

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
HYDERABAD**

III Year B.Tech EEE I-Sem

L	T/P/D	C
3	1/-/-	3

(55009) IC APPLICATIONS

Part 1 : LINEAR INTEGRATED CIRCUITS

UNIT I : INTEGRATED CIRCUITS

Classification, chip size and circuit complexity, ideal and practical Op-amp, internal circuits, Op-amp characteristics, DC and AC characteristics, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

UNIT II : OP-AMP APPLICATIONS

Basic application of Op-amp, instrumentation amplifier, ac amplifier, V to I and I to V converters, sample & hold circuits, Differentiators and Integrators, Comparators, Schmitt trigger, Multivibrators, introduction to voltage regulators, features of 723.

UNIT III : ACTIVE FILTERS & OSCILLATORS

Introduction, 1st order LPF, HPF filters. Band pass, Band reject and all pass filters. Oscillator types and principle of operation – RC, Wien and quadrature type, waveform generators – triangular, sawtooth, square wave and VCO.

UNIT IV : TIMERS & PHASE LOCKED LOOPS

Introduction to 555 timer, functional diagram, monostable and astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks of 565.

Part 2 : DATA CONVERTER INTEGRATED CIRCUIT IC's

UNIT V : D-A AND A-D CONVERTERS

Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs - parallel comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC. DAC and ADC specifications.

Part 3 : DIGITAL INTEGRATED CIRCUITS

UNIT VI : INTRODUCTION

Classification of Integrated circuits, comparison of various logic families, standard TTL NAND Gate- Analysis & characteristics, TTL open collector O/Ps, Tristate TTL, MOS & CMOS open drain and tristate outputs,

CMOS transmission gate, IC interfacing- TTL driving CMOS & CMOS driving TTL.

UNIT VII : COMBINATIONAL CIRCUIT IC's

Design using TTL-74XX & CMOS 40XX series, code converters, decoders, Demultiplexers, Encoder, priority Encoder, multiplexers & their applications, priority generators circuits. arithmetic circuits-parallel binary adder/subtractor circuits using 2's, Complement system. Digital comparator circuits.

UNIT VIII : SEQUENTIAL CIRCUIT IC's

Flip-flops & their conversions. Synchronous and asynchronous counters. Decade counter, shift registers & applications, familiarities with commonly available 74XX & CMOS 40XX series of IC counters.

TEXT BOOKS

1. Linear Integrated Circuits --D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005.

REFERENCES:

1. Op Amps & linear integrated circuits- concepts and applications James M. Fiore cengage learning 2009
2. Op Amps and Linear ICs Ramakanth A Gayakwad PHI 1987.
3. Operational Amplifiers and Linear Integrated Circuits: 4/e William D Stanley PEI 2009
4. Operational Amplifiers and Linear Integrated Circuits K Lal kishore pearson 2008.
5. Modern Digital digital Electronics RP Jain 4/e TMH 2010.

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(55010) MANAGEMENT SCIENCE

Unit I

Introduction to Management: Entrepreneurship and organization - Nature and Importance of Management, Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Herzberg's Two-Factor Theory of Motivation, Systems Approach to Management, Leadership Styles, Social responsibilities of Management.

Unit II

Designing Organisational Structures: Departmentation and Decentralisation, Types of Organisation structures - Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, Virtual Organisation, Cellular Organisation, team structure, boundaryless organization, inverted pyramid structure, lean and flat organization structure and their merits, demerits and suitability.

Unit III

Operations Management: Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study -Basic procedure involved in Method Study and Work Measurement-Statistical Quality Control: \bar{X} chart, R chart, c chart, p chart, (simple Problems), Acceptance Sampling, Deming's contribution to quality.

Unit IV

A) Materials Management: Objectives, Need for Inventory control, EOQ, ABC Analysis, Purchase Procedure, Stores Management and Stores Records - Supply Chain Management
B) Marketing: Functions of Marketing, Marketing Mix, Marketing Strategies based on Product Life Cycle., Channels of distribution.

Unit V

Human Resources Management (HRM): Evolution of HRM, Concepts of HRM, Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation and Merit Rating.

Unit VI

Project Management (PERT/CPM): Network Analysis, Programme Evaluation

and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (simple problems)

Unit VII

Strategic Management: Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

Unit VIII

Contemporary Management Practices: Basic concepts of Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levels, Value Chain Analysis, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering 5S Model, Deming's PDCA, Kaizen, Poka-Yoke, Muda, Benchmarking, Balanced Score Card.

TEXT BOOK:

1. Aryasri: Management Science, TMH, New Delhi, 2009

REFERENCE BOOKS:

1. Stoner, Management, Pearson, 2009
2. Kotler Philip & Keller Kevin Lane: Marketing Management PHI, 2009.
3. Koontz, Weihrich, & Aryasri: Principles of Management, TMH, 2009.
4. Thomas N. Duening & John M. Ivancevich Management—Principles and Guidelines, Cengage, 2009.
5. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2009.
6. Memoria & S.V. Ganker, Personnel Management, Himalaya, 2009
7. Schermerhorn: Management, Wiley, 2009.
8. Parnell: Strategic Management, Biztantra, 2009.
9. L.S. Srinath: PERT/CPM, Affiliated East-West Press, 2009.
10. William J. Stevenson & Ceyhun Ozgur: Introduction to Management Science, TMH, 2007.

Pre-requisites: Managerial Economics

Objective: To familiarize with the process of management and to provide basic insights into select contemporary management practices.

Codes/Tables: Normal Distribution Function Table need to be permitted into the examination Hall.

Question Paper Pattern: 5 Questions to be answered out of 8 questions. The question paper should contain atleast 2 practical problems, one each from units -III & VI

Each question should not have more than 3 bits.

Unit VIII will have only short questions, not essay questions.

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(55011) POWER SYSTEMS-II

Objective:

This course is an extension of Power systems-I course. It deals with basic theory of transmission lines modeling and their performance analysis. Also this course gives emphasis on mechanical design of transmission lines, cables and insulators.

UNIT-I

Transmission Line Parameters

Types of conductors - calculation of resistance for solid conductors - Calculation of inductance for single phase and three phase, single and double circuit lines, concept of GMR & GMD, symmetrical and asymmetrical conductor configuration with and without transposition, Numerical Problems.

Calculation of capacitance for 2 wire and 3 wire systems, effect of ground on capacitance, capacitance calculations for symmetrical and asymmetrical single and three phase, single and double circuit lines, Numerical Problems.

UNIT-II

Performance of Short and Medium Length Transmission Lines

Classification of Transmission Lines - Short, medium and long line and their model representations - Nominal-T, Nominal-Pie and A, B, C, D Constants for symmetrical & Asymmetrical Networks, Numerical Problems.

Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.

UNIT-III

Performance of Long Transmission Lines

Long Transmission Line-Rigorous Solution, evaluation of A,B,C,D Constants, Interpretation of the Long Line Equations, Incident, Reflected and Refracted Waves -Surge Impedance and SIL of Long Lines, Wave Length and Velocity of Propagation of Waves - Representation of Long Lines - Equivalent-T and Equivalent Pie network models (numerical problems).

UNIT-IV

Power System Transients

Types of System Transients - Travelling or Propagation of Surges - Attenuation, Distortion, Reflection and Refraction Coefficients - Termination of lines with different types of conditions - Open Circuited Line, Short Circuited Line, T-Junction, Lumped Reactive Junctions (Numerical

Problems). Bewley's Lattice Diagrams (for all the cases mentioned with numerical examples).

UNIT-V

Various Factors Governing the Performance of Transmission line

Skin and Proximity effects - Description and effect on Resistance of Solid Conductors -

Ferranti effect - Charging Current - Effect on Regulation of the Transmission Line.

Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss, Radio Interference.

UNIT-VI

Overhead Line Insulators

Types of Insulators, String efficiency and Methods for improvement, Numerical Problems - voltage distribution, calculation of string efficiency, Capacitance grading and Static Shielding.

UNIT-VII

Sag and Tension Calculations

Sag and Tension Calculations with equal and unequal heights of towers, Effect of Wind and Ice on weight of Conductor, Numerical Problems - Stringing chart and sag template and its applications.

UNIT-VIII

Underground Cables

Types of Cables, Construction, Types of Insulating materials, Calculations of Insulation resistance and stress in insulation, Numerical Problems. Capacitance of Single and 3-Core belted cables, Numerical Problems. Grading of Cables - Capacitance grading, Numerical Problems, Description of Inter-sheath grading. HV cables

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar, A.Chakrabarthy, Dhanpat Rai & Co Pvt. Ltd.
2. Electrical power systems - by C.L.Wadhwa, New Age International (P) Limited, Publishers,1998.

REFERENCE BOOKS:

1. Power System Engineering by I.J.Nagarath & D.P Kothari, TMH 2/e, 2010
2. Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
3. Power System Analysis, Operation and control by Abhijit Chakrabarti, Sunitha Halder, PHI, 3/e, 2010
4. Electrical Power Transmission system engineering Analysis and design by Turan Gonen, CRC Press (Taylor & Francis Group) Special Indian Edition,2/e.

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(55012) CONTROL SYSTEMS

Objective :

In this course it is aimed to introduce to the students the principles and applications of control systems in every day life. The basic concepts of block diagram reduction, time domain analysis solutions to time invariant systems and also deals with the different aspects of stability analysis of systems in frequency domain and time domain.

UNIT - I : INTRODUCTION

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback.

Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

UNIT II : TRANSFER FUNCTION REPRESENTATION

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

UNIT-III : TIME RESPONSE ANALYSIS

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT - IV : STABILITY ANALYSIS IN S-DOMAIN

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability
Root Locus Technique: The root locus concept - construction of root loci-effects of adding poles and zeros to $G(s)H(s)$ on the root loci.

UNIT - V : FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications-Bode diagrams-

Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

UNIT – VI : STABILITY ANALYSIS IN FREQUENCY DOMAIN

Polar Plots-Nyquist Plots-Stability Analysis.

UNIT – VII : CLASSICAL CONTROL DESIGN TECHNIQUES

Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers.

UNIT – VIII : STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability

TEXT BOOKS:

1. Automatic Control Systems 7th edition– by B. C. Kuo 2009– PHI/Jhon wiley 8ed
2. Control Systems Principles and Design – by I M. Gopal, TMH3rd edition 2008.

REFERENCE BOOKS:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems by Anand Kumar, PHI 2008.
3. Control Systems Engg. by NISE 5th Edition – John wiley
4. “Modelling & Control Of Dynamic Systems” by Narciso F. Macia George J. Thaler, cengage Publishers.

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(55013) POWER ELECTRONICS

Objective :

With the advent of semiconductor devices, revolution is taking place in the power transmission distribution and utilization. This course introduces the basic concepts of power semiconductor devices, converters and choppers and their analysis.

UNIT – I

POWER SEMI CONDUCTOR DEVICES

Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power MOSFET – Power IGBT and their characteristics and other thyristors – Basic theory of operation of SCR – Static characteristics – Turn on and turn off methods- Dynamic characteristics of SCR - Turn on and Turn off times -Salient points

UNIT – II

DEVICES AND COMMUTATION CIRCUITS

Two transistor analogy – SCR - UJT firing circuit — Series and parallel connections of SCR's – Snubber circuit details – Specifications and Ratings of SCR's, BJT, IGBT - Numerical problems – Line Commutation and Forced Commutation circuits.

UNIT – III

SINGLE PHASE HALF CONTROLLED CONVERTERS

Phase control technique – Single phase Line commutated converters – Mid point and Bridge connections – Half controlled converters with Resistive, RL loads and RLE load– Derivation of average load voltage and current - Active and Reactive power inputs to the converters without and with Free wheeling Diode– Numerical problems

UNIT – IV

SINGLE PHASE FULLY CONTROLLED CONVERTERS

Fully controlled converters, Mid point and Bridge connections with Resistive, RL loads and RLE load– Derivation of average load voltage and current – Line commutated inverters -Active and Reactive power inputs to the converters without and with Free wheeling Diode, Effect of source inductance – Derivation of load voltage and current – Numerical problems.

UNIT – V

THREE PHASE LINE COMMUTATED CONVERTERS

Three phase converters – Three pulse and six pulse converters – Mid point

and bridge connections average load voltage With R and RL loads – Effect of Source inductance–Dual converters (both single phase and three phase) – Waveforms – Numerical Problems.

UNIT – VI

AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS

AC voltage controllers – Single phase two SCR's in anti parallel – With R and RL loads – modes of operation of Triac – Triac with R and RL loads – Derivation of RMS load voltage, current and power factor wave forms – Firing circuits – Numerical problems – Cyclo converters – Single phase mid point cyclo converters with Resistive and inductive load (Principle of operation only) – Bridge configuration of single phase cyclo converter (Principle of operation only) – Waveforms

UNIT – VII

CHOPPERS

Choppers – Time ratio control and Current limit control strategies – Step down choppers Derivation of load voltage and currents with R, RL and RLE loads- Step up Chopper – load voltage expression Morgan's chopper – Jones chopper and Oscillation chopper (Principle of operation only) Waveforms — AC Chopper – Problems.

UNIT – VIII

INVERTERS

Inverters – Single phase inverter – Basic series inverter – Basic parallel Capacitor inverter bridge inverter – Waveforms – Simple forced commutation circuits for bridge inverters – Mc Murray and Mc Murray – Bedford inverters – Voltage control techniques for inverters Pulse width modulation techniques – Numerical problems.

TEXT BOOKS :

1. Power Electronics – by M. D. Singh & K. B. Kanchandhani, Tata Mc Graw – Hill Publishing company, 1998.
2. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998

REFERENCE BOOKS :

1. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
2. Power Electronics - by V.R.Moorthi , 1st edition -2005, OXFORD University Press
3. Power Electronics-by P.C.Sen,Tata Mc Graw-Hill Publishing.
4. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradra, A. Joshi and R. M. K. Sinha, New Age International (P) Limited Publishers, 1996.

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(55014) ELECTRICAL MACHINES - III

Objective:

This subject is an extension of previous machines courses. It deals with the detailed analysis of Synchronous generators and motors which are the prime source of electrical power generation and its utilities. Also concerns about the different types of single phase motors which are having significant applications in house hold appliances and control systems.

UNIT – I : Construction and Principle of operation of synchronous machines

Constructional Features of round rotor and salient pole machines – Armature windings – Integral slot and fractional slot windings; Distributed and concentrated windings – distribution, pitch and winding factors – E.M.F Equation.

UNIT-II : Synchronous Generator Characteristics

Harmonics in generated e.m.f. – suppression of harmonics – armature reaction - leakage reactance – synchronous reactance and impedance – experimental determination - phasor diagram – load characteristics.

UNIT – III : Regulation of Synchronous Generator

Regulation by synchronous impedance method, M.M.F. method, Z.P.F. method and A.S.A. methods – salient pole alternators – two reaction analysis – experimental determination of X_d and X_q (Slip test) Phasor diagrams – Regulation of salient pole alternators.

UNIT – IV : Parallel Operation of Synchronous Generator

Synchronizing alternators with infinite bus bars – synchronizing power torque – parallel operation and load sharing - Effect of change of excitation and mechanical power input. Analysis of short circuit current wave form – determination of sub-transient, transient and steady state reactances.

UNIT – V : Synchronous Motors – Principle of Operation

Theory of operation – phasor diagram – Variation of current and power factor with excitation – synchronous condenser – Mathematical analysis for power developed .

UNIT-VI : Power Circles

Excitation and power circles – hunting and its suppression – Methods of starting – synchronous induction motor.

UNIT – VII : Single Phase Motors

Single phase Motors: Single phase induction motor – Constructional features–Double revolving field theory Equivalent circuit – split-phase motors – Capacitor start Capacitor run motors.

UNIT – VIII : Special Motors

Principles of A.C. Series motor-Universal motor, Stepper motor shaded pole motor, (Qualitative Treatment only)

TEXT BOOKS

1. Electric Machines – by I.J.Nagrath & D.P.Kothari, Tata Mc Graw-Hill Publishers, 3rd Edition 2006.
2. Electrical Machines – by P.S. Bimbra, Khanna Publishers.

REFERENCE BOOKS:

1. Electrical Machines by Milukutla S. Sarma, Mukesh K. pathak, Cengage Learning, 2009
2. Electric Machinery – by A.E. Fitzgerald, C.Kingsley and S.Umans, Mc Graw-Hill Companies, 5th edition, 1990.
3. Electromechanics-III (Synchronous and single phase machines), S.Kamakashiah, Right Publishers

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(55602) ELECTRICAL MACHINES LAB – II

The following experiments are required to be conducted as compulsory experiments:

1. O.C. & S.C. Tests on Single phase Transformer
 2. Sumpner's test on a pair of single phase transformers
 3. Brake test on three phase Induction Motor
 4. No-load & Blocked rotor tests on three phase Induction motor
 5. Regulation of a three –phase alternator by synchronous impedance & m.m.f. methods
 6. V and Inverted V curves of a three—phase synchronous motor.
 7. Equivalent Circuit of a single phase induction motor
 8. Determination of X_d and X_q of a salient pole synchronous machine
- In addition to the above eight experiments, atleast any two of the following experiments are required to be conducted from the following list:
1. Parallel operation of Single phase Transformers
 2. Separation of core losses of a single phase transformer
 3. Scott connection of transformers
 4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
 5. Efficiency of a three-phase alternator
 6. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers
 7. Measurement of sequence impedance of a three-phase alternator.

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(55603) CONTROL SYSTEMS AND SIMULATION LAB

Any Eight of the following experiments are to be conducted:

1. Time response of Second order system
2. Characteristics of Synchros
3. Programmable logic controller – Study and verification of truth tables of logic gates, simple Boolean expressions and application of speed control of motor.
4. Effect of feedback on DC servo motor
5. Transfer function of DC motor
6. Effect of P, PD, PI, PID Controller on a second order systems
7. Lag and lead compensation – Magnitude and phase plot
8. Transfer function of DC generator
9. Temperature controller using PID
10. Characteristics of magnetic amplifiers
11. Characteristics of AC servo motor

Any two simulation experiments are to be conducted:-

1. PSPICE simulation of Op-Amp based Integrator and Differentiator circuits.
2. Linear system analysis (Time domain analysis, Error analysis) using MATLAB.
3. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant, system using MATLAB
4. State space model for classical transfer function using MATLAB – Verification.

REFERENCE BOOKS:

1. Simulation of Electrical and electronics Circuits using PSPICE – by M.H.Rashid, M/s PHI Publications.
2. PSPICE A/D user's manual – Microsim, USA.
3. PSPICE reference guide – Microsim, USA.
4. MATLAB and its Tool Books user's manual and – Mathworks, USA.