BE 401 Engineering Mathematics – II

Unit I : Concept of Probability:
Probability Mass function, Probability density function. Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution, Testing of Hypothesis:- Students t-test, Fisher's z-test, Chi-Square Method.

Unit II : Functions of complex variables:
Analytic functions, Harmonic Conjugate, Cauchy-Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for evaluation of real integrals.

Unit III : Introduction of Fourier series:
Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series Fourier Transform: Definition and properties of Fourier. Fourier transform, Sine and Cosine transform.

Unit IV: Laplace Transform:
Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations.

Unit V : Vector Calculus:
Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem.

References:-

1) Higher Engineering Mathematics by B.S. Grewal, Khanna Publication.

2) Engineering mathematics volume II & III by D.K. Jain

3) Engineering mathematics volume II by D.C. Agrawal

EC 402 Electromagnetic Theory

Unit I : Co-ordinate systems

Cartesian, cylindrical and spherical Co-ordinate systems, vector&scaler fields, gradient, divergence & curl of a vector field, Divergence theorem &Stokes's theorem, Electrostatic Fields – Coulomb's law, electric field intensity due to different charge distribution viz. line charge, sheet charge, volume charge, equipotential surfaces, line of force, Gauss law, applications of Gauss law, Gauss law in point form, method of images.

Unit II : Laplace's & Poisson's equations

Laplace's & Poisson's equations, Electric dipole, dipole moment, potential & electric field intensity due to dipole, Behavior of conductors in an electric field. Conductor & insulator, polarization, Boundary value conditions for electric Field, Capacitance & Capacitances of various types of capacitors, Energy stored and energy density in static electric field, Current density, conduction & convection current density ohms law in point form, equation of continuity.

Unit III : Magnetic Fields

Magnetic Fields, Biot-Savart's law, Magnetic Field intensity due to straight current carrying filament, circular, square and solenoid current carrying wire, Relationship between magnetic flux, flux density & magnetic Field intensity;Magnetic Boundary conditions.Ampere's circuital law and its applications, magnetic Field intensity due to infinite sheet, Magnetic force, moving charge in a magnetic field, Lorentz Force on straight and long current carrying conductors in magnetic field, force between two long & parallel current carrying conductors. Magnetic dipole & dipole moment, torque on a current carrying loop in magnetic field.

Unit IV : Magnetic Potential

Scalar magnetic potential and its limitations, Vector magnetic potential and its properties, vector magnetic potential due to different simple configurations; Self and Mutual inductances, self inductance of solenoid, toroid coils, mutual inductance between a straight long wire & a square loop. Energy stored in magnetic Field & energy density, Faraday's Law, Displacement current, Maxwell's equations for different types- free space, harmonically varying Field, static and steady fields, differential & integral form.

Unit V : Electro Magnetic Waves :

Electro Magnetic Waves : Uniform plane wave in time domain in free space, Sinusoidally time varying uniform plane wave in free space, Wave equation and solution for material medium, Uniform plane wave in dielectrics and conductors, Pointing Vector theorem, instantaneous, average and complex poynting vector, power loss in a plane conductor, , Polarization of waves, Reflection by conductors and dielectric – Normal & Oblique incidence, Reflection at surface of a conducting medium, transmission line analogy.

References:

1. P.V. Gupta; Electromagnetic Fields; DhanpatRai
2.Mathew N.O Sadiku; Elements of Electromagnetic; Oxford
3.S.P. Seth; Electromagnetic Field ;DhanpatRai& Sons
4.Sandeep wali ; Elements of Electromagnetic; Oxford
5. N.N. Rao; Element of Engineering Electromagnetic; PHI.
6. John D. Kraus; Electromagnetic; TMH.

EC 403 Electronics Circuits

Unit-I: Operational Amplifier and its Applications
Ideal OPAMP, Differential amplifier, Constant current source (Current mirror etc), Level shifter, CMRR, Open & closed loop circuits, importance of feedback loop (positive & negative), inverting & non-inverting amplifiers, Voltage follower/Buffer circuits. Application of Operational amplifiers: Adder, Integrator & Differentiator, Comparator, Schmitt Trigger, Instrumentation Amplifier, Log & Antilog amplifier, Trans-conductance multiplier, Voltage to current & Current to voltage converter.

Unit-II: Feedback Amplifier and Oscillator
Feedback Amplifier: The general feedback structure, properties of negative feed back, the four basic feedback topologies, the series-shunt feedback amplifier, the series-series feedback amplifier, the shunt-shunt and shunt- series feedback amplifier. Oscillators: Basic principles of sinusoidal oscillators, op-amp RC oscillator circuits, LC oscillator.

Unit-III: Voltage & Power Amplifier
Transistor amplifier: RC coupled amplifier, Function of all components, Equivalent circuit, derivation of voltage gain, Current gain, Input impedance & output impedance, Frequency response characteristics, Lower & upper half frequencies, Bandwidth, Concept of Wide band amplifier. Power amplifier: Class A, B, AB, C, Conversion efficiency, Tuned amplifier.

Unit-IV: Active Filters and Wave Shaping Circuits:
Introduction to active filters, their Characteristics, Classification of filters, Magnitude and frequency response, Butterworth 1st and 2nd order Low pass, High pass and band pass filters, Chebyshev filter characteristics, notch filter, All pass filters, self-tuned filters, Band reject filters. Zero Crossing Detector, Monostable and Astable Multivibrator ,Schmitt Trigger, Voltage limiters, Clipper and clampers, Absolute value output circuit, Peak detector, Sample and hold Circuit, Precision rectifiers.

Unit-V:FET Amplifier:
FET Parameters, JFET As An Amplifier, FET Small Signal Mode Common Source A.C. Amplifier, The Common Drain Or Source Follower, Common Gate Amplifier, General Treatment Of Low Frequency Common Source And Common Drain Amplifier, Common Source Amplifier at High Frequencies.

References :
1. Microelectronic Circuits, Sedra & Smith, Oxford University Press.
2. Integrated Electronics, Milman & Halkias, Mc Graw Hill Company.
3. Electronic devices & Circuits, Balbir Kumar & Shail B. Jain, PHI.
4. Op-amps and Linear IC's, R.A. Gayakwad, PHI.
5.Ramakant A. Gayakwad, "op-amps & liner ICS" PHI ,4th edition,1987
6.R.F Coughlin & Fredric DRISCOLL,"Operational Amplifiers & Linear Integrated Circits"6thedition,PHP
7.DavidA.Bell."operational Amplifiers & Analog Intrgrated Circuits: Megraw HILL.
8 Sergio Franco."Design with operational Amplifiers & Analog Integrated circuits"Megraw Hill.
9 C.G Clayton "operationals".Butterworth &Compny Publ. Lit./Elsevier.1971

List of Experiments: Practicals may be performed on kit or on Simulation Software

1) Measurement of Op-amp Parameters. (Gain, Input offset Voltage, CMRR, Slew rate)
2) Design and Study of Op-Amp as Inverting and Non-Inverting Amplifier
3) Design and Study of Op-Amp as Difference & summing amplifier
4) Design and Study of Op-Amp as differentiator& Integrator
5) Design and Study of power amplifiers.
6) Design and Study of Oscillators.
7) Design and Study of Active Filters.
8) Design and Study of RC coupled amplifier
9) Design and Study of Multi vibrators
10) Design and Study of a function generator.
11) Design and Study of a Voltage Controlled Oscillator.
12) Design and Study of Phase Locked Loop.

EC 404 Digital Circuits and System Design

Unit I State Machines & sequential systems

The Need for State Machines, The State Machine, Basic Concepts in State Machine Analysis, Characterizing equation & definition of synchronous sequential machines. Realization of state diagram and state table from verbal description, Mealy and Moore model machines state table and transition diagram. Minimization of the state table of completely and incompletely specified sequential machines.

Unit II Asynchronous Sequential Machine

The Fundamental-Mode Model, Problems of Asynchronous Circuits Basic Design Principles, Analysis and Design of Asynchronous Sequential Circuits – Reduction of State and Flow Tables – Race-free State Assignment – Hazards. An Asynchronous Design Example.

Unit III Synchronous State Machine Design:

Sequential Counters, State Changes Referenced to Clock, Number of State Flip-Flops, Input Forming Logic, Output Forming Logic, Generation of a State Diagram from a Timing Chart, Redundant States, General State Machine Architecture, A synchronous Design Example.

Unit IV Fault Detection in combinational circuit

Introduction of fault, reason of fault, Types of faults, Fault detection using Boolean Difference and path sensitization method.

Unit V Designing with Verilog HDL

Basic Concepts, Design Modeling, Modeling Style, Data Types, Tasks And Functions, Timing And Delays, User-Defined Primitives, PLI, Simulation And Synthesis Tools.

References

1. Kohavi: Switching & Finite Automata Theory, TMH.
3. Lee: Digital Circuits and Logic Design, PHI Learning..
4. Roth Jr.: Fundamentals of Logic Design, Jaico Publishing House.
5. Parag K. Lala: Fault Tolerant and Fault Testable Hardware Design, BS Publication.
6. Verilog HDL A Guide To Digital Design And Synthesis, Edition: 2 by Samir Palnitkar.
7. A Verilog HDL Primer, Third Edition, by J. Bhasker

List of Experiments:

1. Designing and Simulation of Logic Gates with Verilog HDL
2. Designing and Simulation of Adders with Verilog HDL
3. Designing and Simulation of Subtractors with Verilog HDL
4. Designing and Simulation of Multiplexers with Verilog HDL
5. Designing and Simulation of Demultiplexers with Verilog HDL
6. Designing and Simulation of Decoders with Verilog HDL
7. Designing and Simulation of encoders & Priority encoder with Verilog HDL

8. Designing and Simulation of Comparators with Verilog HDL
9. Designing and Simulation of Flip-flops with Verilog HDL
10. Designing and Simulation of counters with Verilog HDL

EC 405 Analog Communications

Unit - 1 Introduction:

Introduction to communication system, Need for modulation. Amplitude Modulation,Defination, Time domain and frequency domain description, power relations in Am waves. Generation of AM waves, square law Modulator, Switching modulator,Detection of AM Waves; Square law detector,, Envelope detector.

Unit - 2 Modulation:

Double side band suppressed carrier modulation (DSBSC): Time-Domain description, Frequency-Domain representation, Generation of DSBSC waves: balanced modulator, ring modulator. Coherent detection of DSBSC modulated waves. Costas loop. Single Side-Band Modulation (SSB): Quadrature carrier multiplexing, Hilbert transform, properties of Hilbert transform, Preenvelope, Canonical representation of band pass signals, Single side-band modulation, Frequency-Domain description of SSB wave, Time-Domain description. Phase discrimination method for generating an SSB modulated wave, Time-Domain description. Phase discrimination method for generating an SSB modulated wave. Demodulation of SSB waves.

Unit - 3 Radio Transmitter and Receiver

Frequency – Domain description, Generation of VSB modulated wave, Time - Domain description, Envelop detection of VSB wave plus carrier, Comparison of amplitude modulation techniques, Frequency translation, Frequency division multiplexing, Application: Radio broadcasting, AM radio. Pulse Modulation: Types of pulse Modulation PAM, Generation and Demodulation of PWM, Generation and Demodulation of PPM

Unit – 4 Angle Modulation (FM)-I:

Basic definitions, FM, narrow band FM, wide band FM, transmission bandwidth of FM waves, generation of FM waves: indirect FM and direct FM. Angle Modulation (FM)-II: Demodulation of FM waves, FM stereo multiplexing, Phase-locked loop, Nonlinear model of the phase – locked loop, Linear model of the phase – locked loop, Nonlinear effects in FM systems.

Unit - 5 Noise:

Introduction, shot noise, thermal noise, white noise, Noise equivalent bandwidth, Narrow bandwidth, Noise Figure, Equivalent noise temperature, cascade connection of two-port networks. Noise In Continuous Wave Modulation Systems: Introduction, Receiver model, Noise in DSB-SC receivers, Noise in SSB receivers, Noise in AM receivers, Threshold effect, Noise in FM receivers, FM threshold effect, Pre-emphasis and De-emphasis in FM,.

References :1. Communication Systems, Simon Haykins, 5th Edition, John Willey, India Pvt. Ltd, 2009. 2. An Introduction to Analog and Digital Communication, Simon Haykins, John Wiley India Pvt. Ltd., 2008

3. Modern digital and analog Communication systems B. P. Lathi, Oxford University Press., 4th ed, 2010,
4. Communication Systems, Harold P.E, Stern Samy and AMahmond, Pearson Edn, 2004.
5. Communication Systems: Singh and Sapre: Analog and digital TMH 2nd , Ed 2007.

List of Experiments: Practicals may be performed on kit or on Simulation Software

1. Analysis of AM Modulation and Demodulation Techniques (Transmitter and Receiver), Calculation of Parameters
2. To generate the amplitude modulated signal(AM wave) by using given message signal and carrier signals in MATLAB software
3. To generate the AM-DSBSC modulated signal(DSBSC wave) by using given message signal and carrier signals in MATLAB software
4. To demodule the DSBSC wave using synchronous detector
5. To generate frequency modulated signal and observe the characteristics of FM wave using MATLAB software.
6. To demodulate a Frequency Modulated signal using MATLAB software
7. To generate amplitude modulated wave using simulink and demodulate the modulated wave.
8. To generate DSB-SC Modulated wave using simulink and demodulate the modulated signal
9. To generate frequency modulated signal using communication block set of SIMULINK
10. To generate amplitude modulated wave and determine the percentage modulation.
11. To Demodulate the modulated wave using envelope detector.
12. To demodulate the modulated wave and to observe the characteristics of diode detector.
13. To generate frequency modulated signal and determine the modulation index and bandwidth for various values of amplitude and frequency of modulating signal.
14. To generate the SSB modulated wave.
15. To observe the spectrum of AM and FM signals and obtain the power levels in dBm of fundamental frequency components by using spectrum Analyzer.
16. To write a MATLAB program to simulate the PWM wavefor the given message signal

EC 406 Software Lab –II (MATLAB)

List of Experiments

1. Study of MATLAB with tools
2. Arithmetic Operation on Matrices and Numbers
3. Equation Writing and determining values
4. Generating Signal and Sequences
5. Arithmetic operations on Signal and Sequences
6. Generating M-files and simulation for small examples
7. Designing and modeling with Simulink model for simple example