T K R COLLEGE OF ENGINEERING &TECHNOLOGY
(Autonomous)
B.TECH. ELECTRICAL AND ELECTRONICS ENGINEERING
COURSE STRUCTURE & SYLLABUS-R17

III YEAR I SEMESTER

S.No	Course Code	Course Title	L	T	P	Credits
1	**A25PC1**	Electrical Measurements & Instrumentation	**4**	**1**	**0**	**4**
2	**A25PC2**	Power Systems – II	**4**	**1**	**0**	**4**
3	**A25PC3**	Microprocessors and Microcontrollers	**4**	**1**	**0**	**4**
4	**A25HS4**	Fundamentals of Management	**3**	**0**	**0**	**3**
5		**Open elective-I**	**3**	**0**	**0**	**3**
6	**A25PE6**	**Professional elective-I** 1. Computer Organization 2. Digital Signal Processing 3. Information Security	**3**	**0**	**0**	**3**
7	**A25PC7**	Electrical Measurements & Instrumentation Lab	**0**	**0**	**3**	**2**
8	**A25PC8**	Basic Electrical simulation Lab	**0**	**0**	**3**	**2**
9	**A25PC9**	Microprocessors and Microcontrollers Lab	**0**	**0**	**3**	**2**
Total Credits						**27**

III YEAR II SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	A26PC1	Power Systems Analysis	4	1	0	4
2	A26PC2	Power Electronics	4	1	0	4
3	A26PC3	Switch Gear and Protection	4	1	0	4
4		**Open elective-II**	3	0	0	3
5	A26PE5	**Professional elective-II** 1. Electric Drives 2. Design of Electrical Machines 3. High Voltage Engineering	3	0	0	3
6	A26PE6	**Professional elective-III** 1. Linear System Analysis 2. Linear Discrete IC Application 3. Computer Aided analysis and Design	3	0	0	3
7	A26PC7	Power Systems Lab	0	0	3	2
8	A26PC8	Power Electronics & Simulation Lab	0	0	3	2
9	A26HS9	Advanced English Communication skills Lab	0	0	3	2
Total Credits						**27**

T K R COLLEGE OF ENGINEERING &TECHNOLOGY
(Autonomous)

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING -R17

ELECTRICAL MEASUREMENTS & INSTRUMENTATION -A25PC1

B.Tech. III Year I Sem. **L/T/P/C**
4/1/0/4

PRE-REQUISITE:
Basic Electrical and Electronics Engineering, Network theory & Electromagnetic fields.

COURSE OBJECTIVES:
1. To introduce the basic principles of all measuring instruments.
2. To deal with the measurement of voltage, current, Power factor, power, energy and magnetic measurements.

COURSE OUTCOMES:
After completion of this course, the students will be able to
1. Understand different types of measuring instruments, their construction, working principle and characteristics.
2. Identify the instruments suitable for measuring voltage and current.
3. Analyze the energy and power measuring instruments.
4. Apply the suitable bridge to measure unknown resistance, inductance and capacitance
5. Understand and analyze the concept of transducers, photovoltaic cells, photo conductive cells, and photo diodes.

UNIT- I:
Introduction to Measuring Instruments:
Classification – deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type instruments – expression for the deflecting torque and control torque – Errors and compensations, extension of range using shunts and series resistance. Electrostatic Voltmeters-electrometer type and attracted disc type
– extension of range of E.S. Voltmeters.

UNIT– II:
Potentiometers & Instrument transformers:
Principle and operation of D.C. Crompton's
potentiometer – standardization – Measurement of unknown resistance, current, voltage. A.C. Potentiometers: polar and coordinate type's standardization – applications. CT and PT – Ratio and phase angle errors.

UNIT –III:
Measurement of Power & Energy:
Single phase dynamometer wattmeter, LPF and UPF, Double element and three element dynamometer wattmeter's, expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems. Single phase induction type energy meter – driving and braking torques – errors and compensations
– testing by phantom loading using R.S.S. meter. Three phase energy meter – tri-vector meter, maximum demand meters.

UNIT – IV:

DC & AC bridges:

Method of measuring low, medium and high resistance – sensitivity of Wheat-stone's bridge – Carey Foster's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance – loss of charge method. Measurement of inductance- Maxwell's bridge, Hay's bridge, Anderson's bridge - Owen's bridge. Measurement of capacitance and loss angle – Desauty's Bridge - Wien's bridge – Schering Bridge.

UNIT-V:

Transducers: Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle and operation of LVDT and capacitive transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic cells, photo conductive cells, and photodiodes.

Measurement of Non-Electrical Quantities: Measurement of strain, Gauge sensitivity, Displacement, Velocity, Acceleration, Force, Torque, Temperature, Pressure and Flow.

TEXT BOOKS:

1. "A. K. Sawhney", "Electrical & Electronic Measurement & Instruments", Dhanpat Rai & Co. Publications, 2005.
2. "E.W. Golding and F. C. Widdis", "Electrical Measurements and measuring Instruments", fifth Edition, Wheeler Publishing, 2011.

REFERENCE BOOKS:

1. "R. K. Rajput", "Electrical & Electronic Measurement & Instrumentation", S. Chand and Company Ltd., 2007.
2. "Buckingham and Price", "Electrical Measurements", Prentice – Hall,1988.
3. "Reissland, M. U", "Electrical Measurements: Fundamentals, Concepts, Applications", New Age International (P) Limited Publishers, 1 st Edition 2010.
4. "G. K. Banerjee", "Electrical and Electronic Measurements", PHI Learning Pvt. Ltd., 2 nd Edition, 2016
5. "S. C. Bhargava", "Electrical Measuring Instruments and Measurements", BS Publications, 2012.
6. Electronic Instrumentation and Measurement techniques by W.D. Coopeer, A.D Helfrick

T K R COLLEGE OF ENGINEERING &TECHNOLOGY

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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

POWER SYSTEMS – II -A25PC2

B.Tech. III Year I Sem. **L /T/ P/ C**
4 / 1/ 0/ 4

PREREQUISITE:
PS-I and Electromagnetic field theory.

COURSE OBJECTIVES:
1. To compute inductance and capacitance of different transmission Lines.
2. To understand performance of short, medium and long transmission lines.
3. To examine the traveling wave performance and sag of transmission lines.
4. To design insulators for overhead lines and understand cables for power transmission.

COURSE OUTCOMES:
After completion of this course, the students will be able to
1. Compute resistance, inductance and capacitance for different configurations of transmission lines and types of conductors.
2. Analyze the performance of short, medium and long transmission lines
3. Analyze power system transients and various effects occur in transmission lines.
4. Apply the suitable insulators for overhead transmission line and analyze sting efficiency, sag and tension calculations.
5. Analyze different types of underground cables and insulating materials.

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. 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 configuration. Mathematical Solutions to estimate regulation and efficiency of all types of lines - Numerical Problems.
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 – III:
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). 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 – IV:

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. 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 – V:

Underground Cables: - Types of Cables, Construction, Types of Insulating materials, Calculation 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 - HVcables.

TEXT BOOKS

1. "C. L. Wadhwa", "Electrical power systems", New Age International (P) Limited Publishers, 1998.
2. "Grainger and Stevenson", "Power Systems Analysis", Mc Graw Hill, 1st Edition. 2003.
3. "M. L. Soni, P. V. Gupta, U.S. Bhatnagar and A. Chakrabarthy", Power System Engineering, Dhanpat Rai & Co Pvt. Ltd, 2009.

REFERENCE BOOKS

1. "I. J. Nagarath& D. P Kothari", "Power System Engineering", TMH, 2nd Edition 2010.
2. "B. R. Gupta", "Power System Analysis and Design", Wheeler Publishing, 1998.
3. "Abhijit Chakrabarti and SunithaHalder", "Power System Analysis Operation and control", PHI, 3rd Edition, 2010.

T K R COLLEGE OF ENGINEERING &TECHNOLOGY
(Autonomous)

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17
MICROPROCESSORS AND MICROCONTROLLERS - A25PC3

B.Tech III Year I Sem. **L/T/P/C**
4/1/0/4

PREREQUISITES:
Switching Theory and Logic Design (STLD), Computer Organization (CO).

COURSE OBJECTIVES:
1. To develop an understanding of the operations of microprocessors and micro controllers; machine language programming and interfacing techniques.

COURSE OUTCOMES:
After completion of this course the student will be able to:
1. Acquire the knowledge of internal architecture, organization of 8086 and can develop assembly language programming.
2. Acquire the knowledge of internal architecture, organization of 8051 and can develop assembly language programming.
3. Acquire the knowledge of interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessors/microcontroller-based systems.
4. Acquire the knowledge of stands the internal architecture and organization of ARM processors/controllers and can develop assembly language programming.
5. Acquire the knowledge of internal architecture and organization of Advanced ARM Processors.

UNIT – I:
8086 Architecture: 8086 Architecture-Functional diagram, Register Organization,8086 Flag register and function of 8086 flags, Memory Segmentation, Programming Model, Memory addresses, Physical Memory Organization, Architecture of 8086, Pin diagram of 8086, Signal descriptions of 8086- common function signals, minimum and maximum mode signals, Timing diagrams, Interrupts of 8086.
Instruction Set and Assembly Language Programming of 8086: Instruction formats, addressing modes, Instruction Set, Assembler Directives, Macros, and Simple Programs involving Logical, Branch and Call Instructions, Sorting, String Manipulations.

UNIT – II:
Introduction to Microcontrollers: Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.
8051 Real Time Control: Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and Counters.

UNIT – III:
I/O and Memory Interface: 8255 PPI, Stepper motor interfacing to 8086, LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.
Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232, USB.

UNIT – IV: ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table, ARM instruction set – Data processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

UNIT – V: Advanced ARM Processors: Introduction to CORTEX Processor and its architecture, OMAP Processor and its Architecture.

TEXT BOOKS

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandani, MHE, 2nd Edition 2006.
2. The 8051 Microcontroller, Kenneth. J. Ayala, Cengage Learning, 3rd Ed.
3. ARM System Developers guide, Andrew N SLOSS, Dominic SYMES, Chris WRIGHT, Elsevier, 2012.

REFERENCE BOOKS

1. Microprocessors and Interfacing, D. V. Hall, MGH, 2nd Edition 2006.
2. Introduction to Embedded Systems, Shibu K.V, MHE, 2009.
3. The 8051Microcontrollers, Architecture and Programming and Applications -K. Uma Rao, And he Pallavi, Pearson, 2009.

T K R COLLEGE OF ENGINEERING &TECHNOLOGY
(Autonomous)

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

FUNDAMENTALS OF MANAGEMENT - A25HS4

B.Tech. III Year I Sem. **L/T/P/C**
3/0/0/3

COURSE OBJECTIVES:
1. To make the students to understand the management concepts
2. To analyze the managerial skills.
3. To know the applications of management concepts in practical aspects of business.
4. To interpret, understand and develop the management principles in organizations.
5. To learn the basic concepts of organization its principles and functions.

COURSE OUT COMES:
1. To infer the basic knowledge of management functions, levels and evolution of Management.
2. To ensure the students in decision making problem solving for the issues in corporate in the organization.
3. To acquire the knowledge of entire organization design and structure.
4. To perceive the strategically decision in selection, requirement training and development.
5. To enact and impose the qualities of a leader, mentor and coach.

UNIT – I:
Introduction to Management: Definition, Nature and Scope, Functions, Managerial Roles, Levels of Management, Managerial Skills, Challenges of Management; Evolution of Management- Classical Approach- Scientific and Administrative Management; The Behavioral approach.

UNIT – II:
Planning and Decision Making: General Framework for Planning - Planning Process, Types of Plans. Decision making and Problem solving - Programmed and Non-Programmed Decisions, Steps in Problem Solving and Decision Making.

UNIT – III:
Organization and HRM: Principles of Organization: Organizational Design & Organizational Structures; Departmentalization, Delegation; Empowerment, Centralization, Decentralization, Recentralization;
Human Resource Management & Business Strategy: Talent Management, Talent Management Models and Strategic Human Resource Planning; Recruitment and Selection; Training and Development; Performance Appraisal.

UNIT – IV:
Leading and Motivation: Leadership, Power and Authority, Leadership Styles; Behavioral Leadership, Situational Leadership, Leadership Skills, Leader as Mentor and Coach, Leadership during adversity and Crisis.
Motivation - Types of Motivation; Motivational Theories - Needs Hierarchy Theory, Two Factor Theory, Theory X and Theory Y.

UNIT – V:

Controlling: Control, Types and Strategies for Control, Steps in Control Process, Budgetary and Non- Budgetary Controls. Characteristics of Effective Controls.

TEXT BOOKS

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.
2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.

REFERENCE BOOKS

1. Essentials of Management, Koontz Kleihrich, Tata Mc - Graw Hill.
2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012.
3. Harold Koontz and Heinz Weihrich, 2010, Essentials of Management,TMH

T K R COLLEGE OF ENGINEERING &TECHNOLOGY
(Autonomous)

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

COMPUTER ORGANIZATION- A25PE6
Professional Elective - I

B. Tech. III Year I Sem **L /T /P/ C**
3 / 0 /0/ 3

COURSE OBJECTIVES:

1. To understand basic components of computers.
2. To understand the architecture of 8086 processor.
3. To understand the instruction sets, instruction formats and various addressing modes of 8086.
4. To understand the representation of data at the machine level and how computations are performed at machine level.
5. To understand the memory organization and I/O organization.
6. To understand the parallelism both in terms of single and multiple processors.

COURSE OUTCOMES:

1. Able to understand the basic components and the design of CPU, ALU and Control Unit.
2. Ability to understand memory hierarchy and its impact on computer cost/performance.
3. Ability to understand the advantage of instruction level parallelism and pipelining for high performance Processor design.
4. Ability to understand the instruction set, instruction formats and addressing modes of 8086.
5. Ability to write assembly language programs to solveproblems.

UNIT – I:

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture. Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt, Complete Computer Description. Micro Programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

UNIT – II:

Central Processing Unit: The 8086 Processor Architecture, register organization, Physical memory organization, General Bus Operation, I/O Addressing Capability, Special Processor Activities, Minimum and Maximum mode system and timings. 8086 Instruction Set and Assembler Directives- Machine language instruction formats, addressing modes, Instruction set of 8086, Assembler directives and operators.

UNIT – III:

Assembly Language Programming with 8086- Machine level programs, Machine coding the programs, Programming with an assembler, Assembly Language example programs. Stack structure of 8086, Interrupts and Interrupt service routines, Interrupt cycle of 8086, Interrupt programming, Passing parameters to procedures, Macros, Timings and Delays.

UNIT – IV:

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating - point Arithmetic operations. Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP), Intel 8089 IOP.

UNIT – V:

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory. Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors. Multi Processors: Characteristics of Multiprocessors, Interconnection Structures, inter processor arbitration, Inter processor communication, and synchronization.

TEXT BOOKS

1. Computer System Architecture, M. Moris Mano, Third Edition, Pearson. (UNITS- I, IV, V)
2. Advanced Microprocessors and Peripherals, K M Bhurchandi, A.K Ray ,3rd edition, McGraw Hill India Education Private Ltd. (UNITS - II, III).

REFERENCE BOOKS

1. Microprocessors and Interfacing, D V Hall, SSSP Rao, 3rd edition, McGraw Hill India Education Private Ltd.
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, Tata McGraw Hill, 2002
3. Computer Organization and Architecture, William Stallings, 9th Edition, Pearson.
4. David A. Patterson, John L. Hennessy: Computer Organization and Design – The Hardware / Software Interface ARM Edition, 4th Edition, Elsevier,2009.

T K R COLLEGE OF ENGINEERING &TECHNOLOGY
(Autonomous)

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

DIGITAL SIGNAL PROCESSING- A25PE6

B. Tech. I II Year I Sem. **L/ T/ P/ C**
3 / 0/ 0/ 3

PREREQUISITES:
To have knowledge of Signals and Systems.

COURSE OBJECTIVES:
The objective of this subject is to
1. Provide background and fundamental material for the analysis and processing of digital signals.
2. Study fundamentals of time, frequency and Z plane analysis and to discuss the inter relationships of these analytic method.
3. Study the design and structures of digital filters from analysis to synthesis for a given specifications.
4. Acquaint in FFT algorithms, multi rate signal processing techniques and finite word length effects.

COURSE OUTCOMES:
After completion of this course, the students will be able to
1. Acquire knowledge on various types of continuous and discrete time signals, solves linear constant coefficient difference equation also can realize digital filters.
2. Calculate time domain and frequency domain of signals using DFS, DFT and develop FFT Algorithm for faster realization of signals and systems
3. Design digital IIR filters from analog filters using various techniques.
4. Design digital FIR filters using Window techniques, Fourier methods and frequency sampling techniques.
5. Design Interpolator and Decimator, knows the impacts of Finite Word Length Effects in Filter design.

UNIT –I:
INTRODUCTION: Introduction to Digital Signal Processing, Applications, Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations, Frequency domain representation of discrete time signals and systems.
RANSFORMS: Review of Z-transforms, Applications of Z – transforms, solution of difference equations of digital filters, system function, stability criterion, frequency response of stable systems.

UNIT – II:
DISCRETE FOURIER TRANSFORMS: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT: Over-lap save, Over-lap add methods, Relation between DTFT, DFS and Z-transform.

FAST FOURIER TRANSFORMS: Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT, and FFT for composite N, Linear filtering approach for computing DFT.

UNIT–III:

IIR DIGITAL FILTERS: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters-Backward difference algorithm, Step and Impulse invariant techniques, Bilinear transformation method, spectral transformations, Realization of IIR Digital filters, applications.

UNIT–IV:

FIR DIGITAL FILTERS: Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Fourier series method, Window Techniques, Frequency Sampling technique, Realization of FIR Digital filters, Comparison of IIR & FIR filters.

UNIT –V:

MULTIRATE DIGITAL SIGNAL PROCESSING: Introduction, Down Sampling, Decimation, Up sampling, Interpolation, sampling rate conversion, Multistage implementation of Interpolator and Decimator, Applications.

Finite Word Length Effects: Limit cycles, Overflow oscillations, Round-off noise in IIR digital filters, computational output round off noise, Methods to prevent overflow. Tradeoff between round off and overflow noise, Dead band effects.

TEXT BOOKS

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI,2007.
2. Discrete Time Signal Processing-A.V. Oppenheim and R.W. Schaffer, PHI,2009
3. Digital Signal processing –Tarun Kumar Rawat, Oxford University Press,2015

REFERENCE BOOKS

1. Analog and Digital Signal Processing by Ashok Ambardar -2nd Edition, Brooks/Cole Publishing Company,2006
2. Digital Signal processing-S. Shalivahanan, A. Vallavaraj and C. Gnanapriya, TMH, 2009.
3. Fundamentals of Digital Signal processing- Loney Ludeman, John Wiley,2009

T K R COLLEGE OF ENGINEERING &TECHNOLOGY
(Autonomous)

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

INFORMATION SECURITY - A25PE6

B. Tech. III Year I Sem. **L/ T/ P /C**
3 /0/ 0/ 3

COURSE OBJECTIVES:

1. Explain the objectives of information security
2. Explain the importance and application of each of confidentiality, integrity, authentication and availability
3. Understand various cryptographic algorithms.
4. Understand the basic categories of threats to computers and networks
5. Describe public-key cryptosystem.
6. Describe the enhancements made to IPv4 by IP Sec
7. Understand Intrusions and intrusion detection
8. Discuss the fundamental ideas of public-key cryptography.
9. Generate and distribute a PGP key pair and use the PGP package to send an encrypted e-mail message.
10. Discuss Web security and Firewalls.

COURSE OUTCOMES:

1. Student will be able to understand basic cryptographic a algorithms, message and web authentication and security issues.
2. Ability to identify information system requirements for both of them such as client and server.
3. Ability to understand the current legal issues towards information security.

UNIT –I:

Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

UNIT – II:

Symmetric key Ciphers: Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Crypt analysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Keydistribution

Asymmetric key Ciphers: Principles of public key cryp to systems, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution.

UNIT –III:

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm

Authentication Applications: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication.

UNIT – IV:

E-Mail Security: Pretty Good Privacy, S/MIME

IP Security: IP security overview, IP Security architecture, Authentication Header, encapsulating

security payload, combining security associations, key management.

UNIT – V:

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction

Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related threats, Countermeasures, Firewall design principles, types of firewalls

Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual E lections.

TEXT BOOKS

1. Cryptography and Network Security: William Stallings, Pearson Education,4th Edition
2. Cryptography and Network Security: Atul Kahate, Mc Graw Hill Edition.

REFERENCE BOOKS

1. Cryptography and Network Security: C K Shyamala, N Harin i, Dr T R Padmanabhan, Wiley India, 1th Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, MC Graw Hill, 2nd Edition
3. Information Security, Principles and Practice: Mark Stamp, WileyIndia.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White,TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGELearning
6. Network Security and Cryptography: Bernard Menezes, CENGAGELearning

T K R COLLEGE OF ENGINEERING &TECHNOLOGY
(Autonomous)

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

ELECTRICAL MEASUREMENTS & INSTRUMENTATION LAB (A25PC7)

B. Tech. III Year I Sem. **L/T/P/C**
0/0/3/2

Course Objectives:

1. To calibrate LPF Watt Meter, energy meter, P. F Meter using electro dynamo meter type instrument as the standard instrument.
2. To determine unknown inductance, resistance, capacitance by performing experimentson D.C Bridges & C Bridges.
3. To determine three phase active & reactive powers using single wattmeter method practically.
4. To determine the ratio and phase angle errors of current transformer and potential transformer.

Course Outcomes:

After completion of this course the students will be able to

1. Understand different measuring instruments and their characteristics.
2. Find the accuracy of instruments by performing experiment
3. Analyze the calibration of different measuring instruments.

The following experiments are required to be conducted as compulsory experiments

1. Calibration and Testing of single phase energy Meter.
2. Calibration of dynamometer type power factormeter.
3. Calibration of PMMC ammeter and voltmeter using D.C. Potentiometer.
4. Measurement of low resistance using Kelvin's double Bridge.
5. Dielectric test of transformer oil.
6. Measurement of unknown inductance and capacitance using Schering bridge & Anderson bridge.
7. Measurement of 3 - Phase reactive power using single wattmeter.
8. Measurement of displacement using LVDT.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted

1. Calibration of LPF wattmeter by Phantom loading.
2. Measurement of 3-phase power with single watt meter and twoCTs.
3. C.T. testing using mutual Inductor – Measurement of % ratio, phase angle error of given CT by Null method.
4. PT testing by comparison – V. G. as Null detector – Measurement of % ratio error and phase angle error of the given PT by Nullmethod.
5. Resistance strain gauge – Strain measurements and Calibration.
6. Measurement of Turns ratio of Transformer using AC bridges.
7. Measurement of % ratio error and phase angle of given CT bycomparison.

T K R COLLEGE OF ENGINEERING &TECHNOLOGY
(Autonomous)

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

BASIC ELECTRICAL SIMULATION LAB -A25PC8

B.Tech. III- Year I-Sem. **L/ T/ P/ C**
0 / 0/ 3/2

PREREQUISITE:
Basic Electrical and Electronics Engineering & Network Theory.

COURSE OBJECTIVES:
1. To develop the simulation skills.
2. To generate various signals and synthesis for the engineering systems.
3. To analyze harmonics in the systems.
4. To analyze electrical circuit in simulation environment.

COURSE OUTCOMES:
After completion of this course, students will be able to
1. Apply the signal generation techniques for different systems.
2. Analyze electrical networks by various laws and theorems using simulation.
3. Design various filters and verify using simulation.
4. Analyze the performance of bridge rectifiers and harmonics using simulation.

The following experiments are required to be conducted compulsory experiments:
1. Basic Operations on Matrices
2. Generation of various signals and sequences (Periodic and Aperiodic), such as unit Impulse, Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on signals and sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy, and Average Power
4. Mesh and Nodal Analysis of Electrical circuits using simulation.
5. Verification of Network Theorems using simulation.
6. Waveform Synthesis using Laplace Transform.
7. Locating the Zeros and Poles and Plotting the Pole-Zero maps in S plane and Z-Plane for the given transfer function.
8. Harmonic analysis of non-sinusoidal waveforms.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted.
1. Simulation of DC and AC Circuits
2. Transient Analysis of R, RL and RLC circuits using simulation.
3. Measurement of active Power of three phase circuit for balanced and unbalanced load.
4. Simulation of single-phase diode bridge rectifiers with filter for R & RL load
5. Simulation of three phase diode bridge rectifiers with R, RL load
6. Design of Low Pass and High Pass filters.
7. Design of Passive filters.
8. Solution of I order and II order different equations using RK fourth order method.

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(Autonomous)

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

MICROPROCESSORS AND MICROCONTROLLERS LAB - A25PC9

B.Tech. III- Year I-Sem. **L/ T/P/ C**
0/ 0/ 3 /2

COURSE OBJECTIVES:

1. To develop an understanding of the operations of microprocessors and micro controllers; machine language programming and interfacing techniques.

Note: - Minimum of 12 experiments to be conducted. The following programs/experiments are to be written for assembler and to be executed the same with 8086 and 8051 kits.

List of Experiments:

1. Programs for 16-bit arithmetic operations 8086(using various addressing modes)
2. Programs for sorting an array for 8086.
3. Programs for searching for a number of characters in a string for8086.
4. Programs for string manipulation for 8086.
5. Programs for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086.
7. Parallel communication between two microprocessor kits using 8255.
8. Serial communication between two microprocessor kits using 8251.
9. Interfacing to 8086 and programming to control stepper motor.
10. Programming using arithmetic, logical and bit manipulation instructions of 8051.
11. Program and verify Timer/Counter in 8051.
12. Program and verify interrupt handling in 8051.
13. UART operation in 8051.
14. Communication between 8051 kit and PC.
15. Interfacing LCD to 8051
16. Interfacing Matrix/Keyboard to 8051
17. Data transfer from peripheral to memory through DMA controller8237/8257.
18. Programs for arithmetic operations using ARM7 2148 plus.
19. Program for Digital output (blink LEDs) using ARM7 2148plus.

COURSE OUTCOMES:

Upon completion of this course the student will be able to:

1. Apply the fundamentals of assembly level programming for microprocessors/ microcontrollers.
2. Develop programs on a microprocessor using instruction set of 8086.
3. Develop the assembly level programming using 8051 instruction set.
4. Analyze different I/O devices which can be interfaced to microprocessor and microcontroller.
5. Develop programs using instruction set of ARM.

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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

POWER SYSTEMS ANALYSIS - A26PC1

B.Tech III Year II Sem. **L/ T/ P/ C**
4 /1 / 0 / 4

PREREQUISITE:
Power Systems-I & Power Systems –II.

COURSE OBJECTIVES:
1. To understand and develop Y_{bus} and Z_{bus} matrices
2. To know the importance of load flow studies and its importance
3. To analyze various types of short circuits
4. To know rotor angle stability of power systems.

COURSE OUTCOMES:
After completion of this course, the students will be able to
1. Analyze Graph theory and develop the Y_{bus} and Z_{bus} matrices.
2. Analyze power flow studies using Gauss-seidal, Newton Raphson methods.
3. Analyze the sensitivity and power flow studies using Fast decoupled method.
4. Analyze short circuit studies for the protection of power system.
5. Estimate stability and instability in power systems.

UNIT – I:
Power System Network Matrices: Graph Theory: Definitions and Relevant concepts in Graph Theory, Network Matrices. Transmission Network Representations: Bus Admittance frame and Bus Impedance frame. Formation of Y_{bus}: Direct and Singular Transformation Methods, Numerical Problems. Formation of Z_{Bus}: Modification of existing Z_{Bus} Matrix for addition of a new branch, & complete Z_{Bus} building algorithm Numerical Problems.

UNIT – II:
Power Flow Studies – I: Introduction: Necessity of Power Flow Studies, Bus classification and Notations, Convergence & Bus mismatch criteria. Load Flow Methods: Gauss- Seidal Method in complex form without & with voltage control buses, line flows and loss calculations, Newton Raphson method in Polar and Rectangular form, derivation of Jacobian elements, Numerical solutions for one or two iterations.

UNIT – III:
Power Flow Studies - II: Introduction to sensitivity & decoupled sub matrices of J- matrix, Decoupled load flow method and its assumptions, Fast Decoupled load method and its assumptions, Comparison of Different Methods – DC load Flow method, Numerical solutions for one or two iterations.

UNIT – IV:
Short Circuit Analysis: Per-Unit Representation. Per-Unit equivalent reactance network of a three phase Power System, Numerical Problems. Symmetrical fault Analysis: Short Circuit Current and MVA Calculations, Fault levels, Application of Series Reactors. Symmetrical Components, sequence impedances and networks. Unsymmetrical Fault Analysis: Fault current calculations for LG, LL, LLG faults with and without fault impedance, Numerical Problems.

UNIT – V:

Power System Stability Analysis: Introduction to Power System Stability issues. Rotor dynamics & Swing equation, Power angle equation with & without neglecting line resistance, Steady State Stability, Determination of Transient Stability through Equal Area Criterion for single machine infinite bus system, Critical clearing angle & time, Numerical problems. Multi-machine transient analysis: Classical representation of system and its assumptions, Solution of Swing Equation by Point-by-Point Method, Methods to improve Stability.

TEXT BOOKS

1. "I. J. Nagrath & D. P. Kothari", "Modern Power system Analysis", Tata McGraw-Hill Publishing Company, 4th Edition 2011.
2. Grainger and Stevenson, "Power System Analysis", Tata McGraw Hill,2003.

REFERENCE BOOKS

1. "M. A. Pai", "Computer Techniques in Power System Analysis", TMH Publications, 3rd Edition 2014.
2. Abhijit Chakrabarthi and Sunita Haldar, "Power System Analysis Operation and Control", 3rd Edition, PHI, 2010.
3. "Hadi Saadat", "Power System Analysis", TMH Edition, 2002.
4. "C. L. Wadhwa", "Electrical power systems", New Age International (P) Limited Publishers, 1998.

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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

POWER ELECTRONICS - A26PC2

B.Tech. III Year II Sem. **L /T/ P/ C**
4 /1 /0 / 4

PREREQUISITE:
Electronic circuits

COURSE OBJECTIVES:
1. To Design/develop suitable power converter for efficient control or conversion of power in drive
2. To Design / develop suitable power converter for efficient transmission and utilization of power in power system applications.

COURSE OUTCOMES:
After completion of this course the students will be able to
1. Understand the characteristics of power semiconductor devices and commutation techniques.
2. Analyze the performance of single phase and three phase converters.
3. Analyze AC Voltage Controllers and Cyclo converters.
4. Select the suitable chopper for particular applications.
5. Analyze single phase and three phase inverters with suitable PWM techniques.

UNIT – I:
Power Semi-Conductor Devices and Commutation Circuits: 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. Two transistor analogy of SCR - R, RC, UJT firing circuits - Series and parallel connections of SCRs - Snubber circuit details – Specifications and Ratings of SCR, BJT, IGBT - Numerical problems – Line Commutation and Forced Commutation circuits.

UNIT – II:
Single Phase Half Wave Controlled Converters: Phase control technique - Single phase Line commutated converters - Half wave-controlled converters with Resistive, RL load and RLE load - Derivation of average load voltage and current -Active and Reactive power inputs to the converters without and with Freewheeling Diode - Numerical problems
Single Phase Fully Controlled Converters: Fully controlled converters, Midpoint and Bridge connections with Resistive, RL loads and RLE load - Derivation of average load voltage and current– Line commutated inverters, semi-converters, active and Reactive power inputs to the converters, Effect of source inductance – Expressions of load voltage and current – Single phase dual converters - Numerical problems.
Three Phase line commutated Converters: Three phase converters - Three pulse and six pulse converters and bridge connections with R, RL load voltage and current with R and RL load and RLE loads - Semi Converters, Effect of Source inductance– Dual converters – Circulating and non-circulating mode - Waveforms - Numerical Problems.

UNIT – III:

AC Voltage Controllers and 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, Numerical problems- Single phase and three phase cyclo converters.

UNIT – IV:

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 - Oscillation choppers - waveforms — AC Chopper – Problems.

UNIT – V:

Inverters: Inverters – Single phase inverter – Basic series inverter, parallel Capacitor inverter, bridge inverter – Three phase inverters (180 and 120 Mode), Voltage control techniques for inverters- Pulse width modulation techniques – Numerical problems.

TEXT BOOKS:

1. M. D. Singh & K. B. Kanchandhani, "Power Electronics", Tata Mc Graw – Hill Publishing Company, 1998.
2. "M. H. Rashid", "Power Electronics: Circuits, Devices and Applications", Prentice Hall of India, 2nd edition, 1998
3. "V. R. Murthy", "Power Electronics", Oxford University Press, 1st Edition 2005.

REFERENCE BOOKS:

1. Vedam Subramanyam, "Power Electronics", New Age International (P) Limited, Publishers, 2nd Edition 2008.
2. Philip T. Krein, "Elements of Power Electronics", Oxford University Press, 1997.
3. M. S. Jamil Asghar, "Power Electronics", PHI Private Limited, 2004.
4. P. C. Sen, "Power Electronics", Tata Mc Graw-Hill Publishing, 2001
5. John G. Kassakian, Martin, F. Schlect, Geroge C. Verghese, "Principles of Power Electronics",
   Pearson Education, 1st Edition 2010.
6. Ned Mohan, Power Electronics.
7. P.S.Bhimra,PowerElectronics.

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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

SWITCH GEAR AND PROTECTION - A26PC3

B.Tech. III Year II Sem. **L /T/ P /C**
4 /1/ 0/ 4

PREREQUISITE:
Power Systems - I & Power Systems – II

COURSE OBJECTIVES:
1. To introduce all kinds of circuit breakers and relays for protection of Generators,
2. Transformers and feeder bus bars from Over voltages and other hazards.
3. To describe neutral grounding for overall protection.
4. To understand the phenomenon of Over Voltages and its classification.

COURSE OUTCOMES:
After Completion of this course student will be able to
1. Understand the types of Circuit breakers for appropriate protection of power system equipment.
2. Analyze the electromagnetic and static relays and their choice for the protection of power system equipment.
3. Understand various types of Protective devices in Electrical Power Systems.
4. Understand the importance of Neutral Grounding, Effects of Ungrounded Neutral grounding on system performance, Methods and Practices.
5. Interpret the existing transmission voltage levels and various means to protect the system against over voltages.

UNIT – I:
Introduction to Circuit Breakers:
Circuit Breakers: Elementary principles of arc interruption, Recovery, Restriking Voltage and Recovery voltages - Restriking Phenomenon, Average and Maximum RRRV, Numerical Problems - Current Chopping and Resistance Switching - CB ratings and Specifications: Types and Numerical Problems. – Auto- reclosures. Description and Operation of following types of circuit breakers: Minimum Oil Circuit breakers, Air Blast Circuit Breakers, Vacuum, and SF6 circuit breakers.

UNIT – II :
Electromagnetic and Static Relays:
Principle of Operation and Construction of Attracted armature, Balanced Beam, induction Disc and Induction Cup relays. Types of Over Current Relays: Instantaneous, DMT and IDMT types. Application of relays: Over current/ under voltage relays, Direction relays, Differential Relays and Percentage Differential Relays. Universal torque equation, Distance relays: Impedance, Reactance, and Mho and Off-Set Mho relays, Characteristics of Distance Relays and Comparison. Static Relays: Static Relays verses Electromagnetic Relays.

UNIT – III:
Protection of Power Equipment:
Protection of generators against Stator faults, Rotor faults, and Abnormal Conditions. Restricted Earth fault and Inter-turn fault Protection. Numerical Problems on % Winding Unprotected.

Protection of transformers: Percentage Differential Protection, Numerical Problem on Design of CT s Ratio, Buchholtz relay Protection.
Protection of Lines: Over Current, Carrier Current and Three-zone distance relay protection using Impedance relays. Translay Relay.
Protection of Bus bars – Differential protection.

UNIT – IV :
Neutral Grounding:
Grounded and Ungrounded Neutral Systems. - Effects of Ungrounded Neutral on system performance. Methods of Neutral Grounding: Solid, Resistance, Reactance
- Arcing Grounds and Grounding Practices.

UNIT – V :
Protection Against Over voltages:
Generation of Over Voltages in Power Systems - Protection against Lightning Over Voltages - Valve type and Zinc-Oxide Lighting Arresters - Insulation Coordination -BIL, Impulse Ratio, Standard Impulse Test Wave, Volt- Time Characteristics.

TEXT BOOKS

1. "Badri Ram, D. N Viswakarma", "Power System Protection and Switchgear", TMH Publications, 2011
2. "C. L. Wadhwa", "Electrical Power Systems", New Age international (P) Limited, Publishers, 6th Edition 2007
3. "Sunil S Rao", "Switchgear and Protection", Khanna Publishers, 2008.

REFERENCE BOOKS

1. "Paithankar and S. R. Bhide", "Fundamentals of Power System Protection", PHI, 2003.
   "C R Mason", Art & Science of Protective Relaying – Wiley Eastern Ltd, 1966

T K R COLLEGE OF ENGINEERING &TECHNOLOGY
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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

ELECTRIC DRIVES -A26PE5

B.Tech. III Year II Sem. **L/T/P/C**
3/0/0/3

COURSE OBJECTIVES:

1. This course is an extension of Power Electronics applications to AC and DC drives.
2. Control of DC motor drives with single phase and three phase converters and choppers are given in detail.
3. The control of AC motor drives with variable frequency converters and variable voltage are presented.

COURSE OUTCOMES:

After Completion of this course, the students will be able to

1. Discuss control of DC Motors through Phase Controlled Rectifiers.
2. Develop Four Quadrant Operation of DC Drives through Dual Converters.
3. Explain Control of DC Motors by Choppers.
4. Demonstrate different control techniques of induction motors.
5. Demonstrate different control techniques of synchronous motors.

UNIT – I:

Control of DC Motors through Phase Controlled Rectifiers:

Introduction to Thyristor controlled Drives, Single Phase semi and fully controlled converters connected to DC separately excited and DC series motors – continuous current operation – output voltage and current waveform – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed DC motors. Three phase semi and fully controlled converters connected to DC separately excited and DC series motors – output voltage and current waveform – Speed and Torque expressions – Speed – Torque characteristics – Problems.

UNIT – II:

Four Quadrant Operation of DC Drives through Dual Converters:

Introduction to Four quadrant operation – Motoring operations. Electric Braking – Plugging, Dynamic and Regenerative Braking operations. Four quadrant operation of D.0 motors by dual converters – Closed loop operation of DC motor (Block Diagram Only).

UNIT-III:

Control of DC Motors By Choppers (1-, 2-, 4- Quadrant Operations) :

Single quadrant, Two -quadrant and four quadrant chopper fed dc separately excited and series excitedmotors

– Continuous current operation – Output voltage and current wave forms – Speed torque expressions – speed torque characteristics – Problems on Chopper fed DC Motors – Closed Loop operation (Block Diagram Only).

UNIT –IV:

Control of Induction Motors:

Variable voltage characteristics: Control of Induction Motor by Ac Voltage Controllers – Waveforms – speed torque characteristics.

Variable frequency characteristics: Variable frequency control of induction motor by

Voltage source and current source inverter and cyclo-converters- PWM control – Comparison of VSI and CSI operations – Speed torqu characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block Diagram Only).

Static rotor resistance control: Slip power recovery – Static Scherbius drive – Static Kramer Drive – their performance and speed torque characteristics – advantages applications – problems.

UNIT – V

Control of Synchronous Motors:

Separate control & self control of synchronous motors – Operation of self controlled synchronous motors by VSI and CSI cycloconverters. Load commutated CSI fed Synchronous Motor – Operation – Waveforms – speed torque characteristics – Applications – Advantages and Numerical Problems – Closed Loop control operation of synchronous motor drives (Block Diagram Only),variable frequency control, Cyclo converter, PWM, VFI, CSI.

TEXT BOOKS

1. Power Semiconductor Drives, PV Rao, BS Publications.
2. Fundamentals of Electric Drives, G K Dubey Narosa Publications

REFERENCE BOOKS

1. Power Semiconductor Drives, S. B. Dewan, G. R. Slemon , A. Straughen, Wiley Pvt Ltd.
2. Electric Drives N. K. De, P. K. Sen, PHI Learning Private Ltd.

T K R COLLEGE OF ENGINEERING &TECHNOLOGY
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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

DESIGN OF ELECTRICAL MACHINES - A26PE5

B.Tech. III Year II Semester **L/T/P/C**
3/0/0/3

COURSE OBJECTIVES: The main objectives of the course are

1. To introduces the basic concepts of machines and transformer
2. To teach the modeling of induction motor and synchronous motor
3. To develop Computer aided Design of machines

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

1. Understand the construction and performance characteristics of electrical machines.
2. Understand the various factors which influence the design: electrical, magnetic and thermal Loading of electrical machines
3. Understand the principles of electrical machine design and carry out a basic design of an ac Machine.
4. Use software tools to do design calculations.

UNIT I:

Introduction: Major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings, thermal considerations, heat flow, temperature rise, rating of machines.

UNIT II:

Transformers : Sizing of a transformer, main dimensions, kVA output for single- and three-phase transformers, window space factor, overall dimensions, operating characteristics, regulation, no load current, temperature rise in transformers, design of cooling tank, methods for cooling of transformers.

UNIT III:

Induction Motors : Sizing of an induction motor, main dimensions, length of air gap, rules for selecting rotor slots of squirrel cage machines, design of rotor bars & slots, design of end rings, design of wound rotor, magnetic leakage calculations, leakage reactance of polyphase machines, magnetizing current, short circuit current, circle diagram, operating characteristics.

UNIT IV:

Synchronous Machines: Sizing of a synchronous machine, main dimensions, design of salient pole machines, short circuit ratio, shape of pole face, armature design, armature parameters, estimation of air
gap length, design of rotor, design of damper winding, determination of full load field mmf, design of field winding, design of turbo alternators, rotordesign.

UNIT V:

Computer aided Design (CAD): Limitations (assumptions) of traditional designs, need for CAD analysis, synthesis and hybrid methods, design optimization methods, variables, constraints and objective function, problem formulation. Introduction to FEM based machine design. Introduction to **c**omplex structures of modern machines-PMSMs, BLDCs, SRM and claw-pole machines

TEXT / REFERENCE BOOKS:

1. A. K. Sawhney, "A Course in Electrical Machine Design", Dhanpat Rai and Sons, 1970.
2. M.G. Say, "Theory & Performance & Design of A.C. Machines", ELBS London.
3. S. K. Sen, "Principles of Electrical Machine Design with computer programmes", Oxford and IBH Publishing, 2006.

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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

HIGH VOLTAGE ENGINEERING -A26PE5

B.Tech. III Year II Semester **L/ T/ P /C**
3 /0/ 0/3

Prerequisite:
Power Systems-I

COURSE OBJECTIVES:
1. To get the knowledge of dielectric materials.
2. Deals with Various Dielectric Materials, Numerical methods for electric field computation and Applications.
3. To learn the over voltage phenomena and insulationco-ordination.
4. Deals with high voltage testing of materials and electrical apparatus.

COURSE OUTCOMES:
After completion of this course the students will be able to
1. Understand Various Dielectric Materials, Numerical methods for electric field computation and Applications.
2. Analyze break down occurs in Gaseous, Solid and liquiddielectrics.
3. Understand the generation and measurement of high voltages and currents.
4. Analyze the causes of over voltage and insulationcoordination.
5. Analyze the High Voltage Testing of Electrical Apparatus and Non-Destructive materials.

UNIT I:
Introduction to High Voltage Technology and Applications: Electric Field Stresses, Gas / Vaccum as Insulator, Liquid Dielectrics, Solids and Composites, Estimation and Control of Electric Stress, Numerical methods for electric field computation, Surge voltages, their distribution and control, Applications of insulating materials in transformers, rotating machines, circuit breakers, cable power capacitors and bushings.

UNIT II:
Break Down in Gaseous, Solid and Liquid Dielectrics: Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases, Paschen's law. Liquid as Insulator, pure and commercial liquids, breakdown in pure and commercial liquids. Intrinsic breakdown, electromechanical breakdown, thermal breakdown, breakdown of solid dielectrics in practice, Breakdown in composite dielectrics, solid dielectrics used in practice.

UNIT III:
Generation and Measurements of High Voltages and Currents: Generation of High Direct Current Voltages, Generation of High alternating voltages, Generation of Impulse Voltages, Generation of Impulse currents, Tripping and control of impulse generators. Measurement of High Direct Current voltages, Measurement of High Voltages alternating and impulse, Measurement of High Currents-direct, alternating and Impulse, Oscilloscope for impulse voltage and current measurements and trapping.

UNIT IV:

Over Voltage Phenomenon and Insulation Co-Ordination : Natural causes for over voltages – Lightning phenomenon, Overvoltage due to switching surges, system faults and other abnormal conditions, Principles of Insulation Coordination on High voltage and Extra High Voltage power systems.

UNIT V:

Non-Destructive and High Voltage Testing of Material and Electrical Apparatus: Measurement of D.C Resistivity, Measurement of Dielectric Constant and loss factor, Partial discharge measurements. Testing of Insulators and bushings, Testing of Isolators and circuit breakers, testing of cables, Testing of Transformers, Testing of Surge Arresters, Radio Interference measurements.

TEXT BOOKS

1. High Voltage Engineering - *M.S.Naidu and V. Kamaraju* – TMH Publications, 3rd Edition, 2009.
2. High Voltage Engineering - *C.L.Wadhwa*, New Age Internationals (P) Limited, 1997.

REFERENCE BOOKS

1. High Voltage Insulation Engineering - *Ravindra Arora, Wolfgang Mosch*, New Age International (P) Limited, 1995.
2. High Voltage Engineering: Fundamentals - *E.Kuffel, W.S.Zaengl, J.Kuffel*, Elsevier publications, 2nd Edition, 2000.

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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING R-17

LINEAR SYSTEMS ANALYSIS - A26PE6

B. Tech. III Year II Semester **L /T/ P/ C**
3 /0/ 0 /3

PREREQUISITE:
Mathematics – II & Network Theory.

COURSE OBJECTIVES:
1. To develop ability to analyze linear systems and signals
2. To develop critical understanding of mathematical methods to analyze linear systems and signals.

COURSE OUTCOMES:
1. After successfully completing this course, students will be able to:
2. Analyze the state variables in electrical networks.
3. Apply Fourier series and Fourier Transform for electrical networks.
4. Apply Laplace Transform for electrical networks, and analyze network synthesis.
5. Apply the knowledge of sampling theorem for signals.
6. Analyze the electrical networks using Z-Transforms and inverse Z-Transforms.

UNIT-I:
State Variable Analysis: Choice of state variables in Electrical Networks-Formulation of state equations for Electrical networks Equivalent source method. Network topological method - Solution of state equations-Analysis of simple networks with state variable approach.

UNIT–II:
Fourier Series and Fourier Transform Representation: Introduction, Trigonometric form of Fourier series, Exponential form of Fourier series, Wave symmetry, Fourier integrals and transforms, Fourier transform of a periodic function , Properties of Fourier Transform , Parseval's theorem , Fourier transform of some common signals, Fourier transform relationship with Laplace Transform.

Applications of Fourier series and Fourier Transform Representation: Introduction, Effective value, and average values of non sinusoidal periodic waves, currents, Power Factor, Effects of harmonics, Application in Circuit Analysis, Circuit Analysis using Fourier Series.

UNIT – III:
Laplace Transform Applications: Application of Laplace transform Methods of Analysis – Response of RL, RC, RLC Networks to Step, Ramp, and impulse functions, Shifting Theorem – Convolution Integral – Applications
Testing of Polynomials: Elements of realisability - Hurwitz polynomials-positive real functions- Properties-Testing-Sturm's Test, examples.
Network Synthesis: Network synthesis: Synthesis of one port RL, RC and LC networks-Foster and Cauer methods.

UNIT-IV:

Sampling: Sampling theorem – Graphical and Analytical proof for Band Limited Signal impulse sampling, natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, introduction to Band Pass sampling, Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Power density spectrum, Relation between auto correlation function and Energy / Power spectral density function.

UNIT-V:

Z-Transforms: Fundamental difference between continuous and discrete time signals, discrete time complex, exponential and sinusoidal signals, periodicity of discrete time complex exponential, concept of Z Transform of a discrete sequence. Distinction between Laplace, Fourier, and Z-Transforms. Region of convergence in Z-Transforms, constraints on ROC for various classes of signals, Inverse Z-Transform properties of Z-Transforms.

TEXT BOOKS

1. "B. P. Lathi", "Signals, Systems and Communications", BS Publications 2003.
2. "Gopal G Bhise, Prem R. Chadha", Engineering Network Analysis and Filter Design, Umesh Publications 2009.

REFERENCE BOOKS

1. "A. N. Tripathi", "Linear System Analysis", New Age International, 2nd Edition 1987.
2. "D. Roy Chowdhary", "Network and Systems", New Age International, 2005. "Umesh Sinha" "Network Analysis and Synthesis", Satya Prakashan Publications, 2013.
3. "A. Cheng", linear system analysis, Oxford publishers, 1999.

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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING -R17

LINEAR DISCRETE IC APPLICATIONS - A26PE6

B. Tech. III Year II Semester **L/ T/ P/ C**
3 /0/ 0 / 3

COURSE OBJECTIVES:

The main objectives of the course are:

1. To introduce the basic building blocks of linear integrated circuits.
2. To teach the linear and non - linear applications of operational amplifiers.
3. To introduce the theory and applications of analog multipliers and PLL.
4. To teach the theory of ADC and DAC
5. To introduce the concepts of waveform generation and introduce some special function ICs.
6. To understand and implement the working of basic digital circuits.

COURSE OUTCOMES:

On completion of this course, the students will have:

1. A thorough understanding of operational amplifiers with linear integrated circuits.
2. Understanding of the different families of digital integrated circuits and their characteristics.
3. Also, students will be able to design circuits using operational amplifiers for various applications.

UNIT – I:

Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT – II:

Op-Amp, IC-555 & IC 565 Applications: Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Saw tooth, Square Wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, Description of Individual Blocks, Applications.

UNIT – III:

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT – IV:

Digital Integrated Circuits: Classification of Integrated Circuits, Comparison of Various Logic Families, CMOS Transmission Gate, IC interfacing- TTL Driving CMOS & CMOS Driving TTL, Combinational Logic ICs – Specifications and Applications of TTL-74XX &

CMOS 40XX Series ICs - Code Converters, Decoders, De multiplexers, LED & LCD Decoders with Drivers , Encoders, Priority Encoders, Multiplexers, De multiplexers, Priority Generators/Checkers, Parallel Binary Adder/Sub tractor, Magnitude Comparators.

UNIT – V:

Sequential Logic ICs and Memories: Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers**.** Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Operational Amplifiers - George Clayton and Steve Winder, 5th Ed, Elsevier

REFERENCE BOOKS

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Modern Digital Electronics – RP Jain – 4/e – TMH, 2010.
3. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005
4. Digital Design Principles and Practices – John. F. Wakerly 3/e,2005.
5. Operational Amplifiers with Linear Integrated Circuits, 4/e William D. Stanley, Pearson Education India, 2009.

T K R COLLEGE OF ENGINEERING &TECHNOLOGY
(Autonomous)

B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING - R17

COMPUTER AIDED ANALYSIS AND DESIGN - A26PE6

B.Tech. III Year II Semester **L /T/ P/ C**
3/ 0 /0 /3

PREREQUISITE:
Elements of Electrical Engineering, DC Machines and Transformer, Elements of Electrical Design.

COURSE OBJECTIVES:
The main objectives of the course are:
1. To introduce the basic concepts of CAD.
2. To teach the application of finite element method in design.
3. To teach the CAD of electrical machines.

COURSE OUTCOMES:
After completion of this course, the students will be able to:
1. Explain the concepts related to computer aided design of electrical equipment's.
2. Formulate and solve the optimum design problems with computers.
3. Discuss application of finite element method in designing.
4. Develop computer aided design of electrical apparatus.
5. Explain the computer aided design of dc machines and transformers.

UNIT-I:
Concept of Computer-Aided Design and Optimization: Introduction; Computer Aided Design; Explanation of details of flow chart; Input data to be fed into the program; Applicable constraints Max or Minimum permissible limits; Output data to be printed after execution of program; Various objective parameters for optimization in an electrical machine; Selection of optimal design; Explanation of lowest cost and significance of "Kg/KVA"; Flowcharts.

UNIT –II:
Basic Concepts of Design: Introduction; Specification; Output coefficient; Importance of specific loadings; Electrical Materials: Conducting Materials, Insulating Materials and Magnetic Materials; Magnetic circuit calculations; General procedure for calculation of Amp-Turns; Heating and Cooling; Modes of heat dissipation; Standard ratings of Electrical machines; Ventilation schemes in static machines (Transformers) and in rotating machines; Quantity of cooling medium; Types of enclosures; General design procedure; Steps to get optimal design.

UNIT – III:
Application of Finite Element Method in Design: Introduction; Basics of Finite element, Shape functions, Single element computation. Assembly of elemental coefficient matrix, Global coefficient matrix, Application of FEM technique for design problems. Use of open source FEM software for 2D design. Computation of Capacitance of capacitor, cable, multi

dielectric cable through FEM, Computation of electrostatic field for various geometry, skin and proximity effect in conductors.

UNIT – IV:

Computer Aided Design of Electrical Apparatus: Introduction; Flowcharts and programs for computer aided design of Starters, field regulators, small transformers, choke coils. 2D FEM open source software based electrical apparatus design.

UNIT – V:

COMPUTER AIDED DESIGN OF DC MACHINES: Introduction; Flowcharts and programs for computer aided design of DC machines. 2D FEM open source software-based DC machine part design.

COMPUTER AIDED DESIGN OF TRANSFORMERS: Introduction; Flowcharts and programs for computer aided design of transformers, 2D FEM open source software-based transformer part design.

TEXT BOOKS

1. Computer aided design of electrical machines - K M Vishnu Murthy, B S Publications
2. Computer aided design of electrical machines – Maurya, Jallan, Shukla, Kataria publication.

REFERENCE BOOKS

1. An Introduction to the Finite Element Method – J Reddy, TMH Publication

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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING -R17

POWER SYSTEMS LAB -A26PC7

B. Tech III Year II Semester **L / T/ P/C**
0 /0/3/ 2

PREREQUISITE:
Power System & Electrical Machines.

COURSE OBJECTIVES:
1. Perform testing of CT, PT's and Insulator strings
2. To find sequence impedances of 3-Φ synchronous machine and Transformer
3. To perform fault analysis on Transmission line models and Generators.

COURSE OUTCOMES:
After completion of this course, the students will be able to
1. Test different types of relays and their characteristics.
2. Apply various load flow techniques for the power flow studies.
3. Understand Different protection methods
4. Analyze various faults, ABCD constants, Regulation and transient stability of transmission line.

The following experiments are required to be conducted as compulsory experiments:
Part - A
1. Characteristics of IDMT Over Current Relay.
2. Differential protection of 1-Φ transformer.
3. Characteristics of Micro Processor based Over Voltage/Under Voltage relay.
4. Testing of CT, PT's and Insulator strings.
5. Finding the sequence impedances of 3-Φ synchronous machine.
6. Finding the sequence impedances of 3-Φ Transformer.

In addition to the above six experiments, at least any four of the experiments from the following list are required to be conducted.

Part - B
1. Formation of Y BUS.
2. Load Flow Analysis using Gauss Seidal (GS) Method.
3. Load Flow Analysis using Fast Decoupled (FD) Method.
4. Formation of ZBUS.
5. LG, LL and 3-Φ fault analysis of 3-Φ synchronous machine.
6. Power circle diagrams of a 3-Φ transmission line model.
7. ABCD constants and Regulation of a 3-Φ transmission line model.
8. Transient Stability Analysis for Single Machine connected to Infinite Bus by Point by Point method.

REFERENCE BOOKS

1. C.L. Wadhwa: Electrical Power Systems –Third Edition, New Age International Pub. Co., 2001
2. Hadi Sadat: Power System Analysis –Tata Mc Graw Hill Pub. Co. 2002.
3. D. P. Kothari: Modern Power System Analysis-Tata Mc Graw Hill Pub. Co. 2003.

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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING -R17

POWER ELECTRONICS AND SIMULATIONLAB -A26PC8

B. Tech. III Year II Semester **L /T/ P /C**
0 /0 / 3/ 2

PREREQUISITE:
Power Electronics.

COURSE OBJECTIVES:
Apply the concepts of power electronic converters for efficient conversion/control of power from source to load. Design the power converter with suitable switches meeting a specific load requirement.

COURSE OUTCOMES:
After completion of this course, the students will be able to
1. Understand the operating principles of various power semiconductor devices and converters.
2. Apply power electronic simulation tools to develop the power converters.
3. Analyze and choose the appropriate converters for various applications.

Any eight experiments should be conducted
1. Study the static Characteristics of SCR, MOSFET &IGBT,
2. Gate firing circuits for SCR's
3. Single Phase AC Voltage Controller with R and RLLoads
4. Single Phase half controlled & fully controlled bridge converter with R and RLloads
5. Forced Commutation circuits (Class A, Class B, Class C, Class D & ClassE)
6. Single Phase Cycle converter with R and RLloads
7. Single Phase series & parallel inverter with R and RLloads
8. Single Phase Bridge inverter with R and RL loads

Any two experiments should be conducted
1. DC Jones chopper with R and RL Loads
2. Three Phase half-controlled bridge converter with R-load
3. Single Phase dual converter with RL loads
4. (a) Simulation of single-phase Half wave converter using R and RL loads
   (b) Simulation of single- phase full converter using R, RL and RLE loads
   (c) Simulation of single-phase Semi converter using R, RL and RLE loads
5. (a) Simulation of Single-phase AC voltage controller using R and RL loads
   (b) Simulation of Single phase Cyclo-converter with R and RL-loads
6. Simulation of Buck, Boost chopper
7. Simulation of single-phase Inverter with PWM control
8. Simulation of three phase fully controlled converter with R and RL loads, with and without freewheeling diode. Observation of waveforms for Continuous and Discontinuous modes of operation.
9. Study of PWM (single pulse width and multiple pulse width) techniques.

REFERENCE BOOKS

1. M. H. Rashid, Simulation of Electric and Electronic circuits using PSPICE – by M/s PHI Publications.
2. User's manual of related software's
3. Reference guides of related software's
4. Rashid, Spice for power electronics and electric power, CRCPress.

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B.TECH. ELECTRICAL & ELECTRONICS ENGINEERING -R17

ADVANCED ENGLISH COMMUNICATION SKILLS LAB -A26HS9

B. Tech. III Year II Semester **L/ T/ P/ C**
0 /0/ 3/ 2

INTRODUCTION

A course on Advanced Communication Skills (ACS) Lab is considered essential at the third-year level of B. Tech and B. Pharmacy courses. At this stage, the students need to prepare themselves for their career which requires them to listen to, read, speak and write in English both for their professional and interpersonal communication. The main purpose of this course is to prepare the students of Engineering for their placements.

COURSE OBJECTIVES:

1. To improve students' fluency in spoken English
2. To enable them to listen to English spoken at normal conversational speed
3. To help students develop their vocabulary
4. To read and comprehend texts in different contexts
5. To communicate their ideas relevantly and coherently in writing
6. To make students industry-ready
7. To help students acquire behavioral skills for their personal and professional life
8. To respond appropriately in different socio-cultural and professional contexts
9. To sensitize the importance of Soft Skills and people skills.

COURSE OUTCOMES:

Students will be able to:

1. Acquire vocabulary and use it contextually
2. Listen and speak effectively
3. Develop proficiency in academic reading and writing
4. Increase possibilities of job prospects
5. Communicate confidently in formal and informal contexts
6. Develop interpersonal communication skills.

SYLLABUS

The following course activities will be conducted as part of the Advanced English Communication Skills (AECS) Lab:

UNIT-I:

Inter-personal Communication and Building Vocabulary – Starting a Conversation – Responding Appropriately and Relevantly – Using Appropriate Body Language – Role Play in Different Situations – Synonyms and Antonyms, One-word Substitutes, Prefixes and Suffixes, Idioms and Phrases and Collocations.

UNIT-II:

Reading Skills and Group Discussion–General Vs Local Comprehension, Reading for Facts, Guessing Meanings from Context, Skimming, Scanning, Inferring Meaning and practice with different texts.

UNIT-III:

Writing Skills – Structure and Presentation of Different Types of Writing – Letter writing / Resume Writing/ e-correspondence/statement of purpose/ Technical Report Writing/Styles-Types-Report in Manuscript format.

UNIT-IV:

Group Discussion and Presentation Skills- Group Discussions-Dynamics of Group Discussion, Intervention, Summarizing, Modulation of Voice, Body Language, Relevance, Fluency and Organization of Ideas and Rubrics of Evaluation- Concept and Process

Presentation Skills – Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs and Written Presentations through Posters/Projects/Reports/ emails/Assignment.

UNIT-V:

Interview Skills – Pre-interview Planning, Opening Strategies, Answering Strategies, Interview through Tele-conference & Video-conference and MockInterviews.

Minimum Hardware Requirement

Advanced English Communication Skills (AECS) Laboratory shall have the following infrastructural facilities to accommodate at least 35 students in the lab:

Spacious room with appropriate acoustics

Eight round tables with five movable chairs for each table. Audio-visual aids

LCD Projector

Public Address system

Computer with suitable configuration

Suggested Software: The software consisting of the prescribed topics elaborated above should be procured and used.

Oxford Advanced Learner's Compass, 8th Edition

DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.

REFERENCE BOOKS

1. Rizvi, M Ashraf. Effective Technical Communication. Mc Graw –Hill
2. Kumar, Sanjay and Pushp Lata. English for Effective Communication, OUP,2015
3. Konar, Nira. English Language Laboratories – A Comprehensive Manual, PHI Learning Pvt Ltd,2011.
4. Shiv Khera, You can Win, Macmillan Books, New York,2003.
5. Jeff Butterfield, Soft Skills for Everyone, Cengage Learning,2015

List of Open Electives.