E. Van Valkenburg, Pearson
2. Network Analysis and Synthesis by Franklin F. Kuo, Wiley
3. Circuits, Devices and Systems by Smith and Dorf, Wiley
4. Network analysis and Synthesis by Pankaj Swarnkar, Satya Prakashan
5. Electric Circuits by M. Nahavi and J A Edminister, Schaum's Outlines

Network Lab Experiments

1. Study of Superposition Theorem
2. Study of cascaded 2 port network
3. Study of Reciprocity Theorem
4. Study of Tellegans theorem
5. Network theorems (superposition, Norton's, thevinins, maximum power transfer)
6. Study of Millman's theorem
7. Study of maximum power transfer theorem
8. Network theorem (Norton's & thevinins)

Course Name: Signals and Systems Code: EC 214

Classification of signals and systems, various system representation techniques, Fourier transforms and series, application to analysis of systems, Laplace transform its properties and applications to system analysis, Linear Time Invariant (LTI) systems and their properties, Random variables and random process, characterization of random variables and random process, random signals.

Text/ Reference Books:

1.	Signals and Systems	A.V. Oppenheim, A.S. Willsky and I.T. Young.
2.	Analog and Digital Signal Processing	Ashok Ambardar
3.	Signals and Systems	Simon Haykin, Barry Van Veen
4.	Digital Signal Processing: Principles Algorithms & Applications	John G. Prokis
5.	Signals and Systems	A. Anand Kumar

Course Name: Electronic Workshop Code: EC 216

Handling and measurement of Electronics Instruments, safety measures in electronics labs, Analysis for electronics components using data sheets, design of small electronics circuits, Basics of testing and calibration, Assembling an electronic circuit on PCB and testing.

References:

1. Robust Electronics Devices, vol 1, John r Barries, Kluwer Academic Publisher
2. Electronics, Engineer Reference Book, 6th edition, Elsevier Publication
3. Encyclopedia of electronics components charl platt, vol 1

Detailed Syllabus for B.Tech. ECE

B.Tech. - ECE (Fourth Semester)

Course Name: Linear Integrated Circuits Code: EC 221

Introduction to operational amplifiers: The difference amplifier and the ideal operational amplifier models, concept of negative feedback and virtual short ;Analysis of simple operational amplifier circuits; Frequency response of amplifiers, Bode plots.

Feedback: Feedback topologies and analysis for discrete transistoramplifiers; stability of feedback circuits using Barkhausen criteria. Linear application operational amplifiers: Instrumentation and Isolation amplifiers; Current and voltage sources; Active filters. Non-linear applications of operational amplifiers: Comparators, clippers and clampers;Linearization amplifiers; Precision rectifiers; Logarithmic amplifiers, multifunction circuits and true rms convertors.

Waveform Generation: sinusoidal feedback oscillators; Relaxation oscillators, square-triangle oscillators. Real operational amplifiers: Current sources and active loads, difference, intermediate and output stages including Miller capacitors for frequency computation; Operational amplifier parameters; Effects of real operational amplifier parameters on circuit performance.
Analog and Digital interface circuits: A/D, D/A Converters, S/H circuits and multiplexers.

Text/ Reference Books:

1. Introduction to Operational Amplifier theory and applications — J.V. Wait, L.P. Huelsman and GA Korn, 2nd edition, McGraw Hill, New York, 1992.
2. Microelectronics — J. Millman and A. Grabel, 2nd edition, McGraw Hill, 1988.
3. The Art of Electronics — P. Horowitz and W. Hill, 2nd edition, Cambridge University Press, 1989.
4. Microelectronic Circuits . — A.S. Sedra and K.C. Smith Saunder's College Publishing, 1991.

Linear Integrated Circuits Lab Experiments

1. **CE , CB , CC Amplifiers.**
    - To measure the voltage gain and plot the frequency response characteristics of CE Amplifier.
    - To measure the voltage gain and plot the frequency response characteristics of CC Amplifier.

- To measure the voltage gain and plot the frequency response characteristics of CB Amplifier.

2. Transistor Biasing methods.

- To measure voltage gain for Fixed bias condition of the transistor.
- To measure voltage gain for Collector Base bias condition of the transistor.
- To measure voltage gain for Emitter Base bias condition of the transistor.

3. Narrow Band Amplifier.

- To measure the voltage gain of the Narrow Band Amplifier.

4. Push Pull Amplifier.

- To measure the voltage gain(AV) of the class B push pull Amplifier.
- To find out the Power gain of the class B push pull Amplifier.

5. Wide Band Amplifier.

- To measure voltage gain of Wide Bnad Amplifier and observe its bandwidth.

6. MOSFET Amplifier.

- To measure the voltage gain of the MOSFET Amplifier.

7. Thermal Stability of Transistor.

- First connect the given connector has shown.
- Now increase the different values of transistor parameters as given.
- Measure Ve , Vc , Vb , Vbe , Ic of transistors and note down.
- Now increase the temperature of transistors of some degree and measure the above value again and make the conclusion according to theory of thermal stability.

8. Negative Feedback Amplifier.

- To measure the voltage gain of the amplifier with or without feedback.
- To plot frequency response with and without feedback for transistor amplifier.

Course Name: Microprocessors and Microcontrollers Code: EC 222

Microprocessors (8085) - internal architecture, Instruction set and assembly language programming. Introduction to 8086 microprocessor, internal architecture, pin description, memory segmentation, addressing modes, instruction set and assembly language programming. Basic Interfacing devices: Memory interfacing, 8255, 8253, 8259, 8257, 8251, Interfacing A/D and D/A converters, Case studies of microprocessor based systems. Salient features of advanced microprocessors: 80286,386,486, Pentium.

Introduction to 8051 microcontrollers, its architecture, pin description, I/O configuration, interrupts, addressing modes, an overview of 8051 instruction set, Microcontroller applications.

Text/ Reference Books:

1. 8085 Microprocessor Ramesh Goenkar, Prentice Hall
2. Microprocessor and Interfacing D. V. Hall
3. The 8051 Microcontroller Kenneth J Aya
4. THE INTEL MICROPROCESSORS BARRY B. BREY, Pearson Prentice Hall

Micro Processor & Micro Controller-Lab

1. Write C program to interface stepper motor.
2. Write C program to interface DC motor.
3. Write C program to interface traffic light controller.
4. Write C program to interface Elevator.
5. Write C program to interface ADC-DAC controller.
6. Write C program to interface temperature controller.
7. Write C program to interface DAC controller.
8. Write a program to add two 8-bit BCD numbers.
9. Write a program to add ‘n’ 8-bit BCD numbers.
10. Write a program to add two ‘n’ byte BCD numbers.
11. Write a program to perform 8-bit binary subtraction.
12. Write a program to perform 8-bit binary subtraction by 1’s compliment method.
13. Write a program to perform 8-bit binary subtraction by 2’s compliment method.
14. Write a program to perform 8-bit binary subtraction by 9’s compliment method.
15. Write a program to perform 8-bit binary subtraction by 10’s compliment method.
16. Write a program to perform two ‘n’ byte binary subtractions.

Course Name: Analog & Digital Communication Code: EC 223

Basic blocks in a communication system: transmitter, channel and receiver; baseband and pass band signals and their representations; concept of modulation and demodulation. Continuous wave (CW) modulation: AM, DSB/SC, SSB, VSB, methods of generation; Demodulation techniques of CW modulation: coherent and non-coherent;

Nonlinear modulation techniques: FM and PM, narrowband FM, wideband FM, methods of generation; FM spectrum; Demodulation techniques for FM; Frequency Division Multiplexing (FDM); Radio transmitters and receivers. Performance of analog modulation schemes in AWGN : CNR, post-demodulation SNR and figure of merit for AM, DSB/SC, SSB, FM, threshold effect in FM, pre-emphasis and de-emphasis in FM, FMFB. Noise in receivers; Noise figures; Radio link design.

Signal analysis and analog modulation: Analog signal, digital, convolution correlation, autocorrelation, of analog modulation, amplitude and angle modulation, spectral analysis and relation, noise source, band pass noise, noise performance of AM and FM signal. Pulse Modulation: Natural sampling, flat top sampling, sampling theorem, PAM, bandwidth, pulse time modulation method of generation and detection of PAM, and PPM, time division multiplexing, Noise in pulse modulation system.

Pulse code modulation: Quantization of signal, quantization errors, PCM, PCM system, comp multiplexing PCM system, differential PCM, delta modulation, adaptive delta modulation, noise in PCM system. Information theory and Coding: Unit of information, entropy, Joint and conditional entropy, information rate mutual Information, channel capacity of BSC, BEC and binary channel theorem Shannon Harte'y theorem, bandwidth S/N trade off, average length of code control coding, Hamming distance block code, convolution code.

Digital Communication: Differential phase shift keying (DPSK), quadrature phase shift k (QPSK), M- ray PSK, Binary frequency shift keying (BESK), comparison of DPSK QPSK, M-ray FSK, duo binary encoding, base band signal reception, probability of optimum filter, matched filter.

Text/ Reference Books:

1. Modern Digital and Analog Communication Systems — B.P.Lathi,
2. Communication Systems — Simon Haykins
3. Communication Systems — A. B. Carlson
4. Analog & Digital Communication — R.P. Singh & Sapre
5. Communication Engineering — Rao

Analog Communication Lab Experiments

1) Double side band AM Generation.
2) Double side band AM Reception.
3) Single side band AM Generation.
4) Receiver Characteristics (Selectivity, Sensitivity, Fadelity).
5) Frequency Modulation using Reactance Modulator.
6) Frequency Modulation using Varactor Modulator.
7) Quadrature Detector.
8) Operation of Phased locked loop Detector.
9) Operation of Foster – Seeley loop Detector.
10) Operation of Ratio Detector.

Course Name: Database Management System Code: ECE 224

Introduction to DBMS concepts and architecture: file organization techniques, database approach v/s traditional file accessing approach, advantages of database systems, data models, schemas and instances, database languages and interface, initial conceptual design of database, DBMS Architecture database system utilities, data independence, functions of DBA and designer.

Entities attributes, entity types, value sets, key attributes, relationships, defining the E-R design of database. Relational data models: Domains, tuples, attributes, relations, characteristics of relations, key attributes of relations, relational database, schemas, integrity constraints, update operations on relations. Hierarchical data model: Hierarchical database structures, Integrity constraints, data definition and manipulation in hierarchical model. Network data model: Records, record types and data items, set types and set instances, constraint on set membership, representation of set instances, special types of sets, DBTG proposal and implementation.

Relational algebra and relational calculus: Relational algebra operations like select, project, join, division, outer join, outer union etc., insertion, deletion and modification anomalies. Data definition in SQL, queries, update statements and views in SQL. QUEL and QBE, data and storage definition, data retrival queries and update statements etc.

Introduction to normalization, normal forms, functional dependency, decomposition, dependency preservation and lossless join, problems with null valued and dangling tuples, multivalued dependencies, inclusion and template dependencies. Distributed databases, protection, security and integrity constraints, concurrent operations on databases, recovery, transaction processing, database machines. Comparison of various database models, comparison of some existing DBMS.

Text/ Reference Books:

1. Fundamentals of Database System by Navathe
2. Fundamentals of Database System by Korth
3. Database Management System by Raghu Ramakrishnan

Course Name: Probability Theory and Random Process Code: EC 225

Fundamentals of probability theory and random processes, axiomatic probability theory; discrete and continuous random variables; functions of random variables; generating functions and transform methods; inequalities, bounds and large deviation theory; convergence and limit theorems; random processes; spectral representation; Gaussian processes; Poisson and birth-death processes; Markov chains; random walks, Brownian motion, diffusion and Ito processes.

Text/ Reference Books:

- Probability Theory and Random Processes by P. Ramesh Babu, TMH 2017
- Probability and Random Processes by Palaniammal S, PHI 2011

Course Name: Entrepreneurship Development Code: EC-226

Entrepreneurship Development – Concept and Importance, function of Enterpriser, Goal determination – Problems Challenges and solutions.

Project Proposal- Need and Objects; Nature of organization, Production Management; Financial Management; Marketing Management; Consumer Management.

Role of Regulatory Institutions; Role of Development Organizations; Self Employment Oriented Schemes; Various grant schemes.a. Production management; b. Marketing management – Sales and the art of selling, understanding the market and market policy; Consumer management, time management.

Role of regulatory institutions-district industry centre, pollution control board, special study of electricity development and municipal corporation; Role of development organization, khadi & villages commission/Board; Self-employment-oriented schemes, Prime minister's employment schemes.

References:

- Hisrich R D, Peters M P, "Entrepreneurship" 8th Edition, Tata McGraw-Hill, 2013.
- Mathew J Manimala, "Enterprenuership theory at cross roads: paradigms and praxis" 2nd Edition Dream tech, 2005.
- Rajeev Roy, 'Entrepreneurship' 2nd Edition, Oxford University Press, 2011.

Detailed Syllabus for B.Tech. ECE

B.Tech. - ECE (Fifth Semester)

Course Name: Computer Networks Code: EC 311

Introduction to networks and layered architecture: OSI, TCP/IP; Telecommunications and cellular networks overview; Examples of networks: Arpanet, Internet, Network Topologies WAN, LAN, MAN.

Physical Layer: Basics of communication; Physical media types and their important bandwidth and bit-error-rate characteristics; Wired and wireless media including copper cables, optical fibre and wireless and topology; Multiplexing-circuit switching and packet switching.

Data Link Layer: Framing; Error detection and correction techniques; Topologies; Wired LANs: Ethernet, Wireless LANs, Wireless WANs, Connecting LANs; Virtual-circuit networks, Performance analysis of networks.

Network layer: Network layer and addressing, IP version 4 and 6; Packet delivery, forwarding and routing protocols including distance-vector and link-state approaches; Interior and exterior gateway protocol concepts; Example protocols: OSPF, RIP, BGP.

Transmission layer: Reliable end-to-end transmission protocols-TCP and UDP, SCTP, Congestion control techniques. WAN, ATM.

Application Layer: Socket interface and socket programming; Ex: protocols such as DNS, SMTP, FTP, HTTP, POP, IMAP etc.

Text/ Reference Books:

1. W. Stallings, Data and Computer Communications, 6th edition, Prentice Hall, 2000.
2. A. S. Tannenbaum, Computer Networks, 4th edition, Prentice Hall, 2003.
3. F. Halsall, Data Communications, Computer Networks and Open Systems, 4th edition, Addison-Wesley, 1996.
4. Walrand and Varaiya, High Performance Communication Networks, Morgan Kaufman, 1996.
5. D. E. Comer, Internet working with TCP/IP: Principles, Protocols, Architecture, 3rd edition, Prentice Hall, 2000.
6. W. R. Stevens, TCP/IP Illustrated Vol. I, Addison Wesley, 1994.

Computer Networks Lab Experiments:

1. Experimental study of application protocols such as HTTP, FTP, SMTP, using network packet sniffers and analyzers such as Ethereal. Small exercises in socket programming in C/C++/Java/Python.

2. Experiments with packet sniffers to study the TCP protocol. Using OS (netstat, etc) tools to understand TCP protocol FSM, retransmission timer behavior, congestion control behaviour.

3. Introduction to ns2 (network simulator) - small simulation exercises to study TCP behavior under different scenarios.

4. Setting up a small IP network - configure interfaces, IP addresses and routing protocols to set up a small IP network. Study dynamic behaviour using packet sniffers

5. Experiments with ns2 to study behaviour (especially performance of) link layer protocols such as Ethernet and 802.11 wireless LAN.

Course Name: Digital Signal Processing Code: EC 312

Discrete time systems, linear time invariant (LTI) systems and important properties. Z-Transform. Signal flow graphs and digital system representation. Discrete Fourier transform (DFT) and its properties. Fast Fourier transforms, Introduction to transformation matrices in a general form. Digital filters, FIR and IIR. FIR filters, structure, designs. IIR filters, Applications of DSP.

Text/ Reference Books:

1. Digital Signal Processing: S. Mitra,

2. Digital Signal Processing, Algorithm and Applications: John C. Proakis & Dimities Manolakis

3. Discrete Time Signal Processing: Oppenheim and Schafer

Digital Signal Processing Lab Experiments:

1. Getting started with MATLAB
2. Matrices and array operations
3. Graphical operation using MATLAB
4. Programming with MATLAB
5. Creating Graphical user interface
6. Basic Signal Processing Concepts
7. Design a Filter with fdesign and filterbuilder
8. Spectral Analysis using MATLAB
9. Filtering, Linear Systems and Transforms Overview
10. Filter Design and Implementation

Course Name: EM Fields Code: EC 313

Review of vector algebra, Electric and Magnetic field overview and applications, Maxwell's equations for static and time varying field, boundary conditions for conductor and dielectric. Wave equations for free space, uniform plane waves, linear elliptical and circular polarization, wave equations for conducting medium, wave propagation in conductors and dielectric, depth of penetration, reflection and refraction of plane waves by conductor and dielectric, Poynting vector and flow of power, wave between parallel planes, concept of TE, TM & TEM waves.

Text/ Reference Books:

1. Elements of Electromagnetics Mathew N.O. Sadiku,
2. Engineering Electromagnetics W.H. Hayt,

3. Introduction to Electrodynamics — David J. Griffithe
4. Engineering Electromagnetics, Mc Graw Hill — John D Kraus

Course Name: Control Systems Code: EC 314

Basic control system components; Feedback principle; Transfer function; Block diagram representation; Signal flow graph; Transient and steady-state analysis of LTI systems; Frequency response; Routh-Hurwitz and Nyquist stability criteria; Bode and root-locus plots; Lag, lead and lag-lead compensation; State variable model and solution of state equation of LTI systems.

Text/ Reference Books:

1. Control System Engineering — Nagrath & Gopal
2. Linear Control System — B.S.Manke
3. Modern Control System — R.C. Dorf & R.N. Bishop
4. Modern Control Engineering — K. Ogata

Control Systems Lab Experiments:

1. Design & Develop First Order Type zero system &determine its impulse response
2. Design a Derivative Controller
3. Design an Integral Controller
4. Design a 1st order low pass Butterworth Filter and determine its cut off frequency
5. Time domain analysis of first order control systems on simulation software 20-sim Version 4.4
6. (a) Obtain the transfer function of a system from the given poles and zeroes using MATLAB.
   (b) Obtain the poles and zeros of a given transfer function using MATLAB.
7. (a) Obtain the step response of a transfer function of the given system using MATLAB.
   (b) Obtain the ramp response of a transfer function of the given system using MATLAB.
   (c) Obtain the impulse response of a transfer function of the given system using MATLAB.
8. Obtain the time response of a given second order system with its damping frequency using MATLAB.
9. (a) To determine the transfer function of a DC Motor.
   (b) Interaction between mechanical and electrical quantities of a motor.
   (c) Measuring time response of a DC motor and comparing with time response obtained through transfer function
10. (a) Plot the root locus for a given transfer function of the system using MATLAB.
    (b) Obtain bode plot for a givan transfer function of the system using MATLAB.
11. (a) Obtain the transfer function from the state model using MATLAB.
    (b) Obtain the state model from the transfer function using MATLAB.
    (c) Obtain a state model from given poles and zeros using MATLAB.
    (d) Obtain poles and zeros from a given state model using MATLAB
12. (a) Obtain the step response of a state model for a given system using MATLAB.
    (b) Obtain the impulse response of a state model for a given system.
    (c) Obtain the ramp response of a state model for a given system.

Course Name: Operating System Code: EC 315

The Evolution of operating Systems (OS); Fundamental goals of operating systems overview of important features of OS operation.

Overview of OS: multiprogramming, Batch, interactive, time sharing, distributed operating systems and real time systems; Concurrency and parallelism.

Process management and scheduling: Concept of process and process synchronization, process states, process state transitions, the process control block, operations on processes, suspend and resume, interrupt processing, mutual exclusion, the producer/consumer problem, the critical section problem, semaphores, classical problems in concurrency, inter process communication; Issues in user service and system performance.

Synchronization primitives and problems, deadlocks (essential topics: peterson's algorithm, monitors), detection and prevention of deadlocks, dynamic resource allocation.

Memory Management: Memory fragmentation and techniques for memory reuse paging, virtual memory management using paging, Segmentation, Distributed and Multiprocessor Systems.

File Management: File systems, implementation of file Operations. Protection of files.

Text/ Reference Books:

1. Modern Operating Systems, Andrew S Tanenbaum and Herbert Bos, Fourth Edition, Pearson Education, 2014.
2. Operating Systems Concepts, Abraham Silberschatz, Peter B. Galvin and Greg Gagne, Wiley, 2012.
3. Dhamdhere, D. M., Operating Systems---A concept-based approach, Second edition, McGraw-Hill Education India, New Delhi, 2006.
4. Stallings, W., Operating Systems---Internals and Design Principles,Fifth edition, Pearson Education, New York, 2005.

Detailed Syllabus for B.Tech. ECE

B.Tech. - ECE (Sixth Semester)

Course Name: Introduction to VLSI Code: EC 321

Introduction of VLSI Design Methodologies – Design Description domains, Introduction to HDL – HDL Design Examples, CMOS Circuits & Logic design – basic physical design of simple logic gates, CMOS logic Structures,

clocking strategies, I/O Structures, System design and methods – CMOS design methods, CMOS design options, layout and stick diagrams.

Text/ Reference Books:

1. VLSI Technology: Wyne wolf
2. Principles of CMOS VLSI design: Neil H.E. Weste & Kamraneharghian
3. CMOS VLSI Design: Harris, Weste, Banerjee
4. CMOS Digital Integrated Circuits Analysis & Design: Sung-Mo Kang, Yusuf Leblebici

Introduction to VLSI Lab Experiments:

Write a VHDL program to implement a half adder using logic gates.

1. Write a VHDL program to implement a full adder using
   i) Basic logic gates
   ii) Using half adder
2. Write a VHDL program to implement a 4X1 MUX
   i) Using case statement
   ii) Using "?:" statement
   iii) Using If-Else Statement
3. Write a VHDL program to implement a simple 4-bit adder.
4. Write a VHDL program to implement a BCD to Gray Code Converter.
5. Write a VHDL program to implement a 4-bit unsigned comparator
6. Write a VHDL program to implement a D flip-flop using process statement.
7. Write a VHDL program to implement a JK flip flop.
8. Write a VHDL program to implement a 0 to 15 counter.
9. Write a VHDL program to implement a BCD counter.

Course Name: Optical Communication Code: EC 322

Overview of Optical Fiber Communication: Basic concepts, laws and definition, mode theory analysis for optical communication, optical fiber modes and configuration, wave propagation in optical fiber, operating wavelength, single mode and multimode fibers, V–numbers, mode field diameter, numerical aperture, refractive index profiles. Losses in optical fibers. Dispersion in optical waveguides, group delay, Design optimization of advance single mode fibers and dispersion compensating fibre. Trends in fiber design.

Optical Sources & Optical Detectors: Structure, principle and their characteristics, BER. Overview of analog and digital optical link, Point to point link system consideration: Link power budget and risc time analysis .Line coding Fiber Optic Networks,optical amplifiers, WDM & DWDM Optical System, Optical Networks – SONET/SDH, Optical Layer, future of fiber–optic network

Text/ Reference Books:

1. Optical Fiber Communication — G. Keiser
2. Fiber Optic Communication Technique — D.F. Mynbacv and L. Scheiner
3. Optical Fiber Communication — John M Senior
4. Introduction to fiber Optics — A. Ghatak & K. Tyagrajan

Optical Communication Lab Experiments:

1. Setting up a fiber optic analog link
2. Setting up a fiber optic digital link
3. Losses in optical fiber
4. Measurement of numerical aperture
5. Time division multiplexing of signals
6. Framing in time division multiplexing
7. Marker in time division multiplexing
8. Manchester coder/decoder
9. Voice digitization: a law
10. Electromagnetic/ radio frequency interference

Course Name: Microwave Engineering Code: EC 323

Characteristic, features and applications of microwaves, waveguides, Microwaves generators. Scattering matrix representation of microwave networks, properties of scattering matrices, S-matrices for directional coupler, E plane H plane and magic tee, isolator, circulators, directional couplers. Ferrite devices, Gunn effect, Gunn Diode oscillators, Avalanche effect, diodes and their applications. Planer transmission lines such as stripline, microstrip line, slotline etc., Technology of hybrid MICs, advantages of MICs. VSWR measurement, microwave power measurement, impedance measurement, frequency measurement, transmitter and receiver architectures, terrestrial communication.

Text/ Reference Books:

1. Microwave Devices and Circuits — Liao
2. Microwave Engineering and Applications — O. P.Gandhi
3. Microwave and Radar Engineering — M. Kulkarni
4. radio-frequency and microwave communicationCircuits — Devendra k. Misraa john

Microwave Lab Experiments

1. To get familiar with Microwave bench and study of Its components
2. Measurement and study of Reflex klystron (Microwave source)
3. Study of variable ATTENUATOR and its characteristics
4. Frequency measurement using Frequency meter
5. Frequency measurement using Slotted line and VSWR meter

6. Low VSWR measurement using VSWR meter
7. High VSWR measurement using VSWR meter and SS tuner
8. To determine Gain, beam width and field pattern of Horn antenna
9. Measurement of Coupling and directivity of DIRECTIOANL COUPLER
10. Study of ISILATOR, CIRCULATOR, E-plane, H-plane, Magic Tee

Course Name: Wireless Communication Code: EC 324

Multiple Access and Channels: Orthogonal Frequency Division Multiplexing (OFDM), OFDMA, Fading channels, Multiple Input and Multiple Output (MIMO).
Mobile Adhoc Network(MANet) : Infrastructure less network, Medium access Protocols for MANet, Routing Protocols, Wireless Sensor Networks: Distributed Sensing Nodes, Power saving medium access protocols, IEEE 808.15.4.
Cognitive Radio Network (CRN): Spectrum Sensing Techniques: Energy Detector, Cyclostationary Detector, Marched Filter Detector, Radio Identification Detector, Cyclo- Energy Detector etc. Cooperative spectrum Sensing: Data and Decision cooperative spectrum sensing, Fusion Center, Spectrum Allocation Techniques, IEEE 802.22 (WRAN).
Wireless Access Networks: WLAN, IEEE 802.11, WiMAX, IEEE 802.16, LTE, Ultra Wide- Band (UWB).

Text/ Reference Books:

1. "Wireless Communications:Principles and Practice", by T.S. Rappaport, Prentice Hall publication.
2. "Introduction to Wireless and Mobile Systems", by Dharma Prakash Agrawal, Qing- An Zeng, Cengage Learning publication.
3. "Ad Hoc Networking", by Perkins, Pearson publication, 2008 Edition
4. "Ad Hoc Mobile Wireless Networks", by Sudhir K. Sarkar, T.G. Basavraju, C. Puttamadappa, CRC publication.
5. "A survey of spectrum sensing algorithms for cognitive radio Applications", Tevfik Yucek, Huseyin Arslan, IEEE communications survey & tutorials, vol. 11, no. 1, 2009, pp. 116-129.
6. "Cyclo-energy detector for spectrum sensing in cognitive radio", Lei Yang, Zhe Chen, Fuliang Yin, International Journal of Electronics and Communications (AEÜ), 66 (2012), pp. 89-92.
7. "Wireless and Cellular Communications", by William C.Y. Lee, McGRAW-HILL Publication.

List of Electives Level -1 (Any one Subject for VI Semester)

Signal Processing Stream		Communication Stream		VLSI & Embedded System Stream		Robotics Stream	
EC 501	Digital Image Processing	EC 502	Artificial Neural Networks	EC 503	Digital System Design	EC 504	Power Electronics

SYLLABUS OF ELECTIVES LEVEL-1

Course Name: Digital Image Processing Code: EC 501

Introduction to Image Processing Systems, Digital Image Fundamentals:- Image model, Relationship between Pixels, Imaging geometry, Camera model, Image Sensing and Acquisition, Sampling and quantization, Image Enhancement and in spatial Domain: Point processing, Neighbourhood Processing, High pass filtering, High boost filtering, zooming. Image Enhancement based on Histogram modelling, Image Enhancement in frequency domain: 1D& 2D Fourier transform, Low pass frequency domain filter, High pass frequency domain filters, Homomorphic filtering, Image Segmentation, Detection of discontinuation by point detection, line detection, edge detection, Edge linking and boundary detection Local analysis, global by graph, theoretic techniques, Thresh-holding, Morphology, Representation and description, Discrete image transform, Image Compression, Wavelet transformation, Image geometry, Image restoration.

Text/ Reference Books:

1. Digital Image Processing Gonzalez & Wood
2. Digital Image Processing A.K. Jain .Image Processing Dhananjay K.

Course Name: Artificial Neural Networks Code: EC 502

Neuron models, Network architectures, Learning Processes. Single layer and Multi layerperceptrons, Backpropagation Algorithm, Generalization, Function Approximations, Network pruning techniques. Radial Basis Function (RBF) Networks, Regular izat ion theory, Generalized RBF Networks, Estimation of the Regularization parameters, Approximation properties of RBF networks, Comparison of RBF and Multi layer per ceptrons, Recur rent Neural Networks, Computational power of recurrent neural networks, learning algorithms, back propagation through time, Real time recurrent learning, Engineering applications of ANN, System identification, Adaptive filter design, solving interpolation and extrapolation problems using ANN, Classification, Function approximation and pat tern recognition problems.

Text/ Reference Books:

1. Simon Haykin, Neural Networks and Learning Machines, 3rd edition, pearson education, 2008.
2. M.H. Hassoun, Fundamentals of artificial Neural Networks, PHI Learning, 2010.
3. J.M. Zurada, Introduction to artificial Neural Networks, Jaico Publication House, 25 January 1994.
4. Satish Kumar, Neural Networks, Tata McGraw Hill Education, 2009.

Course Name: Digital System Design Code: EC 503

Review of sequential circuits, Mealy & Moore Models, Analysis & Synthesis of Synchronous sequential circuits, Digital system design Hierarchy, ASM charts, Reduction of state tables, State Assignments, Analysis and synthesis of Asynchronous sequential circuits, critical and non-critical races, Essential Hazard, Digital system design implementation options: ASICs – Full custom, gate array based, standard cell based and Programmable ASICs, Antifuse, SRAM, EEPROM/EPROM Technologies for Programmable ASICs. Combinational and sequential circuit design with PLD’s, Introduction to CPLD‟s & FPGA‟s, Digital system modeling: Behavioral, structural and physical domains, Fault Modeling.

Text/ Reference Books:

1. Digital principles and design–By Donald D.Givone.
2. Digital Design – By Morris Mano- 3rd Edition, PHI.

3. An Engineering Approach to Digital Design: William I. Fletcher (PHI).
4. Digital Design Principles and Practices - John F Wakerly, Pearson Education, Fourth Edition.
5. Digital Design using VHDL - Charles H Roth, Jr. LizyKurien John, Cengage Publishers, India Second Edition.
6. Introduction to Digital Systems- Ercegovac. Lang & Moreno, John Wiley (1999). 7. Digital system Design using FPGA & CPLD 'S - Grout ,Elsevier

Course Name: Power Electronics Code: EC 504

Introduction to SCR and Thyristor family, I-V Characteristics of self-commutated switches such as MOSFET, IGBT etc., Basic concepts of firing and control circuit, gate/base drive circuits and protection, design of snubber circuit, AC/DC uncontrolled and Controlled converters, DC-DC, DC-AC and AC-AC converter circuits : topologies, operation, waveform analysis and applications, Datasheet Ratings for Power Semiconductor Devices. Selection of devices/modules, thermal design, driver circuits etc.

Text/ Reference Books:

1. C W Lander, Power Electronics, 3rd Edition, McGraw-Hill, 1993.
2. M. H. Rashid, Power Electronics : Circuits Devices and Application, 2nd Edition, 2006.
3. P S Bimbhra, Power Electronics , Khanna Publishsers-Delhi, edition 2012.
4. Ned Mohan Tore M. Undeland William P. Robbins, Power Electronics : Converters, Applications & Design, 3rd Edition, John Wiley & Sons.
5. Joseph Vithayathil, Power Electronics: Principles and Applications, McGraw-Hill.

Detailed Syllabus for B.Tech. ECE

B.Tech. – ECE (Seventh Semester)

Course Name: Antenna and Wave Propagation Code: EC 411

Antenna terminology: antenna definition, radiation pattern, lobes, front-to-back ratio, radiation intensity, gain, directivity, directive gain, beam width, beam efficiency, solid angle, polarization,axial ratio, antenna aperture, antenna bandwidth, effective length, Radiation power and radiation resistance of short dipole and half wave dipole antenna.

Antenna arrays: Concept of antenna arrays, antenna arrays of point sources, two element array, end fire and broad side arrays, uniform linear arrays of n-elements, patterns and principle of pattern multiplication.

Analysis of power patterns of various antennas: Babinet's principles and complementary antenna, horn antenna, parabolic reflector antenna, slot antenna, log periodic antenna, loop antenna, helical antenna, folded dipole antenna, Yagi-Uda antenna, lens antenna, turnstile antenna, travelling wave antenna, rhombic antenna, microstrip antenna.

Wave propagation: Modes of propagation; Ground wave propagation, surface wave propagation, space wave propagation. Mechanism of radio wave bending by ionosphere; refractive index of ionized region, reflection and refraction of radio waves in ionosphere, critical angle and critical frequency, virtual height, skip distance, least usable frequency and maximum usable frequency. Single hop and multiple hop transmission, influence of earth's magnetic field on radio wave propagation.

Text/ Reference Books:

1. Antennas for all applications, J. D. Kraus & Ronald J. Marhefka, TMH
2. Antennas and Wave Propagation, K. D. Prasad, Khanna or Satya Publications
3. Electromagnetic waves and radiating systems, Jordan & Balmain, Pearson
4. Antenna theory, C.A. Balanis
5. Antenna & Wave Propagation, A.R. Harish & M. Sachidananda
6. Antennas and wave propagation, G. S. N. Raju, Pearson

Antenna and Wave Propagation Lab Experiments

1. To get familiar with Different types of ANTENNAS and Kits
2. Field pattern, beam width and directivity measurement of Dipole antenna
3. Field pattern, beam width and directivity measurement of Yagi-Uda antenna
4. Field pattern, beam width and directivity measurement of Horn antenna
5. Field pattern, beam width and directivity measurement of Loop antennas
6. Field pattern, beam width and directivity measurement of Microstrip Antennas
7. Field pattern, beam width and directivity measurement of Helical antennas
8. Field pattern, beam width and directivity measurement of Parabolic Reflector Antenn
9. Field pattern, beam width and directivity measurement of Log Periodic Antenna

Course Name: Cryptography and Information Security Code: EC-601

Overview of Information Security: confidentiality, integrity, and availability, User authentication, Information Security for Server Systems, Information Security for Client devices

Understanding the Threats: Malicious software (Viruses, trojans, rootkits, worms, botnets), Memory exploits (buffer overflow, heap overflow, integer overflow, format string).

Information Security and Cryptography, Mathematics of Cryptography, Ciphers: Substitution and Transposition, Symmetric Encryption and Message Confidentiality, Integrity of Data, Hash Function, Digital Signature.

Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Stream Cipher and Block Cipher, Random Number Generator, One- time Pad.

Groups, Rings, Fields, Modular Arithmetic, Euclid‘s Algorithm, Finite Fields Of Form GF (p) And GF (2n). Polynomial Arithmetic, Prime Numbers, Fermat‘s And Euler‘s Theorem, Testing For Primality, The Chinese Remainder Theorem, Discrete Logarithms.

Block Cipher Principles, Data Encryption Standard (DES), Multiple Encryption, Triple DES, Advanced Encryption Standard (AES), Principles of Public Key Cryptosystems, The RSA Algorithm, Key Management, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

Text/ Reference Books:

1. William Stallings and Lawrie Brown. 2014. Computer Security: Principles and Practice (3rd ed.). Prentice Hall Press, Upper Saddle River, NJ, USA.
2. Behrouz A. Forouzan. 2007. Cryptography &Amp; Network Security (1 ed.). McGraw-Hill, Inc., New York, NY, USA.
3. M. Stamp, ―Information Security: Principles and Practice, 2st Edition, Wiley, ISBN: 0470626399, 2011.
4. M. E. Whitman and H. J. Mattord, ―Principles of Information Security, 4st Edition, Course Technology, ISBN: 1111138214, 2011.
5. "Designing Security Architecture Solutions", Jay Ramachandran,Wiley.
6. "Web Application Security, A Beginner's Guide" Bryan Sullivan, Vincent Liu, McGraw Hill.

Course Name: Signal Detection and Estimation Theory Code: EC-602

Review of random variables and random processes, response of linear systems to random inputs;

Detection: Bayesian, minimax, and Neyman-Pearson decision rules, likelihood ratio; Matched filter detector and its performance; Estimator-correlator, linear model, general Gaussian detection;

Estimation of Parameters: Minimum variance unbiased estimation, Fisher information matrix, Cramer-Rao bound, sufficient statistics; Weiner filtering, dynamical signal model, discrete Kalman filtering.

Text/ Reference Books:

1. Ralph D. Hippenstiel, Detection Theory, CRC press.
2. H.L. Van Tree, Detection Estimation and Modulation Theory-Part-II, John Wiley & Sons.
3. K. Sam Shanmugham and Arthur M. Breipohl, Random Signals: Detection, Estimation and Data Analysis, BS Publications.
4. Mourad Barkat, Signal detection and estimation, Artech House 1991.
5. Poor, H. Vincent, An Introduction to Signal Detection and Estimation, Springer 1998.

Course Name: VLSI Architectures Code: EC 603

VLSI Design Flow, Design Hierarchy, Concepts of Regularity, Modularity and Locality, VLSI Design Styles. Need for low power VLSI Architecture, Sources of power dissipation in Integrated circuits, Physics of power dissipation in CMOS devices, leakage power dissipation, Impact of technology scaling & Device innovation. Leakage power reduction techniques for Low Power Architectures at circuit level and device level. Introduction to Low power Memories Architecture. Parallel processing and Pipelining architecture. Introduction to ASICs.

Text/ Reference Books:

1. Gary K. Yeap, "Practical Low Power Digital VLSI Design", KAP, 2002
2. Rabaey and Pedram, "Low power design methodologies" Kluwer Academic,1997
3. Kaushik Roy, Sharat Prasad, "Low-Power CMOS VLSI Circuit Design" Wiley, 2000.
4. Kait-Seng Yeo, Kaushik Roy, "Low-Voltage Low-Power VLSI subsystems" Tata McGraw-Hill, 2009.
5. M. Moonen F. Catthoor , "Algorithms and Parallel VLSI Architectures III" Elsevier Science 1995.
6. Josef A. Nossek , "Parallel Processing on VLSI Arrays" Springer Science & Business Media, 2012.

Course Name: Introduction to Robotics Code: EC-604

Introduction to robotics- History, growth; Robot applications- Manufacturing industry, defense, rehabilitation, medical etc., Laws of Robotics. Robot mechanisms; Kinematics- coordinate transformations, DH parameters.

Forward kinematics, Inverse Kinematics. Jacobians, Statics, Trajectory Planning. Actuators (electrical)- DC motors, BLDC servo motors. Sensors, sensor integration.

Control – PWM, joint motion control, feedback control. Computed torque control. Perception, Localisation and mapping.

Probabilistic robotics, Path planning, BFS; DFS; Dijkstra; A-star; D-star; Voronoi; Potential Field; Hybrid approaches.

Simultaneous Localization and Mapping. Introduction to Reinforcement Learning.

Text/ Reference Books:

1. Robert J Schilling, Fundamentals of Robotics, Prentice Hall India, 2000
2. John J Craig, Introduction to Robotics, Prentice Hall International, 2005

Course Name: Adaptive Signal Processing Code: EC-605

Introduction to discrete-time signal processing: Impulse response, z-transform, FIR, IIR filters. Correlation functions and power spectral density. The adaptive linear combiner.

Introduction to gradient search algorithms, steepest-descent algorithm, convergence properties, Newton algorithm.

Adaptive algorithms- LMS algorithm, Recursive Least Squares algorithm, LMS/Newton algorithm. Frequency domain adaptive filters. Applications of adaptive signal processing. Adaptive modeling and system identification. Inverse adaptive modeling, deconvolution and equalization. Adaptive control systems. Adaptive interference canceling, canceling noise, canceling periodic interference, canceling interference in ECG signals, etc.

Linear optimum filtering: Wiener filters, Kalman filters.

Text/ Reference Books:

1. Required: B. Widrow and S. Stearns (1985). Adaptive Signal Processing, Prentice Hall.
2. Optional: S. Haykin (1996). Adaptive Filter Theory, (3rd Edition), Prentice Hall.

Course Name: Wireless Sensor Networks Code: EC-606

Introduction to wireless sensor Networks - Advantages of ad-hoc/sensor networks, Uniqueconstraints and challenges. Applications Platforms for WSN: Sensor node hardware: mica2, micaZ, telosB, cricket, Imote2, tmote, btnode.

Sensor node software (Operating System): tiny0S, MANTIS, Contiki, and Ret0S. Programming tools: C, nesC .Single-Node Architecture. WSN coverage and placement: Coverage problems in WSN – Type of coverage – OGDC coverage Algorithm- Placement Problem. Topology management in wireless sensor Networks-: Different classification of topology management Algorithms- topology discovery-sleep cycle management.

Medium access control in wireless networks. Routing in sensor networks: Data centric- position based routing- data aggregation- Clustered based routing Algorithms. Congestion and flow control: Source of congestion- congestion control scenarios- Protocols for congestion and flow control in sensor networks: ESRT-CODA-PSFQ-RCRT-RMST-Fusion.

Hard ware design of sensor Networks : Characteristics – Design challenges- Design of Architecture-Functional components- Energy supply- operating system. Application: Underwater sensor networks.

Real life deployment of WSN-: Development of sensor based networking for improved management of irrigated crops - usage of sensors on medical devices (like accelerometer and gyroscope) and study of their performance.

Text/ Reference Books:

1. Holger Karl and Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley & Sons, 2005.
2. Stallings, William, Wireless communications and networks. 2 edition. Upper Saddle River, NJ : Pearson Prentice Hall (559 p), 2005.
3. Zhao, Feng, Guibas, Leonidas, Wireless sensor networks : an information processing approach. Amsterdam : Morgan Kaufmann (358 p). 2004.

Course Name: Nano Electronics Code: EC 607

Introduction of Nanoelectronics: The “Top-Down” Approach; The “Bottom-Up” Approach; Why Nanoelectronics; Nanotechnology Potential; MOS Scaling theory-Issues in scaling MOS transistors; Short channel effects; Requirements for non-classical MOS transistor; Metal gate transistor- Motivation, requirements, Integration Issues; High-k gate based MOSFET- Motivation, requirements, integration issues of high-k.

Quantum Mechanics of Electrons: General postulates of quantum mechanics; Time-independent Schrodinger‟s equation-boundary conditions on the Wave function; Analogies between quantum mechanics and classical electromagnetic; probabilistic current density; Multiple particle systems;Spin and angular Momentum.

Free and Confined Electrons: Free Electrons; Free electron gas theory of metals; Electrons confined to a bounded region of space and quantum numbers; Partially confined electrons- finite potential wells; Quantum wells; Quantum wires; Quantum dots.

Tunnel Junctions and Applications of Tunneling: Tunneling through a potential barrier; Potential energy profiles for material interfaces; Applications of tunneling; Coulomb blockade, Single- Electron Transistor (SET).

Germanium Nano MOSFETs: Strain, Quantization; Advantages of germanium over silicon; PMOS versus NMOS; Compound semiconductors - material properties; MESFETs; Compound semiconductors MOSFETs in the context of channel quantization and strain; Hetero structure MOSFETs exploiting novel materials, strain, quantization.

Non-Conventional MOSFET Structures: SOI-PDSOI and FDSOI; Ultrathin body SOI-double gate transistors, integration issues; Vertical transistors–FinFET and Surround gate FET; Carbon Nanotube Transistors (CNT), Graphene Nanoribbon(GNR) ; Semiconductor Nanowire FETs and SETs; Molecular SETs and Molecular Electronics.

Text/ Reference Books:

1. Fundamentals of Modern VLSI Devices, Y. Taur and T Ning, Cambridge University Press.
2. Fundamental of Nanoelectronics, George W. Hanson Pearson Education.
3. Silicon VLSI Technology, Plummer, Deal, Griffin, Pearson Education India.
4. Encyclopedia of Materials Characterization, Edited by Brundle, C.Richard; Evans, Charles A. Jr.; Wilson, Shaun, Elsevier.

Course Name: Advanced Machine Learning Code: EC-608

Directed graphical models: Directed graphical models: overview, representation of probability distribution and conditional independence statements. Undirected graphical models: Representation: potentials, conditional independence and graph separability, factorization. Constructing undirected models from distributions. Relationship between directed and undirected models. Common undirected graphical models: Factor models, Ising and Potts model, Gibbs distribution, log-linear models, CRFs.Feature-based potentials for flexible deployment in many applications. Application in vision and text mining.

Probability basics and Bayesian Networks: On basics of probability, statistics, linear algebra, and machine learning. Inference in graphical models: Overview, Variable elimination, Junction trees and sum product message passing. Learning graphical model parameters (probabilistic methods): Learning conditional graphical models (CRFs), conditional likelihood training. Learning with partially observed data. Generating high dimensional objects: Generative models for text: Blog with fun examples, VariationalAutoencoders, Generative Adversarial Networks (GANs)

Sampling: Foreward sampling, Importance sampling, MCMC sampling. Models for continuous variables: Gaussian Process. Time series forecasting: encoder-decoder approach as in DeepAR. Correlated time series: High-dimensional multivariate forecasting with low-rank Gaussian Copula Processes, NeurIPs 2019. Recurrent Marked Temporal Point Processes

Learning unsupervised representations: Learning representations for text, Word2Vec, BERT, Learning representations in images based on context prediction. Robust Machine Learning: Shortcut Learning in Deep Neural Networks. Transfer Learning: Exploring the Limits of Transfer Learning with a Unified Text-to-Text Transformer

Uncertainty Estimation and out of distribution detection. Learning for Structured prediction: Overview of max-margin training for structured outputs. End to end learning with Structured prediction energy networks., Structured Learning with black-box reward function.

Text/ Reference Books:

1. Probabilistic Graphical Models: Principles and Techniques, by Daphne Koller and Nir Friedman, MIT Press, 2009.
2. Deep Learning by Ian Goodfellow, YoshuaBengio and Aaron Courville, MIT Press, 2016.

Course Name: Statistical Signal Analysis Code: EC-609

Probability space: Set theory primer, Cardinality of sets, Sample space, Sigma algebras, Probability measure, Properties of probability measures. Conditional probability and independence.

Random variables: Definition, Cumulative distribution functions, Discrete random variables, Probability mass function, Continuous random variables, Probability density function, Joint and conditional distributions, Functions of random variables, Expectation, Conditional expectation, Concentration inequalities.

Random vectors and parameter estimation. Transforms: Moment generating function, Characteristic function. Sequences of random variables: Convergence of random sequences, Law of large numbers, Central limit theorem. Introduction to random processes

Text/ Reference Books:

1. Probability and Random Processes with Applications to Signal Processing, 3rd Edition. Henry Stark, Illinois Institute of Technology. John W. Woods, Rensselaer Polytechnic Institute, 2002.
2. D.G. Manolakis, V.K. Ingle and S.M. Kogon, Statistical and Adaptive Signal Processing, McGraw Hill, 2000

Course Name: Big Data Analytics Code: EC-610

Overview of Big Data: Introduction, history, elements, related knowledge, big Data in Businesses, and types of big data analytics. Technologies for Handling Big Data: Understanding Hadoop Ecosystem, Big Data Architecture, Hadoop & its Features, Hadoop 2.x Core Components Preview, Hadoop Storage: HDFS (Hadoop Distributed File System), Hadoop Processing: MapReduce Framework, Different Hadoop Distributions, HDFS, Map Reduce YARN, HBase, HBase architecture, Hive, Hive architecture, different modes of hive, Pig, Pig architecture, different modes of Pig, difference between hive and pig, Sqoop, Sqoop architecture, different modes of Sqoop, etc. Understanding of Apache Spark: RDD, Spark Core, Spark Architecture. Hadoop Vs Apache Spark, Big Data Privacy, Privacy in big data life cycle: Data Generation, Data Storage and Data Processing.

Text/ Reference Books:

1. Hadoop: The Defiantive Guide, By Tom White O'Rielly Publications 4th edition 2015.
2. High Performance Spark, By Holden Karau, Rachel Warren O'Rielly Publications 2014.
3. Getting Started with Storm, By Jonathan Leibiusky, Gabriel Eisbruch, Dario SimonassiO'Rielly Publications 2014.
4. Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and GraphBy David Loshin
5. Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data: Analytics for Enterprise Class Hadoop and Streaming Data By Paul Zikopoulos, Chris Eaton.
6. Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, By Michael Minelli, Michele Chambers, AmbigaDhira.

Course Name: CMOS RF IC Design Code: EC 611

Characteristics of passive IC components at RF frequencies: Interconnects, resistors, capacitors, inductors and transformers – Transmission lines. Noise – classical two-port noise theory, noise models for active and passive components.

High frequency amplifier design: Zeros as bandwidth enhancers, shunt-series amplifier, fT doublers, neutralization and unilateralization.

Low noise amplifier design: LNA topologies, power constrained noise optimization, linearity and large signal performance.

Mixers: Nonlinear systems as linear mixers, multiplier-based mixers, subsampling mixers, diode- ring mixers.

RF power amplifiers: Class A, AB, B, C, D, E and F amplifiers, modulation of power amplifiers, design and linearity considerations.

Oscillators & synthesizers: Basic topologies, VCO, describing functions, resonators, negative resistance oscillators, synthesis with static moduli, synthesis with dithering moduli, combination synthesizers – phase noise considerations.

Text/ Reference Books:

1. Thomas H. Lee, The Design of CMOS Radio-Frequency Integrated Circuits, 2nd ed., Cambridge, UK: Cambridge University Press, 2004.
2. Behzad Razavi, RF Microelectronics,2nd Ed., Prentice Hall, 1998.
3. A.A. Abidi, P.R. Gray, and R.G. Meyer, eds., Integrated Circuits for Wireless Communications, New York: IEEE Press, 1999.
4. R. Ludwig and P. Bretchko, RF Circuit Design, Theory and Applications, Pearson, 2000.

Course Name: Electronics and Instrumentation Code: EC 612

Instrumentation Scheme & Characteristics: Definition, Application and Methods of measurements, instrument classification, Functional Elements of an instrument, input output configuration of measuring instruments, Methods of Correction for interfering and modifying inputs, Standards, calibration, Accuracy, Precision, Loading effects, selection of instruments, Measurement systems–Static and dynamic characteristics, Zero order, first order and second order systems & their response.

Error analysis Types of errors, Methods of error analysis, uncertainty analysis, statistical analysis, Gaussian Error distribution, Rejection of data, method of least square, curve fitting, graphical analysis, General consideration in data analysis.

DC & AC Measurement: Analog Ammeter, Voltmeter and Ohmmeters, PMMC, Moving Iron, Electro-dynamometer, Electrostatic, Ohmmeter, Digital type voltmeter, AC voltmeter using rectifier, true RMS voltmeter, Digital VOM meter.

Transducers: Principles, classification, Guidelines for selection, Requirements, Types and Application of Transducers, Resistance, Capacitance, inductance Transducers, Potentiometer, Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Photosensitive Device, Capacitive transducer, Hall Effect transducers, Micro- sensors (Pyroelectric sensors, Thermo sensors using Semiconductor devices, Thermal radiation sensor), Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, Proximity and displacement.

Display and Indicating Devices: Telemetry & Remote sensing, GIS (Geographical information System), Digital display devices & Recorder, CRO.

Signal Generators & Analyzers Function generators, RF signal generators, Sweep Frequency generator, Frequency synthesizer, Wave analyzer, Harmonic distortion analyzer, Spectrum analyzer.

Text/ Reference Books:

1. Electronic Instrumentation& Measurement by William D Cooper & Albert C. Helfric, PHI Pub.
2. Electrical and Electronic Measurements and Instrumentation by A. K Sawhney.
3. Instruments & Measurement for Electronic by Clyde N. Herrick.

Course Name: Environmental Science Code: EC 701

Natural Resources: Study of various natural resources like forest, minerals, atmosphere, soil and water conservation.
Ecosystem: structure, function and classification of ecosystem, biogeochemical cycle, hydrological cycle, carbon cycle, nitrogen cycle, oxygen cycle, food chain, food web, and energyflow in ecosystem.
Biological diversity and its conservation: Global Environmental Issues, Case studies of environmental disasters like Bhopal Gas Tragedy, Chernobyl Nuclear Accident, and Concept of sustainable development.
Environmental Pollution: pollutants and their classification, impact of pollution on environment. Types of pollution such as water, air, solid waste, noise, radioactive etc: sources, impact, Pollution control and environmental management, Basic concepts of Life Cycle analysis, Environmental Impact Assessment.

Text/ Reference Books:

1. Environment engineering and management Suresh K Dhaneja, S. K. Kataria & Sons
2. Environment sciences S.C.Santra, New Central Book Agency (P) Ltd
3. Environment studies J.P.Sharma, Pinnacle Technology
4. Waste water treatment: B.C.Punmia, Laxmi Publications

Course Name: Technical Communication Code: EC 702

Technical vocabulary, Using words in contexts-Use of suffixes to form nouns from verbs and adjectives-Articles Conjunctions and prepositions. Degrees of comparison.
Reading text: Skimming for general information. Note making, Listening and transferring of information from text to graphic forms-bar charts, flow charts
Paragraph writing: Conversational Techniques, discussions-Oral reporting.
Vocabulary items: Paragraph writing using notes-Giving suitable headings, sub-headings for paragraphs. Discussing creative ideas. Compound nouns - negative prefixes - Antonyms - Use ofmodal verbs. Making sentences using phrases.
Tenses: Simple past and present perfect, Reported Speech. Reading and guessing meanings in context, Listening and Note-taking. Channel conversation from text to chart, Makingrecommendations.
Discussion- Role plays explaining and convincing. Expanding nominal compounds-words with multiple meanings moderate verbs-error correction-compound adjectives. Simple past and present perfect tense Reading – Prediction of content-Understanding advertisements. Scanning the text and comprehension check,
Role play: Discussion-Speculating about future. Formation of nouns, verbs and adjectives from root words.

Text/ Reference Books:

1. P.K. Dutt, G.Rajeevan and C.L.N. Prakash "A course in communication skills", Cambridge University Press, India, 2007.
2. Edgar Thorpe, Showick Thorpe, "Objective English", Second edition, Pearson education, 2007.

Course Name: System Biology Code: EC 703

Introduction: Cellular biology and biochemistry with engineering perspective

Basic concepts of systems biology: Cellular networks: metabolic, transcriptional, and signaling networks,

Stoichiometric matrix: fundamental subspaces. Introduction to concept of constraints, Reconstruction of biochemical reaction networks. Overview of existing constraint-based reconstruction methods
Modeling biochemical reconstructions: Applications of constraint-based metabolic models. Overview of existing human metabolic networks, and cell-specific constraint-based metabolic models

Text/ Reference Books:

1. Alon, Uri. An Introduction to Systems Biology: Design Principles of Biological Circuits. Chapman & Hall / CRC, 2006. ISBN: 9781584886426.
2. An Introduction to Bioinformatics Algorithms by Neil C. Jones, Pavel Pevzner. MIT Press.2004
3. Biological sequence analysis: Probabilistic models of proteins and nucleic acids by Richard Durbin, Eddy, Anders Krogh, 1998
4. Algorithms for Molecular Biology by Ron Shamir Lecture, Fall Semester, 2001
5. Neural Networks: A Systematic Introduction by Raul Rojas. Springer. 1996

Course Name: Intellectual Property Right Code: EC 704

Basics of Intellectual Property, The Intangible Economy, Patents—from ball pens to biologics,Trade Marks, Copyright—Is it right to copy?
Unconventional IP—The expanding scope ; Enforcement of IP—Protecting your rights ; IP for Business-A profit making asset class ; IP, Research, and Universities.
IP for the Creative and Entertainment Industries ; Governments Role in Fostering IP ; TeachingIP—Let everyone learn IP

Text/ Reference Books:

1. D.P. Mittal (Taxman Publication), Indian Patents Law and Procedure.
2. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009), Eastern Book Company, Lucknow

Detailed Syllabus for B.Tech. ECE

B.Tech.- ECE (Eighth Semester)

Course Name: Video Signal Processing Code: EC-613

Video formation, perception and representation: human visual perception, color perception,analog video, digital video, video cameras, video display, video Coding, gamma correction.

Analysis and synthesis of video signal, composite video signal, video formation, spatial and temporal resolution, signal bandwidth, color signal generation and coding.

Motion analysis and motion compensation, motion estimation techniques, video coding standards, video compression standards.

Text/ Reference Books

1. Multimedia communication technology, J. R. Ohm, Springer Publication.
2. Handbook on image and video processing, A.I. Bovik, Academic Press.
3. Digital video, Tekalp, Prentice Hall.
4. Digital video processing, A M Tekalp, PH Publication.
5. Image and video compression for multimedia engineering, Yun Q. Shi & Huifang Sun, CRC Press.
6. Multi-dimensional, signal, image and video processing and coding, John W Woods, Academic Press.

Course Name: Wavelets in Signal Processing Code: EC-614

Introduction: origin of wavelets, continuous wavelet transform, time-frequency resolution, l2 norm of a function.

Piecewise constant representation of a function, ladder of subspaces, scaling function of haar wavelet, wavelet bases. balian-low theorem. Multi-resolution analysis (MRA), construction of wavelets from MRA, fast wavelet algorithm.

Compactly supported wavelets, cascade algorithm, franklin and spline wavelets, wavelet packets. Hilbert space frames, frame representation, representation of signals by frames, iterative reconstruction.

Wavelet methods for signal processing, noise suppression, representation of noise-corrupted signals using frames. Algorithm for reconstruction from corrupted frame representation.

Wavelet methods for image processing, Burt- Adelson and Mallat's pyramidal decomposition schemes, 2D- dyadic wavelet transform.

Text/ Reference Books

1. A first course on wavelets, E.Hernandez & G.Weiss, CRC Press.
2. Computational signal processing with wavelets, A.Teolis, Birkhauser.
3. Wavelet transforms, R.M. Rao & A.S. Bopardikar, Addition Wesley.
4. Fundamentals of wavelets, J.C. Goswami & A.K. Chan, John Wiley,1999.
5. Wavelet analysis with applications to image processing, L.Prasad & S.S.Iyengar, CRC Press.
6. An introduction to wavelets through linear algebra, Michael W. Frazier, Springer.
7. A wavelet tour of signal processing, Stephane Mallat, Academic Press, Elsevier.

Course Name: Biomedical Signal Processing Code: EC-615

Introduction to biomedical signals, biomedical image modalities, X-ray, computed tomography, magnetic resonance, ultra-sonography. Histopathology images, image formats, computer-aided diagnostic.

Cardiological signal processing: basic electrocardiography, ECG data acquisition, ECG lead system; ECG parameters and their estimation; use of multi-scale analysis for parameters estimation of ECG waveforms.

Neurological signal processing: the brain and its potentials, the electrophysiology origin of brain waves, the EEG Signal and its characteristics, EEG analysis, linear prediction theory, the autoregressive (AR) method.

Text/ Reference Books:

1. Modern biomedical signal processing–principles and techniques, D. C. Reddy, TMH.
2. Biomedical signal processing, M. Akay, Academic press.
3. Biomedical Signal Processing, W. J. Tompkins, Prentice hall of India.
4. The biomedical engineering handbook, J. D. Bronzino, CRC and free press,.
5. Biomedical signal processing, Arnon Cohen ,Crc Pr I Llc.
6. Biomedical signal and image processing, Kayvan Najarian & Robert Splinter, Second Edition by CRC Press.
7. Advanced methods of biomedical signal processing, Sergio Cerutti & Carlo Marchesi, John Wiley & Sons.

Course Name: Quantum Optical Communication Code: EC 616

Quantum Optics: Dirac notation quantum mechanics; harmonic oscillator quantization; number states, coherent states, and squeezed states; representation and classical fields.

Single-Mode and Two-Mode Quantum Systems: Direct, homodyne, and heterodyne detection; linear propagation loss; phase insensitive and phase sensitive amplifiers; entanglement andteleportation

Multi-Mode Quantum Systems: Field quantization; quantum photodetection

Nonlinear Optics: Phase-matched interactions; optical parametric amplifiers; generation of squeezed states, photon-twin beams, non-classical fourth-order interference, and polarization entanglement

Quantum System Theory: Optimum binary detection; quantum precision measurements; and quantum cryptography

Text/ Reference Books:

7. P. Kok and B. W. Lovett, Introduction to Optical Quantum Information Processing, Cambridgeuniversity press.
8. L. Mandel, and E. Wolf. Optical Coherence and Quantum Optics, Cambridge University Press.
9. W. H. Louisell, Quantum Statistical Properties of Radiation, McGraw-Hill.
10. D. Bouwmeester, A. K. Ekert, and A. Zeilinger, eds. The Physics of Quantum Information, Springer

Course Name: Satellite Communication Code: EC 617

Introduction: Overview of Satellite Communications, GEO, MEO and LEO satellite systems, frequency bands ORBITAL MECHANISM Satellite orbit and orbital equations, Kepler's laws ofplanetary motion, locating satellite in the orbit, locating satellite with respect to earth, Look angle calculation, coverage angle and slant range, orbital perturbations, satellite launching, orbital effects in communication subsystem performance.

Satellites subsystems: Attitude and orbit control system, Telemetry tracking command and monitoring, power system, communication subsystem, satellite antennas.

Satellite link design: Basic link analysis, Interference analysis, terrestrial interference, Intermodulation interference, inter-symbol interference and rain induced attenuation, uplink power control, system availability, system design for link without frequency reuse and system design for link with frequency reuse.

Earth station: Earth station antenna types, Antenna gain, antenna gain to noise temperature ratio, G/T measurement, frequency division multiple access, FDM-FM-FDMA, Single channel per carrier.

Satellite based navigation system: The principle of measuring signal transit time, Basic principles of satellite navigation, Signal travel time Determining position, The effect and correction of time error, functional segments of GPS, Improved GPS: DGPS, SBAS, A-GPS and HSGPS.

Text/ Reference Books:

1. Digital Satellite Communications, Tri, T. Ha, Tata McGraw Hill.
2. Satellite Communications, Timothy Pratt, Jeremy E., Willey.
3. Satellite Communication System Engineering, Pritchard, Suyderhoud, Nelson.
4. Electronic Navigation, Nagaraja, Tata McGraw Hill.
5. Global Navigation Satellite Systems, G S Rao, Tata McGraw Hill.
6. The Global Positioning System & Inertial Navigation, Jay Farrell, Tata McGraw Hill.

Course Name: Radar Systems Code: EC 618

Introduction to Radar: Radar Equation, Radar Block Diagram, Radar Frequencies, Applicationsof Radar. Integration of Radar Pulses, Radar Cross Section of Targets, Transmitter Power, Pulse Repetition Frequency, Radar system losses.
Introduction to Doppler and MTI Radar, Delay Line Cancellers, Staggered Pulse Repetition Frequencies, Doppler Filter Banks, Digital MTI Processing, Moving Target Detector, Limitations to MTI Performance, MTI from a Moving Platform (AMIT) – Pulse Doppler Radar, Tracking with Radar – Monopulse Tracking, Conical Scan and Sequential Lobing, Limitations toTracking Accuracy, Low-Angle Tracking, Tracking Range, Comparison of Trackers, Automatic Tracking with Surveillance Radars (ADT).
The Radar Antenna, Reflector Antennas, Electronically Steered Phased Array Antennas, Phase Shifters, Frequency-Scan Arrays, Radar Transmitters and Receivers, Receiver noise Figure,Radar Displays. Radio Direction Finder, An Aural Null Direction Finder, The Goniometer , Adcock Direction finder, Errors in Direction Finding, Automatic Direction Finders, The Commutated Aerial Direction Finder, Hyperbolic Systems of Navigation (Loran and Decca), Loran-A , Loran-A Equipment, Range and precision of Standard Loran, Loran-C,The Decca Navigation System Decca Receivers, Range and Accuracy of Decca, DME and TACAN – Distance Measuring Equipment, Operation of DME – TACAN Equipments, Satellite Navigation System, Navstar Global Positioning System (GPS)

Text/ Reference Books:

1. Introduction Radar Systems, Second Edition, M.I. Skolnik, Mc Graw Hill Book Co.
2. Elements of Electronic Navigation Systems, N.S.Nagaraja.
3. Radar Principles, Peyton Z. Peebles, Jr, John Wiley and Sons.
4. Understanding RADAR Systems, Simon Kingsley & Shaun Quegan, McGraw Hill.
5. Radar foundation for imaging & advanced concepts, R.J Sullivan, PHI.

Course Name: Embedded System Code: EC-619

Introduction to embedded system, its characteristics, application, components, and classification of embedded system. Design challenges, metrics, and methodology of embedded system.

Embedded system architecture: RISC and CISC; memory: caches, virtual memory, memory management unit and address translation.

I/O sub-system: busy-wait I/O, DMA, Interrupt driven I/O; co-processors, hardware accelerators. Peripheral interfacing such as timers, ADC, DAC, Sensors, actuators, LED/LCD display, push button switches, communication interface standards. Softwares in embedded system, operating system.

Text/ Reference Books

1. Computers as components – principles of embedded computing system design, Wolf & Wayne, Second Edition, Morgan-Kaufmann.
2. Embedded system design – a unified hardware / software introduction, F. Vahid & T. Givargis, John Wiley.
3. Embedded systems, Raj Kamal, Tata McGraw Hill.
4. Introduction to embedded systems, K. V. Shibu, 2nd Ed., Tata McGraw Hill.

Course Name: Advanced VLSI Circuits and Systems Code: EC 620

Introduction to VLSI Circuit: Recent trends in VLSI circuits. Circuit design consideration for MOS challenges in analog design. Analog MOSFET Modeling, Low frequency MOSFET Models, High frequency MOSFET Models, temperature effects in MOSFET, Noise in MOSFET.Current Source, Sinks and References.

MOS Diode, Active resistor, Simple current sinks and mirror, Basic current mirrors, advance current mirror, Current and Voltage references, band gap references.

CMOS Amplifier: Performances matrices of amplifier circuits, Common source amplifier,Common gate amplifier, Cascode amplifier, Frequency response of amplifiers and stability of amplifier. CMOS Feedback Amplifier, Feedback equation, Properties of negative feedback on amplifier design, Feedback Topology, Stability.

CMOS Differential Amplifier: Differential signalling, source coupled pair, Current source load, Common mode rejection ratio, CMOS Differential amplifier with current mirror load, Differential to single ended conversion.

CMOS Operational amplifier: Block diagram of Op-amplifier, Ideal characteristics of Op- Amplifier, Design of two stages Op-Amplifier, Compensation of Op-Amplifier, Frequency response of Op-Amplifier, Operational Trans conductance Amplifier (OTA).

CMOS Comparator: Characteristic of a comparator, two stage open loop comparator, Special purpose comparator, Regenerative comparator, High output current amplifier, High speed comparator.

Switched Capacitor Circuits: Switched capacitor circuits, Switched capacitor amplifiers,Switch capacitor integrators.

Text/ Reference Books:

1. Design of Analog CMOS Integrated Circuits, Behzad Razavi, McGraw Hill Pub.
2. Analog Integrated circuit Design, Johns and Martin, John Wiley & Sons.
3. Principles of CMOS VLSI design, Neil Weste & Kamraneharghian , Add Nesly Pub.
4. Analysis and Design of Analog Integrated Circuit, Gray, Hurst, Lewis & Meyer, John Wiley & Sons.
5. Analog Design Essentials, Willy Sansen, Springer, 2006.
6. CMOS Circuit design, Jacob baker, Harry Wili & David Boyce.

Course Name: Analog & mixed signal design Code: EC-621

Introduction to Analog VLSI: Analog integrated circuit design, design challenges for MOS inanalog circuit design, recent trends in analog VLSI circuits. Analog MOSFET Modeling MOS transistor, Low frequency MOSFET Models, High frequency MOSFET Models, temperature effects in MOSFET, Noise in MOSFET. Current Source, Sinks and References. MOS Diode, Active resistor, Simple current sinks and mirror, Basic current mirrors, advance current mirror, Current and Voltage references, band gap references.

Sample and hold and trans-linear circuits: Performance of sample-and-hold circuits– testingsample and holds, MOS sample-and-hold basics.

Switched Capacitor circuits: Basic building blocks: opamps, capacitors, switches, non- overlapping clocks, Basic operation and analysis of switched capacitor circuits, resistor equivalence of a switched capacitor, noise in switched-capacitor circuits. First-Order Filters – switch sharing, fully differential filters, biquad filters, low-Q biquad filter, high-Q biquad filter.

Comparators: Comparator specifications – input offset and noise, hysteresis. Opamp as a comparator.Latched comparators, examples of CMOS and BiCMOS comparators, input- transistor charge trapping.

Data converters specifications: Ideal D/A converter, ideal A/D converter, quantization noise, performance limitations, resolution, offset and gain error, accuracy and linearity.

Nyquist rate digital-to-analog converters (DAC): Decoder-based converters, Binary-scaled converters, R-2R-based converters, Hybrid converters – resistor-capacitor hybrid converters, segmented converters.

Nyquist rate analog-to-digital converters (ADC): Introduction to integrating converters, flash converters, issues in designing flash ADC, Successive-approximation converters, error correction

in successive-approximation converters, multi-bit successive approximation. Algorithmic (orcyclic) A/D Converter, Pipelined A/D converters.

Oversampling ADCs: Oversampling without noise shaping, quantization noise modeling, whitenoise assumption, oversampling advantage, Digital decimation filters – multi-stage, single stage,higher-order modulators – interpolative architecture, multi-stage noise shaping (MASH) architecture, bandpass oversampling converters.

Phase locked loop: Basic phase-locked loop architecture, voltage controlled oscillator, divider, phase detector, loop filer, the PLL in lock, Linearized small-signal analysis. Jitter and phase noise. Electronic oscillators – ring oscillators, LC oscillators, phase noise of oscillators, jitter andphase noise in PLLS, input phase noise and divider phase noise, VCO phase noise, loop filter noise.

Text/ Reference Books:

1. Analog Integrated Circuit Design, T. C. Carusone, David A. Johns, K. W. Martin
2. Design of Analog CMOS Integrated Circuits, Behzad Razavi, McGraw Hill Pub.
3. CMOS Analog Circuit Design", Phillip Allen and Douglas R. Holberg. OxfordUniversity Press , 2004
4. Analog Design Essentials, Willy M. C. Sansen
5. Analog MOS Integrated Circuits for Signal Processing, R.Gregorian and G.C.Temes,John Wiley and Sons, 2004.

Course Name: AI & Deep Learning Code: EC 622

Meaning and definition of artificial intelligence, Production systems: types, characteristics, study and comparison search techniques: BSF, DSF, hill climbing, best first search, A* algorithm, AO* algorithm etc, types of control strategies. Knowledge representation: Problems faced, propositional and predicate logic, resolution and refutation, deduction, theorem proving. Reasoning: introduction, reasoning methods, Baye's theorem, Bayesian network, fuzzy logic. Slot and filler structures: semantic networks, frames, conceptual dependency, scripts etc. Game playing and its techniques, planning techniques, study of blocks world problem in robotics, understanding, natural language processing and common sense. Learning and its techniques, neural networks and its applications, expert systems.

Supervised Learning-Feature Selection, Cross Validation, Bootstrapping, Normalization Classification: Naïve Bayes, Bayesian Network, C4.5, ID3, Support Vector Machine, Extreme Learning Machine, Neural Network, VC Dimension, Regularization, Regression: Linear, Polynomial, Multiple Linear Regression, Support Vector Regression. Committee Machines/ Ensemble Learning: Bagging, Boosting. Unsupervised Learning- Clustering: KNearest Neighbour, K-Means, Fuzzy K-Means, Hierarchical Clustering, Single Linkage, Complete Linkage,

Average Linkage, Non Spherical Clustering Algorithms. Statistical Testing Methods, Probabilistic Inference, Neural Network, Deep Learning Neural Network, Evolutionary Algorithms. Machine Learning Applications: Text Classification, Disease Diagnosis, Biometric Systems, Real Valued Classification.

Text/ Reference Books:

1. Luger, George F., Artificial intelligence: structures and strategies for complex problemsolving6. ed.: Boston: Pearson Addison-Wesley, 2009
2. Russell, Stuart Jonathan; Norvig, Peter, Artificial intelligence: a modern approach3. ed.:Boston: Pearson Education, cop. 2010
3. Pattern Recognition and Machine Learning, Bishop, C. M. (2006),Springer, ISBN 0-387-31073-8
4. (2012) Foundations of Machine Learning, Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar, MIT Press ISBN 978-0-262-01825-8.
5. Machine Learning, Mitchell, T. (1997). McGraw Hill. ISBN 0-07-042807-7, P.Narayanan, Intellectual Property Law, Eastern Law House.

Course Name: Mobile Robotics Code: EC 623

Robot locomotion: Types of locomotion, hopping robots, legged robots, wheeled robots, stability, maneuverability,controllability;

Mobile robot kinematics and dynamics: Forward and inverse kinematics, holonomic and nonholonomic constraints,kinematic models of simple car and legged robots, dynamics simulation of mobile robots;

Perception: Proprioceptive/Exteroceptive and passive/active sensors, performance measures of sensors, sensors formobile robots like global positioning system (GPS), Doppler effect-based sensors, vision based sensors, uncertaintyin sensing, filtering;

Localization: Odometric position estimation, belief representation, probabilistic mapping, Markov localization,Bayesian localization, Kalman localization, positioning beacon systems;

Introduction to planning and navigation: path planning algorithms based on A-star, Dijkstra, Voronoi diagrams,probabilistic roadmaps (PRM), rapidly exploring random trees (RRT), Markov Decision Processes (MDP),stochastic dynamic programming (SDP);

Robotics Project: Students will work on a semester long project consisting of design, fabrication,and programminga mobile robotic platform. tenna terminology: antenna definition, radiation pattern, lobes, FBR, radiation intensity, gain,

directivity, directive gain, beam width, antenna bandwidth etc. Radiation power and radiation resistance of short dipole and half wave dipole antenna.

Text/ Reference Books:

1. R. Siegwart, I. R. Nourbakhsh, "Introduction to Autonomous Mobile Robots", The MITPress, 2011.
2. Peter Corke , Robotics, Vision and Control: Fundamental Algorithms in MATLAB,Springer Tracts in Advanced Robotics, 2011.
3. S. M. LaValle, "Planning Algorithms", Cambridge University Press, 2006. (Availableonlinehttp://planning.cs.uiuc.edu/)
4. Thrun, S., Burgard,W., and Fox, D., Probabilistic Robotics. MIT Press, Cambridge, MA,2005.
5. Melgar, E. R., Diez, C. C., Arduino and Kinect Projects: Design, Build, Blow TheirMinds, 2012.
6. H. Choset, K. M. Lynch, S. Hutchinson, G. Kantor, W. Burgard, L. E. Kavraki, and S. Thrun, Principles of Robot Motion: Theory, Algorithms and Implementations, PHI Ltd., 2005.

Course Name: Neuro Fuzzy Techniques Code: EC 624

Basic concepts of neuro-computing: Artificial Neural Networks (ANN) and their biological roots and motivations. ANNs as numerical data/signal/image processing devices. Encoding (training phase) and decoding (active phase). Taxonomy of neural networks: feedforward and recurrent networks with supervised and unsupervised learning laws. Static and dynamic processing systems. Basic data structures: mapping of vector spaces, clusters, principal components.

Basic terminology related to an artificial neuron:a summing dendrite, synapses and their weights, pre- and post-synaptic signals, activation potential and activation function. Excitatory and inhibitory synapses. The biasing input. Types of activating functions.The Perceptron: The Perceptron and its learning law. Classification of linearly separable patterns.

Linear Networks: Adaline --- the adaptive linear element. Linear regression. The Wiener-Hopf equation. The Least-Mean-Square (Widrow-Hoff) learning algorithm. Method of steepest descent. Adaline as a linear adaptive filter. A sequential regression algorithm.Multi-Layer Feedforward Neural Networks:aka Multi-Layer Perceptrons. Supervised Learning. Approximation and interpolation of functions. Radial-Basis functions. Back-Propagation Learning law. Fast training algorithms. Applications of multilayer perceptrons: Image coding, Paint-quality inspection, Nettalk.

Self-Organising systems: Unsupervised Learning. Local learning laws. GeneralisedHebbian Algorithm. The Oja's and Sanger's rules. Principal component analysis --- Karhunen-Loeve transform.Competitive Learning:MinNet and MaxNet networks. Clustering. Learning Vector Quantisation. Codebooks. Application in data compression.Self-Organising Feature Maps: Kohonen networks.Recurrent

networks: Hopfield networks.

Fuzzy logic Systems: Basic definitions and operations, Fuzzy relations, Fuzzy rules, Fuzzy inference, Fuzzification and de-fuzzification, Adaptive Neuro-Fuzzy Inference Systems.

Text/ Reference Books:

1. Simon Haykin, Neural Networks -- a Comprehensive Foundation, Prentice Hall, 2nd ed.,1999, ISBN 0-13-273350-1
2. H. Demuth, M. Beale, Neural Network Toolbox. For use with MATLAB. User's GuideThe MathWorksInc, (Huge file!)
3. Martin T. Hagan,. H. Demuth,M. Beale, Neural Network Design, PWS Publishing, 1996,ISBN 0-534-94332-2
4. A. Konar, Computational Intelligence Principles, Techniques and Applications. Springer,2005, ISBN: 3-540-20898-4

Name of the Course: Principles of Management Code: EC 705

Nature and Functions of Management: Importance and Process of Management - Development of Management Thoughts - Managerial Roles.

International Business and its Environment: globalization &WTO-. Dynamics of development Global business environment-. Internal and External analysis. Nature and Importance of Planning Management by Objectives Decision Making.

MIS Forecasting: Techniques of Forecasting. Need for Organization - Principles and Process of Organizing – Span of Management Organization Structure Departmentalization Authority, Delegation and Decentralization.

Staffing and Directing: Requirement of Effective Direction Supervisor and his Qualities Co- Ordination Control

Text/ Reference Books:

1. P.C.Tripathi, P.N. Reddy, Principles of Management, Tata McGraw-Hill PublishingCompany Limited, New Delhi.
2. Prasad LM, Principles and Practice of Management, Sultan Chand & Sons, New Delhi.
3. Samuel C. Certo, S. TrevisCerto, Modern management 10 Ed, PHI Learning, New Delhi,2008.
4. James A. Stoner, Edward Freeman, Daniel Gilbert, Management, PHI Learning, NewDelhi, 2007
5. Williams/ Kulshrestha, Principles of Management, Cengage Learning, New Delhi, 2011.
6. Koontz, Weihrich, Aryasri. Principles of Management, TATA McGraw Hill, New Delhi,2004.

Name of the Course: Engineering Economics Code: EC 706

Introduction to economics: Introduction to Engineering Economy, Time value of money, Cashflow diagrams, Interest and Interest rate.

Discrete compounding and payment: Interest formulae for discrete compounding and discretepayments- Gradient series factors.

Nominal & Effective interest: Economic equivalence, Methods of comparison of alternatives.Replacement analysis, Economic life of the asset.
Depreciation and Depletion: Elements of cost, Break even analysis, Economic order quantity.Cost estimation,
Decision under risk and uncertainty: Effect of taxation on economic studies, Income tax analysis.

Text/ Reference Books:

1. Engineering Economy, DeGarmo, Sullivan & Canada Collier Macmillan.
2. Engineering Economic Analysis, Newnan, Eschenbach & Lavelle, Oxford UniversityPress.
3. Engineering Economy, Blank & Tarquin, McGraw-Hill.

Name of the Course: Organizational Behavior Code: EC 707

Concept, nature and importance of management: management skills, levels of management, and human relations, social system approach, decision theory approach. Planning: Organizing: span of control, delegation of authority, authority & responsibility. Staffing, Leading: Leadership Styles,

Development of Leadership Skills: Direction and Supervision Controlling: Integrated Control System, Total Quality Control. Communication

Organization Behavior: Concept, Nature, Models of Organizational Behavior, Individual Behavior: Organizational Power & Politics Organizational Culture: Conflict: Organizational design- Work stress and its management organizational development and change management.

Text/ Reference Books:

1. Robbins Stephen P. - Organizational Behavior (Pearson Education).
2. Newstrom John W. Organizational Behavior: Human Behavior at Work (Tata McGrawHill).
3.

Name of the Course: Project Management Code: EC 708

Concept and cases of project management: Project Life Cycle, Project Selection and Criteria of Choice, Selection Models, Analysis under Uncertainty, Project Portfolio Process.

Project Proposals: The Project and Organization, Pure Project Organization, the Matrix andMixed Organizational Systems, Initial Project Coordination and the Scheme and Syllabus.

Project Plan: Systems Integration, The Action Plan, The Work breakdown Structure and LinearResponsibility Chart.

Network Techniques: PERT (ADM) and CPM (PDM), Risk Analysis the Varieties of ProjectTermination, final Report writing.

Text/ Reference Books:

1. Project management - David I Cleland - Mcgraw Hill International Edition.
2. Project Management – Gopalakrishnan – Mcmillan India Ltd.