B.E. 401 - ENGINEERING MATHEMATICS III

Unit I

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 II

Errors & Approximations, Solution of Algebraic & Trancedental Equations (Regula Falsi , Newton-Raphson, Iterative, Secant Method), Solution of simultaneous linear equatins by Gauss Elimination, Gauss Jordan, Crout's methods , Jacobi's and Gauss-Siedel Iterative methods

Unit III

Difference Operators, Interpolation (Newton Forward & Backward Formulae, Central Interpolation Formulae, Lagrange's and divided difference formulae), Numerical Differentiation and Numerical Integration.

Unit IV

Solution of Ordinary Differential Equations(Taylor's Series, Picard's Method, Modified Euler's Method, Runge-Kutta Method, Milne's Predictor & Corrector method), Correlation and Regression, Curve Fitting (Method of Least Square).

Unit V

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

Reference:

(i) Numerical Methods using Matlab by J.H.Mathews and K.D.Fink, P.H.I.
(ii) Numerical Methods for Scientific and Engg. Computation by MKJain, Iyengar and RK Jain, New Age International Publication
(iii) Mathematical Methods by KV Suryanarayan Rao, SCITECH Publuication
(iv) Numerical Methods using Matlab by Yang,Wiley India
(v) Pobability and Statistics by Ravichandran ,Wiley India
(vi) Mathematical Statistics by George R., Springer

BM- 402 – Digital Circuits & Systems

Unit I

Number systems & codes, Binary arithmetic, Boolean algebra and switching function. Minimization of switching function, Concept of prime implicant , Karnaugh map method, Quine & McCluskey's method, Cases with don't care terms, Multiple output switching function.

Unit II

Introduction to logic gates, Universal gate, Half adder, Half subtractor, Full adder, Full subtractor circuits, Series & parallel addition , BCD adders, Look-ahead carry generator.

Unit III

Linear wave shaping circuits, Bistable, Monostable & Astable multivibrator, Schmitt trigger circuits & Schmitt-Nand gates. Logic families : RTL, DTL, All types of TTL circuits , ECL, I2L , PMOS, NMOS & CMOS logic, Gated flip-flops and gated multivibrator , Interfacing between TTL to MOS.

Unit IV

Decoders, Encoders, Multiplexers, Demultiplexers, Introduction to various Semiconductor memories & designing with ROM and PLA. Introduction to Shift Registers, Counters, Synchronous & asynchronous counters, Designing of Combinational circuits like code converters.

Unit V

Introduction of Analog to Digital & Digital to Analog converters, sample & hold circuits and VF converters.

References:

1. M. Mano; "Digital Logic & Computer Design"; PHI.
2. Malvino & Leach; "Digital Principles & Applications"; TMH
3. W.H. Gothman; "Digital Electronics"; PHI.
4. Millman & Taub; "Pulse, Digital & Switching Waveforms"; TMH
5. Jain RP; Modern digital Electronics; TMH
6. R.J. Tocci, "Digital Systems Principles & Applications".

List of experiment (Expandable)

All experiments (wherever applicable) should be performed through the following steps.
Step 1:Circuit should be designed/ drafted on paper.
Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER).
Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.
Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. To study and test of operation of all logic gates for various IC's (IC#7400,IC#7403,IC# 7408,IC#74332,IC#7486).
2. Verification of Demorgan's theorem.
3. To construct of half adder and full adder
4. To construct of half subtractor and full subtractor circuits

5. Verification of versatility of NAND gate.
6. Verification of versatility of NOR gate.
7. Designing and verification of property of full adder.
8. Design a BCD to excess-3 code converter.
9. Design a Multiplexer/ Demultiplexer.

BM- 403 – Human Physiology –II

Unit I

Nervous system: Structure of neuron and nerve fibre, nerve centers – Brain, its various parts and their functions, brainstem and spinal cord. Receptors, ascending and descending tracts, sensory perception with special reference to pain, Muscle tone, Regulation of posture and equilibrium and function of automatic nervous system.

Unit-II

Special senses: Mechanism of vision, Color vision, Mechanism of Hearing, Test of hearing, Audimetry, Olfaction. Touch.

Unit-III

Endocrine system: Endocrine glands, Hormonal Secretion and their effect, Reproductive system: functions of male reproduction system, Female reproduction organs and contraception.

Unit IV

Digestive system: Salivary, Gastric and intestinal digestion and motility of gastrointestinal tract. Basic principles of metabolism and nutrition. - Enzymes - Classification - mode of action - factors influencing the enzyme action.

Unit V

Biochemistry: Water and electrolytes - Brief description - acid base balance - electrophoresis - flame photometry - densitometry- colorimetry & pH metry.

References:

1. Text book of Human Physiology; Guyton, Saunderson.
2. Essentials of Anatomy & Physiology; Seeley, MGH
3. Human Physiology & Anatomy; Marieb, Adison Wesley
4. Principles of Anatomy & Physiology; Tortora, Wiley
5. Human Physiology (Vol I & II); Chatterjee, MAA
6. Medical Physiology; Marya, CBS
7. Essentials of Medical Physiology; Sembulingam, Jaypee

List of experiments(Expandable):-

1. Study of blood pressure by sphygmomanometer.
2. Study of heart activity by ECG instrument.
3. Study heart sound by phonocardiogram.
4. Measurement of blood Hemoglobin O2 saturation level by plethysmoghraph.

BM- 404 – Analog & Digital Communication

Unit I

Time domain and frequency domain representation of signal, Fourier Transform and its properties, Transform of Gate, Periodic gate, Impulse periodic impulse sine and cosine wave, Concept of energy density and power density (Parseval's theorem), Power density of periodic gate and impulse function, impulse response of a system, convolutions, convolution with impulse function, causal and non causal system impulse response of ideal low pass filter, Correlation & Auto correlation.

Unit-II

Base band signal, need of modulation, Introduction of modulations techniques, Amplitude modulation, Equation and its frequency domain representation, Bandwidth, Power distribution. AM suppressed carrier waveform equation and frequency domain representation Generation (Balance/Chopper modulator) and synchronous detection technique, errors in synchronous detection, Introduction to SSB and VSB Transmission Angle modulation, Frequency and phase modulation equation and their relative phase and frequency deviations, modulation index frequency spectrum, NBFM and WBFM, Bandwidth comparison of modulation techniques.

Unit-III

Sampling of signal, sampling theorem for low pass and Band pass signal, Pulse amplitude modulation (PAM), Time division, multiplexing (TDM). Channel Bandwidth for PAM-TDM signal Type of sampling instantaneous, Natural and flat top, Aperture effect, Introduction to pulse position and pulse duration modulations, Digital signal, Quantization, Quantization error, Pulse code modulation, signal to noise ratio, Companding, Data rate and Baud rate, Bit rate, multiplexed PCM signal, Differential PCM (DPCM), Delta Modulation (DM) and Adaptive Delta Modulation (ADM),comparison of various systems.

Unit-IV

Digital modulations techniques, Generation, detection, equation and Bandwidth of amplitude shift keying (ASK) Binary Phase Shift keying (BPSK), Differential phase shift keying (DPSK), offset and non offset quadrature phase shift keying (QPSK), M-Ary PSK, Binary frequency Shift Keying (BFSK), M-Ary FSK Quadrature Amplitude modulation (QAM), MODEM, Introduction to probability of error.

Unit-V

Information theory and coding- Information, entropies (Marginal and conditional), Model of a communication system, Mathematical representation of source, channel and receiver characteristics, Mutual information, channel capacity efficiency of noise free channel Binary
symmetric channel (BSC) Binary erasure channel (BEC), Repetition of signal, NM symmetric Binary channel, Shannon theorem, Shanon-Hartley theorem (S/N-BW trade off)Source encoding code properties; Shanon, Fano and Huffman coding methods and their efficiency error control coding, Minimum Hamming distance, Linear Block Code, Cyclic code and convolution codes. Line Encoding: Manchester coding, RZ, NRZ coding.

References:

1. Singh & Sapre, Communication System, TMH
2. Taub & shilling, Communication System, TMH
3. Hsu; Analog and digital communication(Schaum); TMH
4. B.P. Lathi, Modern Digital and analog communication system,
5. Simon Haykins, Communication System. John Willy

6. Wayne Tomasi, Electronic Communication system.
7. Martin S. Roden, Analog & Digital Communication System; Discovery Press.
8. Frank R. Dungan, Electronic Communication System, Thomson/Vikas.

List of Experiments (Expandable)

All experiments (wherever applicable) should be performed through the following steps.
Step 1:Circuit should be designed/ drafted on paper.
Step 2: The designed/drafted circuit should be simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER).
Step 3:The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.
Step 4: The bread board circuit should be fabricated on PCB prepared on PCB machine.

1. Study of sampling process and signal reconstruction and aliasing.
2. Study of PAM PPM and PDM
3. Study of PCM transmitter and receiver.
4. Time division multiplexing (TDM) and De multiplexing
5. Study of ASK PSK and FSK transmitter and receiver.
6. Study of AM modulation and Demodulation techniques (Transmitter and Receiver) Calculation of parameters.
7. Study of FM modulation and demodulation (Transmitter and Receiver) & Calculation of parameters
8. To construct and verify pre emphasis and de-emphasis and plot the wave forms.
9. Study of super hetrodyne receiver and characteristics of ratio radio receiver.
10. To construct frequency multiplier circuit and to observe the waveform
11. Study of AVC and AFC.

BM- 405 – Electronics –II

Unit I

Feedback Amplifiers: Concept of feedback, positive and negative feedback, voltage and current feedback, series and shunt feedback, effect of feedback on performance characteristics of an amplifier, stability criterion.

Unit II

Oscillators: Condition for sustained oscillation, R-C phase shift, Hartley, Colpitts, Crystal and wein bridge oscillators, Negative resistance Oscillator.

Unit III

Transistor Circuit Techniques and amplifiers: Linear integrated circuits introduction, Differential amplifiers, configuration, Analysis using h parameters, Differential gain, common mode gain CMRR. Constant current sources, current mirrors, level shifting circuits, cascaded amplifier stages, direct coupled amplifiers, problem of drift, chopper amplifiers

Unit – IV

Operational Amplifiers Specifications, imperfections in operational amplifiers. Slew Rate and its effect on full power bandwith, Input Offset voltage, Bias and offset currents, compensation, frequency response effects, Lag Compensation, application of OP.AMP Inverting and non inverting mode, differential mode, instrumentation amplifiers, comparator, Schmitt trigger, precision rectifiers, logarithmic amplifiers, Analogue computation, Summer, Average integrators, differentiators, scaling multipliers.

Unit-V

Active Filters: Filter specifications, introduction to butter worth chebyshev, inverse chebyshev approximations and their comparison, first and second order low pass high pass, band pass and band stop filters, switched capacitor filters, 555 timer and its applications V/F and F/V converters, pulse generators, voltage to current to voltage converters.

References:

1. Tobbey et al: OP-Amps their design and applications
2. R.A. Gayakwad: OP-Amps and Linear Integrated circuit, PHI
3. D.Raychowdhary and Shaul Jain: Linear Integrated Circuits
4. Millman & Halkias: Itegrated Electronics

List of Experiments (Expandable):

All experiments (wherever applicable) should be performed through the following steps.
Step 1: Circuit should be designed/ drafted on paper.
Step 2: The designed/drafted circuit should be
simulated using Simulation S/W (TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER).
Step 3: The designed/drafted circuit should be tested on the bread board and compare the results with the simulated results.
Step 4: The bread board circuit should be fabricated on PCB prepared on PCB
machine.

1. Char. Of Op-Amp (input offset voltage, slew rate, CMRR, BW, input bias current.
2. Linear application of Op-Amp (voltage follower, inverting and non-inverting amplifier and their frequency response, adder, subtractor, differential amplifier, integrator and differential frequency response)
3. Design and performance evaluation of feedback amplifiers.
4. Design and performance evaluation of oscillators.
5. Design and performance evaluation of various filters.

BM- 406 – Computer Programming –IV

SECTION-A MATLAB

Introduction to MATLAB, Study of MATLAB programming environment, Modelling, Design and development of Programs. Programs Related to Analog Electronics, Electronic circuits and other topics covered in the syllabus.

SECTION-B CIRCUIT SIMULATION/ PCB DESIGNING SOFTWARES

Study of Circuit Simulation Software (any one - TINA-V7/ PSPICE/ Labview/ CIRCUIT MAKER).
PCB Layout Software (any one - PROTEL/ ORCADE/ ALTERA).
Design and Simulation of basic Electronic Circuits (Example Rectifiers, Amplifiers, Oscillators, Digital Circuits, Transient and steady state analysis of RC/RL/RLC circuits etc). Design and fabrication of PCB pertaining to various circuits studied on PCB machine.

References:

1. Chapman Stephen J.: MATLAB Programming for Engineers, 3rd Edition, Thomson /Cengage.
2. Rudra Pratap: Getting Started with MATLAB 7, Oxford University Press (Indian Edition).
3. Palm; Matlab 7.4; TMH.
4. Simulation/Designing Software Manuals.

List of Experiments/ Programs:

Programs to be performed based on the topics contained in the syllabus.