EN010401 ENGINEERING MATHEMATICS III

(Common to all branches)

Teaching scheme **Credits: 4**

2 hours lecture and 2 hour tutorial per week

Objectives: *Apply standard methods of mathematical &statistical analysis*

MODULE 1 Fourier series (12 hours)

Dirichlet conditions – Fourier series with period 2 π and 2l – Half range sine and cosine series – Harmonic Analysis – r.m.s Value

MODULE 2 Fourier Transform (12 hours)

Statement of Fourier integral theorem – Fourier transforms – derivative of transforms- convolution theorem (no proof) – Parsevals identity

MODULE 3 Partial differential equations (12 hours)

Formation by eliminating arbitrary constants and arbitrary functions – solution of Lagrange's equation – Charpits method –solution of Homogeneous partical differential equations with constant coefficients

MODULE 4 Probability distribution (12 hours)

Concept of random variable , probability distribution – Bernoulli's trial – Discrete distribution – Binomial distribution – its mean and variance- fitting of Binominal distribution – Poisson distribution as a limiting case of Binominal distribution – its mean and variance – fitting of Poisson distribution – continuous distribution- Uniform distribution – exponential distribution – its mean and variance – Normal distribution – Standard normal curve- its properties

MODULE 5 Testing of hypothesis (12 hours)

Populations and Samples – Hypothesis – level of significance – type I and type II error – Large samples tests – test of significance for single proportion, difference of proportion, single mean, difference of mean – chi –square test for variance- F test for equality of variances for small samples

References

1. Bali& Iyengar – A text books of Engg. Mathematics – Laxmi Publications Ltd.
2. M.K. Venkataraman – Engg. Mathematics vol II 3rd year part A & B – National Publishing Co.
3. I.N. Sneddon – Elements of partial differential equations – Mc Graw Hill
4. B.V. Ramana – Higher Engg. Mathematics – Mc Graw Hill
5. Richard A Johnson – Miller Fread's probability & Statistics for Engineers- Pearson/ PHI

6. T. Veerarajan – Engg. Mathematics – Mc Graw Hill
7. G. Haribaskaran – Probability, Queueing theory and reliability Engg. – Laxmi Publications
8. V. Sundarapandian - probability ,Statistics and Queueing theory – PHI
9. H.C.Taneja – Advanced Engg. Mathematics Vol II – I.K.International
10. A.K.Mukhopadhyay-Mathematical Methods For Engineers and Physicists-I.K.International

EN010 402(ME): PRINCIPLES OF MANAGEMENT

(Common with EN010 502(ME))

Teaching scheme **Credits:** 4

3 hours lecture and 1 hour tutorial per week

Objectives

- *To develop an understanding of different functional areas of management.*
- *To understand the functions and duties an individual should perform in an organisation.*

Module I (12 hours)

Management Concepts: Vision, Mission, Goals and Objectives of management-MBO-Scientific management- Functions of management- Planning- Organizing- Staffing-Directing- Motivating- Communicating- Coordinating- Controlling- Authority and Responsibility- Delegation- Span of control- Organizational structure- Line, Line and staff and Functional relationship.

Module II (12 hours)

Personnel Management: Definition and concept- Objectives of personnel management-Manpower planning- Recruitment and Selection of manpower- Training and development of manpower- Labour welfare- Labour turnover- Quality circle- Industrial fatigue- Industrial disputes-Method of settling disputes- Trade unions.

Module III (12 hours)

Production management: Objectives and scope of production management- Functions of production department- production management frame work- product life cycle-Types of production- Production procedure- Project planning with CPM and PERT- Basic concepts in network.

Module IV (12 hours)

Financial Management: Objectives and Functions of Financial Management- Types of Capital- Factors affecting working capital- Methods of financing.
Cost Management: Elements of cost- Components of cost- Selling Price of a product.

Module V (12 hours)

Sales and Marketing Management: Sales management- Concept- Functions of sales department- Duties of sales engineer- Selling concept and Marketing concept- Marketing-Definition and principles of marketing- Marketing management and its functions- Sales forecasting- Pricing- Advertising- Sales promotion- Channels of distribution- Market research.

Text Books

1. Koontz and Weihrich, *Essentials of Management*, Tata McGraw Hill.
2. Mahajan M., *Industrial Engineering and Production Management*, Dhanpat Rai and Co.
3. Kemthose and Deepak, *Industrial Engineering an Management,* Prentice Hall of India.

Reference Books

1. Martand Telsang, *Industrial Engineering and Production Management.*
2. Khanna O.P., *Industrial Engineering and Management*, Dhanpat Rai and Co.
3. Philip Kotler, *Marketing Management*, Prentice Hall of India.
4. Sharma S. C. & Banga T. R., *Industrial Organisation and Engineering Economics,* Khanna Publishers.
5. Prasanna Chandra, *Financial Management,* Tata McGraw Hill.

EC010 403 SIGNALS AND SYSTEMS

Teaching scheme **Credits:** 4

2 hours lecture and 2 hours tutorial per week

Objectives

- *To study the methods of analysis of continuous time and discrete time signals and systems to serve as a foundation for further study on communication, signal processing and control*

Module I (12 hrs)

Classification of signals: Continuous time and Discrete time, Even and Odd , Periodic and Non-periodic , Energy and Power – Basic operations on signals: Operations performed on the dependent variable , operations on the independent variable: Shifting , Scaling – Elementary Discrete time and Continuous time signals: Exponential , Sinusoidal , Step , Impulse , Ramp – Systems: Properties of Systems: Stability, Memory, Causality, Invertibility, Time invariance, Linearity – LTI Systems: Representation of Signals in terms of impulses – Impulse response – Convolution sum and Convolution integral – Cascade and Parallel interconnections – Memory, Invertibility, Causality and Stability of LTI systems – Step response of LTI systems – Systems described by differential and difference equations (solution by conventional methods not required)

Module II (12 hrs)

Fourier analysis for continuous time signals and systems: Representation of periodic signals: Continuous Time Fourier Series – convergence of Fourier series – Gibbs phenomenon – Representation of aperiodic signals: Continuous Time Fourier Transform – The Fourier Transform for periodic signals – Properties of Fourier representations – Frequency Response of systems characterized by linear constant coefficient differential equations

Module III (12 hrs)

Fourier analysis for discrete time signals and systems: : Representation of periodic signals: Discrete Time Fourier Series – Representation of aperiodic signals: Discrete Time Fourier Transform – The Fourier Transform for periodic signals – Properties of Fourier representations – Frequency Response of systems characterized by linear constant coefficient difference equations

Module IV (12 hrs)

Filtering: Frequency domain characteristics of ideal filters – Time domain characteristics of ideal LPF – Non-ideal filters – First and Second order filters described by differential and difference equations – Approximating functions: Butterworth, Chebyshev and elliptic filters (Magnitude response only) – Sampling: The sampling theorem – Reconstruction of a signal from its samples using interpolation – Aliasing

Module V (12 hrs)

Bilateral Laplace Transform – ROC – Inverse – Geometric evaluation of the Fourier transform from pole-zero plot – Analysis and characterization of LTI systems using Laplace Transform – The Z Transform – ROC – Inverse – Geometric evaluation of the Fourier Transform from pole-zero plot – Properties of Z transform - Analysis and characterization of LTI systems using Z-Transform

References:

1) A V Oppenheim, A S Willsky and S H Nawab, *Signals and Systems,* Prentice Hall of India.
2) S Haykin, and B V Veen, *Signals and Systems*, Wiley
3) B P Lathi, *Signal Processing and Linear Systems,* OUP
4) E W Kamen, and B Heck, *Fundamentals of Signals and Systems using the web and Matlab*, Pearson
5) Luis F Chaparro , *Signals and Systems Using MATLAB*, Elsevier
6) R E Ziemer, and W H Tranter, *Signals and Systems*, Pearson.
7) R A Gabel and R A Roberts, *Signals and Linear Systems*, Wiley

EC010 404: DIGITAL ELECTRONICS

Teaching scheme **Credits: 4**
3hours lecture and 1 hour tutorial per week.

Objectives

- *To Work with a variety of number systems and numeric representations, including signed and unsigned binary, hexadecimal, 2's complement.*
- *To introduce basic postulates of Boolean algebra and show the correlation between Boolean expression.*
- *To introduce the methods for simplifying Boolean expressions.*
- *To outline the formal procedures for the analysis and design of combinational circuits and sequential circuits.*

Module I (12hours)

Positional Number System: Binary, Octal, Decimal, Hexadecimal number system, Number base conversions, complements - signed magnitude binary numbers - Binary Arithmetic- addition, subtraction - Binary codes- Weighted, BCD, 8421, Gray code, Excess 3 code, ASCII, Error detecting and correcting code, parity, hamming code.
Boolean postulates and laws with proof, De-Morgan's Theorems, Principle of Duality, Minimization of Boolean expressions, Sum of Products (SOP), Product of Sums (POS), Canonical forms, Karnaugh map Minimization, Don't care conditions

Module II (12 hours)

Digital Circuits: Positive and Negative logic, Transistor transistor logic, TTL with totem pole, open collector and tri state output, Emitter coupled logic – basic ECL inverter, NMOS NOR gate, CMOS inverter, NAND and NOR, Gate performance parameters – fan in, fan out, propagation delay, noise margin, power dissipation for each logic, characteristics of TTL and CMOS, subfamilies of TTL and CMOS.

Module III (12 hours)

Introduction to Combinational Circuits: Basic logic gates, Universal gates, Realization of Boolean functions using universal gates, Realization of combinational functions: addition – half and full adder – n bit adder – carry look ahead adder, subtraction, comparison, code conversion, and decoder, encoder, multiplexer, demultiplexer, parity checkers, and parity generator.
Introduction to Sequential Circuits: latches, timing, Flip Flops, types, characteristic equations, excitation tables, Realization of one flip flop using other flip flops.

Module IV (12 hours)

Application of flip flops as bounce elimination switch, register, counter and RAM, Binary ripple counter, synchronous binary counter, Design of modulo 'n' synchronous counter, up/down counters,
Shift registers – SISO, SIPO, PISO, PIPO, bidirectional shift register and universal register, counters based on shift registers

Module V (12 hours)

Hazards in combinational circuits: Static hazard, dynamic hazard, essential hazards, hazard free combinational circuits.
Introduction to programmable logic devices: PLA- block diagram, PAL – block diagram, registered PAL, Configurable PAL, GAL - architecture, CPLD –

classification internal architecture, FPGA - architecture, ASIC – categories , full custom and semi custom.

Reference Books

1. Donald D Givone, *Digital Principles and Design*, Tata McGraw Hill, 2003.
2. G K Kharate, *Digital Electronics*, Oxford university press, 2010
3. Ronald J Tocci, *Digital Systems*, Pearson Education, 10th edition 2009.
4. Thomas L Floyd, *Digital Fundamentals*, Pearson Education, 8th edition, 2003.
5. Donald P Leach, Albert Paul Malvino, *Digital Principles and Applications*, Tata McGraw Hill 6th edition, 2006.
6. Charles H.Roth, *Fundamentals of Logic Design*, Thomson Publication Company 5th edition, 2004.
7. Milos Ercegovac*, Introduction to Digital Systems*, Wiley India, 2010
8. Moris mano, *Digital Design*, Prentice Hall of India, 3rd edition, 2002.
9. Anada kumar, *Fundamentals of Digital Circuits*, Prentice Hall of India, 2008.
10. Brain Holdesworth, *Digital Logic Design*, Elsevier, 4th edition, 2002.

EC010 405 ANALOG COMMUNICATION

Teaching scheme **Credits:** 4
3 hours lecture and 1 hour tutorial per week

Objectives:

- *Present an introduction to linear and non linear modulation and circuits.*
- *Familiarize students with the basics of probability theory and noise in communication system.*
- *Introduce students to telephone system*

Module 1(12 hrs)

Introduction: Block diagram of communication system –need for modulation
Linear Modulation: Mathematical representation of AM- frequency spectrum - Power relations, SSB, VSB and ISB (Basics only)
Angle Modulation: FM and PM, Spectrum of FM signal, Power and Bandwidth of FM signals, Comparison of AM- FM- PM.

Module 2 (12 hrs)

Linear Modulators and Demodulators: Diode and Transistor Modulator, Square Law Detector Envelope Detector.
Generation and Detection of DSB-SC signal :-Balanced Modulator, Ring Modulator, Synchronous Detection.
SSB-SC generation:-Filter method, Phase shift method, Detection of SSB- Product demodulator

Module 3 (12 hrs)

Non Linear modulators and Demodulators:-FM Generation: Direct and Indirect methods, FM Detection:-Simple slope, balanced slope detection, Foster –Seeley detection, Ratio Detection
Radio Transmitters and Receivers:- AM transmitters:-High level and Low level, Receivers:-characteristics of receivers, Super heterodyne receiver, Image frequency rejection, choice of intermediate frequency, mixer, AGC .
FM Stereo Transmitter and Receiver.

Module 4 (12 hrs)

Probability and Random Variables: -Probability, Sample Space, Events, Conditional Probability and Statistical Independence, Bayes' Theorem, Discrete And Continuous Random Variables, CDF and PDF Joint and Conditional PDF, Statistical Averages: Means, Moments, Expectation Probability models: Binomial Distribution, Gaussian Distribution, Rayleigh Distribution

Module 5 (12 hrs)

Noise:- Sources of noise, shot noise, resistor noise, white noise, additive noise, noise bandwidth, noise temperature, noise figure, signal to noise ratio, noise for cascaded stages

Telephone Systems - Telephone subscribers loop system, switching and transmission plan, Transmission system, Signalling techniques, Interchannel signalling, common channel signalling, standard telephone set, telephone call procedures, call progress.

References

1. LE Frenzel, *Principles of Electronic Communication System 3rd Edition*, Tata Mc.GrawHill.
2. Kennedy,Davis , *Electronic Communication systems 4th Edition* ,Tata Mc.GrawHill.
3. D Roddy and J Coolen: *Electronic Communications*, Prentice Hall of India.
4. RP Singh ,S D Sapre ,*Communication System, Analog &Digital*, Tata Mc.Graw Hill
5. AB Carlson,PB Crilly,JC Rutledge, *Communication Systems 4th Edition*, Mc.GrawHill
6. Wayne Tomasi ,*Electronic communication Systems 5th Edition*, Pearson Edn
7. RJ Shoenbeck ,*Electronic communication ,Modulation & Transmission*. Prentice Hall of India.
8. ThiagarajanViswanathan, *Telecommunication Switching systems and Networks*, Prentice Hall of India.
9. Simon Haykin ,*Communication System*,Wiley

EC010 406 : ANALOG CIRCUITS – II

Teaching Scheme : **Credits : 4**

3 hours lecture and 1 hour tutorial per week.

Objectives:

- *To understand differential amplifiers using BJT and MOSFET*
- *To understand operational amplifier and its applications.*

Module I (12)

Differential Amplifiers - BJT differential pair, large signal and small signal analysis of differential amplifiers, Input resistance, voltage gain, CMRR, non ideal characteristics of differential amplifier. Frequency response of differential amplifiers. MOS differential amplifiers, Current sources, Active load, cascode load, current mirror circuits, Wilson current mirror circuits. Small signal equivalent circuits, multistage differential amplifiers.

Module II (12)

Simplified internal circuit of 741 op-amp. DC analysis, Gain and frequency response. MOS Operational Amplifiers, single stage- cascode and folded cascode, two stage op-amp, op-amp with output buffer, frequency compensation and slew rate in two stage Op-amps. Ideal op-amp parameters, Non ideal op-amp. Effect of finite open loop gain, bandwidth and slew rate on circuit performance.

Module III (12)

Opamp applications: Inverting and non-inverting amplifier, summing amplifier, integrator, differentiator, Differential amplifiers, Instrumentation amplifiers, V to I and I to V converters, Comparators, Schmitt Trigger, Square and triangular waveform generator, Oscillators – RC Phase-shift and Wein-Bridge, Multivibrators – Astable and Monostable, Precision rectifiers, Programmable gain Amplifier

Module IV (12)

Filters: I^{st} order Low pass, high pass and all pass filters - Bandpass and band elimination filters Biquadratic filters (single op-amp with finite gain non inverting Sallen-Key of Low pass, High pass, Band pass and Band elimination filters. Switched capacitor Resistor, switched capacitor Integrator, I^{st} order SC filter

Module V (12)

D/A converters: DAC characteristics- resolution, output input equations, weighted resistor, R-2R network. A/D converter: ADC characteristics, Types - Dual slope, Counter ramp, Successive approximation, flash ADC, oversampling and delta sigma ADC.

Waveform generators – grounded capacitor VCO and emitter coupled VCO. Basic PLL topology and principle, transient response of PLL, Linear model of PLL, Major building blocks of PLL – analog and digital phase detector, VCO, filter. Applications of PLL. Monolithic PLL - IC LM565 and CD4046 CMOS PLL. 555 Timer Astable Multi vibrator and Monostable Multi vibrator using 555.

References:

1. Sergio Franco: *Design with Operational Amplifiers and Analog Integrated Circuits*, 3/e,Tata Mc.Graw Hill.
2. Behzad Razavi : *Design of Analog CMOS IC,* Tata Mc.Graw Hill, 2003.
3. Gayakwad : *Op-Amps and Linear Integrated Circuits* , 4/e, Prentice Hall of India..
4. David A.Johns, Ken Martin: *Analog Integrated Circuit Design*, Wiley India, 2008
5. Gray, Hurst, Lewis and Meyer *Analysis and Design of Analog Integrated Circuits*, Wiley
6. Baker R Jacob: *CMOS Circuit Design, Layout and Simulation*, Prentice hall of India.,2005

EC010 407 ANALOG CIRCUITS-II LAB

Teaching Schemes
3 hours practical per week. **Credits: 2**

Objectives

- *To provide experience on design, testing, and analysis of few electronic circuits.*
- *To provide experience on design ,testing and analysis of op-amp circuits .*

LIST OF EXPERIMENTS

1. Differential amplifiers (using BJT and MOSFETs) - Measurement of CMRR
2. Cascade amplifiers - Frequency response.
3. Cascode amplifiers (using BJT and MOSFETs) - Frequency response.

4. Familiarization of Operational amplifiers- Inverting and Non inverting amplifiers, frequency response, Adder, Integrator, comparator and voltage level detector.
5. Measurement of Op-Amp. parameters.
6. Difference Amplifier and Instrumentation amplifier.
7. Astable, Monostable and Schmitt trigger circuit using Op -Amps.
8. Triangular and square wave generators using Op- Amplifier.
9. Wien bridge oscillator using op-amplifier with amplitude stabilization and amplitude control, RC Phase shift Oscillator.
10. Study of 555 and Astable, Monostable multivibrator using 555.
11. Active second order filters using Op-Amp (LPF, HPF, BPF and BSF)
12. . A/D converters- counter ramp and flash type.
13. D/A Converters- ladder circuit.

EC010 408 ANALOG COMMUNICATION LAB

Teaching scheme **Credits: 2**

3 hours practical per week

Objectives

- *To provide experience on design, testing, and analysis of few electronic circuits used for communication engineering.*

  To understand basic transmission concepts and to develop strong concepts in fundamentals.

List of Experiments Using discrete components only:

1. Amplitude Modulator-Measurement of Modulation index.
2. Amplitude Demodulator
3. Study of PLL and VCO ICs
4. Frequency Modulator using VCO
5. Frequency Demodulator
6. DSB-SC Modulator
7. DSB-SC Demodulator
8. Tuned Amplifier
9. Mixer
10. AGC
11. Study of 8038
12. Spectral Analysis of AM and FM .
13. Multiplexing using analog multiplexer ICs

Note:Any other relevant experiments related to EC 010 405