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**J.N.T.U.H. COLLEGE OF ENGINEERING HYDERABAD (Autonomous)**  
**5 YEAR INTEGRATED DUAL DEGREE PROGRAM (IDP)**  
(Leading to B.Tech. & M.Tech)  
**ELECTRICAL AND ELECTRONICS ENGINEERING**  
**COURSE STRUCTURE (w.e.f. AY 2018-19)**
## J.N.T.U.H. COLLEGE OF ENGINEERING HYDERABAD (Autonomous)
### 5 YEAR INTEGRATED DUAL DEGREE PROGRAM (IDP)
(Leading to B.Tech. & M.Tech)
### ELECTRICAL AND ELECTRONICS ENGINEERING
### COURSE STRUCTURE (w.e.f. AY 2018-19)

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J.N.T.U.H. COLLEGE OF ENGINEERING HYDERABAD (Autonomous)
5 YEAR INTEGRATED DUAL DEGREE PROGRAM (IDP)
(Leading to B.Tech. & M.Tech)
ELECTRICAL AND ELECTRONICS ENGINEERING
COURSE STRUCTURE (w.e.f. AY 2018-19)

V YEAR

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**Total Credits** 16

**Total Credits up to III Year** 122

**Total Credits for IV and V years** 94

**Total Credits for IDP** 216
Open Elective-I (UG):
  1. Reliability Engineering
  2. Renewable Energy Sources

Open Elective-II (UG):
  1. Utilization of Electric Energy
  2. Electric Drives and Control

Professional Elective-I (UG):
  1. Computer Architecture
  2. High Voltage Engineering
  3. Electric Machine Design

Professional Elective-II (UG):
  1. Digital signal processing
  2. Power Semiconductor Drives
  3. Wind and Solar Energy systems

Professional Elective-III (UG):
  1. Digital Control systems
  2. Optimization Techniques
  3. Electrical and Hybrid Vehicles

Professional Elective-IV (UG):
  1. HVDC Transmission
  2. Power System Reliability
  3. Industrial Electrical Systems

Professional Elective-V (UG):
  1. Power Quality & FACTS
  2. Control System Design
  3. AI Techniques in Electrical Engineering

Program Elective-I (PG):
  1. Power Electronics for Renewable Energy Systems
  2. Smart Grid Systems
  3. Modern Control Theory

Program Elective-II (PG):
  1. Power Semiconductor Devices and Modeling
  2. Reactive Power Compensation and Management
  3. High Frequency Magnetic Components

Program Elective-III (PG):
  1. Advanced Digital Signal Processing
  2. SCADA Systems and Applications
  3. PWM Converters and Applications
Program Elective-IV (PG):
1. Distributed Generation
2. Industrial Load Modeling and Control
3. Integration of Energy Sources

Open Elective (PG):
1. Business Analytics
2. Industrial Safety
3. Operations Research
5. Composite Materials
6. Energy from Waste

Audit Course I:
1. English for Research Paper Writing
2. Disaster Management
3. Sanskrit for Technical Knowledge
4. Value Education
5. Constitution of India
6. Pedagogy Studies
7. Stress Management by Yoga
8. Personality Development through Life Enlightenment Skills
JNTUH COLLEGE OF ENGINEERING HYDERABAD

I Year B.Tech. EEE I-Sem

MATHEMATICS-I
(LINEAR ALGEBRA AND CALCULUS)

Pre-requisites: Mathematical Knowledge of 12th / intermediate level

Course Objectives:
- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of Eigen values and Eigenvectors and to reduce the quadratic form to canonical form.
- Concept of Sequence.
- Concept of nature of the series.
- Geometrical approach to the mean value theorems and their application to the mathematical problems.
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative.
- Finding maxima and minima of function of two and three variables.

Course Outcomes: After learning the contents of this paper the student must be able to
- Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
- Find the Eigen values and Eigenvectors.
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Analyze the nature of sequence and series.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions.
- Find the extreme values of functions of two variables with/ without constraints.

UNIT-I:
MATRICES
Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; orthogonal matrices; Unitary Matrices; Rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations, Gauss elimination method; Gauss Seidel Iteration Method.

UNIT-II:
EIGEN VALUES AND EIGEN VECTORS
Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and Nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III:
SEQUENCES & SERIES
Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences.
Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D Alembert’s ratio test; Raabe’s test; Cauchy’s Integral test; Cauchy’s root test; logarithmic test. Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.
UNIT-IV:
CALCULUS
Mean value theorems: Rolle’s Theorem, Lagrange’s Mean value theorem with their Geometrical Interpretation and applications, Cauchy’s Mean value Theorem. Taylor’s Series.
Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates), Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT-V:
MULTIVARIABLE CALCULUS (PARTIAL DIFFERENTIATION AND APPLICATIONS)
Definitions of Limit and continuity. Partial Differentiation; Euler’s Theorem; Total derivative; Jacobian; Functional dependence & independence, Maxima and Minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

I Year B.Tech. EEE I-Sem

ENGINEERING CHEMISTRY

Course Objectives:
- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the Engineers and in industry.
- To acquire the skills pertaining to spectroscopy and to apply them for medical field etc.
- To impart then knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways

Course Outcomes: The basic concepts included in this course will help the student to gain:
- The knowledge of atomic, molecular and electronic changes, band theory related to conductivity.
- The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.
- The required skills to get clear concepts on basic spectroscopy and application to medical field etc.
- The knowledge and configurational and conformational analysis of molecules and reaction mechanisms.

UNIT-I:
MOLECULAR STRUCTURE AND THEORIES OF BONDING
Atomic and Molecular orbitals. Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N₂, O₂ and F₂ molecules. π Molecular orbitals of butadiene and benzene.

UNIT-II:
WATER AND ITS TREATMENT

UNIT-III:
ELECTROCHEMISTRY AND CORROSION
UNIT-IV:
STEREOCHEMISTRY, REACTION MECHANISM AND SYNTHESIS OF DRUG MOLECULES
Introduction to representation of 3-dimensional structures, Structural and stereoisoemers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and Absolute configuration. Conformation analysis of n-butane.

UNIT-V:
SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

TEXT BOOKS:

REFERENCES:
1. Physical Chemistry, by P.W. Atkins
2. Engineering Chemistry (NPTEL Web-book), by B.L. Tembe, Kamaluddin and M.S. Krishnan
4. Fundamentals of Molecular Spectroscopy, by C.N. Banwell
B.Tech+M.Tech - EEE - (IDP) w.e.f. 2019-20

JNTUH COLLEGE OF ENGINEERING HYDERABAD
I Year B.Tech. EEE I-Sem

BASIC ELECTRICAL ENGINEERING

Pre-requisites: --

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.

Course Outcomes:

- To analyze and solve electrical circuits using network laws and theorems.
- To understand and analyze basic Electric and Magnetic circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations

UNIT-I:
D.C. CIRCUITS
Time-domain analysis of first-order RL and RC circuits.

UNIT-II:
A.C. CIRCUITS
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit.
Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT-III:
TRANSFORMERS
Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV:
ELECTRICAL MACHINES
Construction and working of synchronous generators.

UNIT-V:
ELECTRICAL INSTALLATIONS
Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOKS:

REFERENCES:
Pre-requisites: Practical skill

Course Objectives:
- To Study of different hand operated power tools, uses and their demonstration.
- To gain a good basic working knowledge required for the production of various engineering products.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To develop a right attitude, team working, precision and safety at work place.
- It explains the construction, function, use and application of different working tools, equipment and machines.
- To study commonly used carpentry joints.
- To have practical exposure to various welding and joining processes.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
- To understanding the computer hardware and practice the Assembly of computer parts.
- To practice the process of Installation of operating system windows.

Course Outcomes: At the end of the course, the student will be able to:
- Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, and foundry, house wiring and welding.
- Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
- Apply basic electrical engineering knowledge for house wiring practice.

I. TRADES FOR EXERCISES:
(Any six trades from the following with minimum of two exercises in each trade)
1. Carpentry – 2 Lectures
2. Fitting- 1 Lecture
3. Tin-Smithy- 1 Lecture
4. Black Smithy-1 Lecture
5. House-wiring-1 Lecture
6. Foundry- 2 Lectures
7. Plumbing-1 Lecture

II. TRADES FOR DEMONSTRATION & EXPOSURE
1. Demonstration of power tools & wiring -1 Lecture
2. Welding – 2 Lecture
3. Machine Shop -2 Lectures

III. IT Workshop I: Computer hardware, identification of parts, Disassembly, Assembly of computer to working Condition, simple diagnostic exercises.

IV. IT Workshop II: Installation of operating system windows and Linux simple diagnostic exercises.

TEXT BOOKS:
1. Workshop Practice by B.L.Juneja Cengage Learning
INTRODUCTION:
In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the skills development in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development in the areas of Vocabulary, Grammar, Reading and Writing Skills, fostering ideas and practice of language skills in various contexts.

Course Objectives:
- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop study skills and communication skills in formal and informal situations.

Course Outcomes: After the end of this course students should be able to
- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently in various contexts and different cultures.
- The student will acquire basic proficiency in English including reading and listening comprehension, writing, and speaking skills.

UNIT-I:
VOCABULARY BUILDING: The Concept of Word Formation --The Use of Prefixes and Suffixes.
GRAMMAR: Identifying Common Errors in Writing with Reference to Articles and Prepositions.
READING: Reading and Its Importance - Techniques for Effective Reading.

UNIT–II:
VOCABULARY: Synonyms and Antonyms.
GRAMMAR: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

UNIT–III:
VOCABULARY: Acquaintance with Prefixes and Suffixes from Foreign Languages in English to form Derivatives-Words from Foreign Languages and their Use in English.
GRAMMAR: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
READING: Sub-skills of Reading - Skimming and Scanning
WRITING: Writing Introduction and Conclusion - Essay Writing.
UNIT-IV:
VOCABULARY: Standard Abbreviations in English
GRAMMAR: Redundancies and Clichés in Oral and Written Communication.
READING: Comprehension - Intensive Reading and Extensive Reading.
WRITING: WRITING PRACTICES---Précis Writing.

UNIT-V:
VOCABULARY: Technical Vocabulary and their usage
GRAMMAR: Common Errors in English
READING: Reading Comprehension - Exercises for Practice

Note: Listening and speaking skills which are given under Unit-6 are covered in the syllabus of ELCS Lab Course.

TEXT BOOKS:

REFERENCES:
3. English: Context and Culture by Board of Editors published by Orient BlackSwan Pvt. Ltd.
Course Objectives:
The chemistry laboratory course consists of experiments related to the principles of chemistry required to the engineering student. The course will make the student to learn:

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- To determine the rate constant of reactions from concentrations as an function of time.
- The measurement of physical properties like adsorption and viscosity.
- To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Course Outcomes: The experiments included in the chemistry laboratory will make the student to gain the skills on

- Determination of parameters like hardness and chloride content in water.
- Estimation of rate constant of a reaction from concentration – time relationships.
- Determination of physical properties like adsorption and viscosity.
- Calculation of Rf values of some organic molecules by TLC technique.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA
2. Determination of chloride content of water by Argentometry
3. Estimation of an HCl by Conductometric titrations
4. Estimation of Acetic acid by Conductometric titrations
5. Estimation of HCl by Potentiometric titrations
6. Estimation of Fe^{2+} by Potentiometry using KMnO_4
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate
8. Synthesis of Aspirin and Paracetamol
9. Thin layer chromatography calculation of Rf values. eg ortho and para nitro phenols
10. Determination of acid value of coconut oil
11. Verification of freundlich adsorption isotherm-adsorption of acetic acid on charcoal
12. Determination of viscosity of castor oil and ground nut oil by using Ostwald’s viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.

REFERENCES:

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi)
ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:
- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning
- To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
- To bring about a consistent accent and intelligibility in students’ pronunciation of English by providing an opportunity for practice in speaking
- To improve the fluency of students in spoken English and neutralize their mother tongue influence
- To train students to use language appropriately for public speaking and interviews

Course Outcomes: After the end of this course Students will be able to:
- Attain Better understanding of nuances of English language through audio- visual experience and group activities
- Attain Neutralization of accent for intelligibility
- Attain Speaking skills with clarity and confidence which in turn enhances their employability skills

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:
- Computer Assisted Language Learning (CALL) Lab
- Interactive Communication Skills (ICS) Lab

Listening Skills: Objectives
1. To enable students, develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.
- Listening for general content
- Listening to fill up information
- Intensive listening
- Listening for specific information

Speaking Skills: Objectives
1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
   - Oral practice: Just A Minute (JAM) Sessions
   - Describing objects/situations/people
   - Role play – Individual/Group activities

The following course content is prescribed for the English Language and Communication Skills Lab based on Unit-6 of AICTE Model Curriculum 2018 for B.Tech First English. As the syllabus is very limited, it is required to prepare teaching/learning materials by the teachers collectively in the form of handouts based on the needs of the students in their respective colleges for effective teaching/learning and timesaving in the Lab.
Exercise-I:
CALL Lab:
Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.
ICS Lab:
Understand: Communication at Work Place- Spoken vs. Written language.

Exercise-II:
CALL Lab:
Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.
ICS Lab:
Understand: Features of Good Conversation - Non-verbal Communication.

Exercise-III:
CALL Lab:
Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).
Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.
ICS Lab:
Understand: How to make Formal Presentations.
Practice: Formal Presentations.

Exercise-IV:
CALL Lab:
Understand: Listening for General Details.
Practice: Listening Comprehension Tests.
ICS Lab:
Understand: Public Speaking – Exposure to Structured Talks.
Practice: Making a Short Speech – Extempore.

Exercise-V:
CALL Lab:
Understand: Listening for Specific Details.
Practice: Listening Comprehension Tests.
ICS Lab:
1. Introduction to Interview Skills.
2. Common errors in speaking.

Minimum Requirement of infrastructural facilities for ELCS Lab:
1. Computer Assisted Language Learning (CALL) Lab:
The Computer Assisted Language Learning Lab has to accommodate 40 students with 40 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

System Requirement (Hardware component):
Computer network with LAN facility (minimum 40 systems with multimedia) with the following specifications:
   i) Computers with Suitable Configuration
   ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:
The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, a LCD and a projector etc.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

I Year B.Tech. EEE I-Sem

BASIC ELECTRICAL ENGINEERING LAB

Pre-requisites: Basic Electrical Engineering

Course Objectives:
- To analyze a given network by applying various electrical laws and network theorems
- To know the response of electrical circuits for different excitations
- To calculate, measure and know the relation between basic electrical parameters.
- To analyze the performance characteristics of DC and AC electrical machines

Course Outcomes:
- Get an exposure to basic electrical laws.
- Understand the response of different types of electrical circuits to different excitations.
- Understand the measurement, calculation and relation between the basic electrical parameters
- Understand the basic characteristics of transformers and electrical machines

List of experiments/demonstrations:
1. Verification of Ohms Law
2. Verification of KVL and KCL
3. Transient Response of Series RL and RC circuits for DC excitation
4. Transient Response of RLC Series circuit for DC excitation
5. Resonance in series RLC circuit
6. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits
8. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
9. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
10. Measurement of Active and Reactive Power in a balanced Three-phase circuit
11. Performance Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
12. Torque-Speed Characteristics of a Separately/Self Excited DC Shunt/Compound Motor
13. Performance Characteristics of a Three-phase Induction Motor
14. Torque-Speed Characteristics of a Three-phase Induction Motor
15. No-Load Characteristics of a Three-phase Alternator

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD
I Year B.Tech. EEE II-Sem

MATHEMATICS-II
(ADVANCED CALCULUS)

Pre-requisites: Mathematical Knowledge of 12th/ intermediate level

Course Objectives:
• Methods of solving the differential equations of first and higher order.
• Evaluation of multiple integrals and their applications
• The physical quantities involved in engineering field related to vector valued functions
• The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course Outcomes: After learning the contents of this paper the student must be able to:
• Identify whether the given differential equation of first order is exact or not
• Solve higher differential equation and apply the concept of differential equation to real world problems
• Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and gravity for cubes, sphere and rectangular parallel piped
• Evaluate the line, surface and volume integrals and converting them from one to another

UNIT-I:
FIRST ORDER ODE
Exact, linear and Bernoulli’s equations; Applications: Newton’s law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut’s type

UNIT-II:
ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDER
Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type $e^{ax}, \sin ax, \cos ax, \text{polynomials in } x, e^{ax}V(x)$ and $xV(x)$; method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre’s equation, Cauchy-Euler equation.

UNIT-III:
MULTIVARIABLE CALCULUS (INTEGRATION)
Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals.
APPLICATIONS:
Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallel piped).

UNIT-IV:
VECTOR DIFFERENTIATION
Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors

UNIT-V:
VECTOR INTEGRATION
Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications

TEXT BOOKS:
REFERENCES:

JNTUH COLLEGE OF ENGINEERING HYDERABAD
I Year B.Tech. EEE II-Sem  
APPLIED PHYSICS

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<th>Course Objectives:</th>
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<td>Understand basic principle of quantum mechanics</td>
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<tr>
<td>Gain the knowledge of carrier concentration and recombination process of semiconductor materials.</td>
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<tr>
<td>Learn about various types of optoelectronic devices</td>
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<tr>
<td>Various types of lasers and significance of optical fibers in communication system</td>
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<tr>
<td>Learn about material properties like dielectrics and magnetic materials.</td>
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<th>Course Outcomes:</th>
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<tr>
<td>Analyze the wave particle duality and about energy levels and uncertainty principle</td>
</tr>
<tr>
<td>Evaluate the mobility of charge carrier concentration of a given semiconductor material.</td>
</tr>
<tr>
<td>Justify how the graded index optical fiber is more efficient than step index optical fiber in fiber optic communication system.</td>
</tr>
<tr>
<td>Will be to learn about working of LED, solar cell and photo detector</td>
</tr>
<tr>
<td>Gain the knowledge and applications of dielectric and magnetic materials</td>
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UNIT-I: QUANTUM MECHANICS
Introduction to quantum physics, Black body radiation, Planck’s law, photoelectric effect Compton effect, wave-particle duality, de Broglie hypothesis, Davisson and Germer experiment, Heisenberg’s uncertainty principle, Born’s interpretation of the wave function, Schrodinger’s time independent wave equation, particle in one dimensional box, potential barrier.

UNIT-II: SEMICONDUCTOR PHYSICS

UNIT-III: OPTOELECTRONICS

UNIT-IV: LASERS AND FIBRE OPTICS

UNIT-V: DIELECTRIC AND MAGNETIC PROPERTIES OF MATERIALS
TEXT BOOKS:

REFERENCES:
1. Richard Robinett, Quantum Mechanics.
3. Online Course: “Optoelectronic Materials and Devices” by Monica Katiyar and Deepak Gupta on NPTEL.
I Year B.Tech. EEE II-Sem

PROGRAMMING FOR PROBLEM SOLVING

Course Objectives:
- To learn the fundamentals of computers.
- To understand the various steps in Program development.
- To learn the syntax and semantics of C Programming Language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes: After the end of this course student able to:
- Write algorithms and to draw flowcharts for solving problems.
- Translate the algorithms/flowcharts to programs (in C language).
- Code and test a given logic in C programming language.
- Formulate a problem into functions and to develop modular reusable code.
- Use arrays, pointers, strings and structures to formulate algorithms and programs.
- Searching and sorting problems.

UNIT-I:

INTRODUCTION TO C LANGUAGE – Background, Simple C programs, Identifiers, Basic data types, Variables, Constants, Input / Output, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Bit wise operators, Statements, Simple C Programming examples.

UNIT-II:
STATEMENTS – if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Programming examples.

DESIGNING STRUCTURED PROGRAMS– Functions, basics, user defined functions, inter function communication, Scope, Storage classes-auto, register, static, external, scope rules, type qualifiers, recursion- recursive functions, Preprocessor commands, example C programs

UNIT-III:
ARRAYS AND STRINGS – Concepts, using arrays in C, inter function communication, array applications, two – dimensional arrays, multidimensional arrays, C program examples. Concepts, C Strings, String Input / Output functions, arrays of strings, string manipulation functions, string / data conversion, C program examples.

UNIT-IV:
POINTERS – Introduction (Basic Concepts), Pointers for inter function communication, pointers to pointers, compatibility, memory allocation functions, array of pointers, programming applications, pointers to void, pointers to functions, command –line arguments.

INPUT AND OUTPUT – Concept of a file, streams, standard input / output functions, formatted input / output functions, text files and binary files, file input / output operations, file status functions (error handling), C program examples.

UNIT-V:
DERIVED TYPES – Structures – Declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit fields, enumerated types, C programming examples.

SORTING AND SEARCHING – Selection sort, Bubble sort, Insertion sort, Linear search and Binary search methods.
TEXT BOOKS:
3. The C Programming Language, B.W. Kernighan and Dennis M. Ritchie, PHI/Pearson Education

REFERENCES:
3. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
JNTUH COLLEGE OF ENGINEERING HYDERABAD
I Year B.Tech. EEE II-Sem

ENGINEERING GRAPHICS

Pre-requisites: Nil

Course objectives:
- To provide basic concepts in engineering drawing.
- To impart knowledge about standard principles of orthographic projection of objects.
- To draw sectional views and pictorial views of solids.

Course Outcomes: At the end of the course, the student will be able to:
- Preparing working drawings to communicate the ideas and information.
- Read, understand and interpret engineering drawings.

UNIT-I:
INTRODUCTION TO ENGINEERING DRAWING

UNIT-II:
ORTHOGRAPHIC PROJECTIONS:

UNIT-III:
Projections of Regular Solids – Auxiliary Views.

UNIT-IV
Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere. Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone

UNIT-V:
ISOMETRIC PROJECTIONS:

Auto CAD: Basic principles only

TEXT BOOKS:
1. Engineering Drawing N.D. Bhatt / Charotar

REFERENCES:
1. A Text Book of Engineering Drawing / Dhawan R K / S. Chand
JNTUH COLLEGE OF ENGINEERING HYDERABAD
I Year B.Tech. EEE II-Sem

APPLIED PHYSICS LAB

Course Objectives:
- To provide an experimental foundation for the theoretical concepts introduced in the lectures.
- To teach how to make careful experimental observations and how to think about and draw conclusions from such data.
- To help students understand the role of direct observation in physics and to distinguish between inferences based on theory and the outcomes of experiments.

Course Outcomes: At the end of the course students will be able:
1. Make careful experimental observations and draw conclusions from such data.
2. Distinguish between inferences based on theory and the outcomes of experiments.
3. Write a technical report which communicates scientific information in a clear and concise manner.

LIST OF EXPERIMENTS:
1. Energy gap of P-N junction diode: To determine the energy gap of a semiconductor diode.
2. Solar Cell: To study the V-I Characteristics of solar cell.
3. Light emitting diode: Plot V-I and P-I characteristics of light emitting diode.
4. Stewart – Gee’s experiment: Determination of magnetic field along the axis of a current carrying coil.
5. Hall Effect: To determine Hall co-efficient of a given semiconductor.
6. Photoelectric effect: To determine work function of a given material.
7. LASER: To study the characteristics of LASER sources.
8. Optical fiber: To determine the bending losses of Optical fibers.
9. LCR Circuit: To determine the Quality factor of LCR Circuit.
10. R-C Circuit: To determine the time constant of R-C circuit.
11. BJT: Characteristics of NPN transistor.
12. Zener diode: To study the V-I Characteristics of Zener diode.

Note: Any 8 experiments are to be performed by each student
JNTUH COLLEGE OF ENGINEERING HYDERABAD

I Year B.Tech. EEE II-Sem

PROGRAMMING FOR PROBLEM SOLVING LAB

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Course Objectives:
- To learn the fundamentals of computers.
- To understand the various steps in Program development.
- To learn the syntax and semantics of C Programming Language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes: At the end of this course student will be able to:
- Write algorithms and to draw flowcharts for solving problems.
- Translate the algorithms/flowcharts to programs (in C language).
- Code and test a given logic in C programming language.
- Formulate simple algorithms for arithmetic and logical problems.
- Decompose a problem into functions and to develop modular reusable code.
- Use arrays, pointers, strings and structures to formulate algorithms and programs.
- Searching and sorting problems.

Week 1:
1. Write a C program to find the sum of individual digits of a positive integer.
2. Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
3. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
4. Write a C program to find the roots of a quadratic equation.

Week 2:
5. Write a C program to find the factorial of a given integer.
6. Write a C program to find the GCD (greatest common divisor) of two given integers.
7. Write a C program to solve Towers of Hanoi problem.
8. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,* , /, % and use Switch Statement)

Week 3:
9. Write a C program to find both the largest and smallest number in a list of integers.
10. Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices     ii) Multiplication of Two Matrices

Week 4:
11. Write a C program that uses functions to perform the following operations:
   i) To insert a sub-string in to a given main string from a given position.
   ii) To delete n characters from a given position in a given string.
12. Write a C program to determine if the given string is a palindrome or not
13. Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn’t contain T.
14. Write a C program to count the lines, words and characters in a given text.

Week 5:
15. Write a C program to generate Pascal’s triangle.
16. Write a C program to construct a pyramid of numbers
17. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: \[1 + x + x^2 + x^3 + \ldots + \ldots + x^n\]
   For example: if n is 3 and x is 5, then the program computes 1+5+25+125.
   Print x, n, the sum
Perform error checking.
For example, the formula does not make sense for negative exponents if $n$ is less than 0.
Have your program print an error message if $n < 0$, then go back and read in the next pair of numbers of
without computing the sum. Are any values of $x$ also illegal? If so, test for them too.

**Week 6:**
18. 2’s complement of a number is obtained by scanning it from right to left and complementing all the bits after
the first appearance of a 1. Thus 2’s complement of 11100 is 00100. Write a C program to find the 2’s
complement of a binary number.
19. Write a C program to convert a Roman numeral to its decimal equivalent.

**Week 7:**
20. Write a C program that uses functions to perform the following operations:
   i) Reading a complex number
   ii) Writing a complex number
   iii) Addition of two complex numbers
   iv) Multiplication of two complex numbers
   (Note: represent complex number using a structure.)

**Week 8:**
21. i) Write a C program which copies one file to another.
   ii) Write a C program to reverse the first $n$ characters in a file.
   (Note: The file name and $n$ are specified on the command line.)
22. i) Write a C program to display the contents of a file.
   ii) Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of
the second are put in the third file)

**Week 9:**
23. Write a C program that implements the following sorting methods to sort a given list of integers in ascending
order
   i) Bubble sort   ii) Selection sort   iii) Insertion sort

**Week 10:**
24. Write C programs that use both recursive and non recursive functions to perform the following searching
operations for a Key value in a given list of integers:
   i) Linear search   ii) Binary search

**TEXT BOOKS:**
3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

**REFERENCES:**
3. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press
JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. EEE I-Sem

MATHEMATICS-III
(NUMERICAL METHODS AND COMPLEX VARIABLES)

Pre-requisites: Mathematics courses of first year of study.

Course Objectives:
- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- Various methods to the find roots of an equation.
- Concept of finite differences and to estimate the value for the given data using interpolation.
- Evaluation of integrals using numerical techniques
- Solving ordinary differential equations using numerical techniques.
- Differentiation and integration of complex valued functions.
- Evaluation of integrals using Cauchy’s integral formula and Cauchy’s residue theorem.
- Expansion of complex functions using Taylor’s and Laurent’s series.

Course Outcomes: After learning the contents of this paper the student must be able to
- Use the Laplace transforms techniques for solving ODE’s
- Find the root of a given equation.
- Estimate the value for the given data using interpolation
- Find the numerical solutions for a given ODE’s
- Analyze the complex function with reference to their analyticity, integration using Cauchy’s integral and residue theorems
- Taylor’s and Laurent’s series expansions of complex function

UNIT-I:
LAPLACE TRANSFORMS

Laplace Transforms; Laplace Transform of standard functions; first shifting theorem; Laplace transforms of functions when they are multiplied and divided by ‘t’. Laplace transforms of derivatives and integrals of function; Evaluation of integrals by Laplace transforms; Laplace transforms of Special functions; Laplace transform of periodic functions.

Inverse Laplace transform by different methods, convolution theorem (without Proof), solving ODEs by Laplace Transform method.

UNIT-II:
NUMERICAL METHODS-I

Solution of polynomial and transcendental equations – Bisection method, Iteration Method, Newton-Raphson method and Regula-Falsi method.

Finite differences- forward differences- backward differences-central differences-symbolic relations and separation of symbols; Interpolation using Newton’s forward and backward difference formulae. Central difference interpolation: Gauss’s forward and backward formulae; Lagrange’s method of interpolation

UNIT-III:
NUMERICAL METHODS-II


Ordinary differential equations: Taylor’s series; Picard’s method; Euler and modified Euler’s methods; Runge-Kutta method of fourth order.
UNIT-IV: COMPLEX VARIABLES (DIFFERENTIATION)
Limit, Continuity and Differentiation of Complex functions. Cauchy-Riemann equations (without proof), Milne-Thomson methods, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

UNIT-V: COMPLEX VARIABLES (INTEGRATION)
Line integrals, Cauchy’s theorem, Cauchy’s Integral formula, Liouville’s theorem, Maximum-Modulus theorem (All theorems without proof); zeros of analytic functions, singularities, Taylor’s series, Laurent’s series; Residues, Cauchy Residue theorem (without proof)

TEXT BOOKS:

REFERENCES:
INTUH COLLEGE OF ENGINEERING HYDERABAD
II Year B.Tech. EEE I-Sem

ELECTRICAL CIRCUIT ANALYSIS

Prerequisite: Mathematics - II (Ordinary Differential Equations and Multivariable Calculus) & Basic Electrical Engineering

Course Objectives:
- To understand Magnetic Circuits, Network Topology and Three phase circuits.
- To analyze transients in Electrical systems.
- To evaluate Network parameters of given Electrical network
- To design basic filter configurations

Course Outcomes:
At the end of this course, students will demonstrate the ability to
- Apply network theorems for the analysis of electrical circuits.
- Obtain the transient and steady-state response of electrical circuits.
- Analyze circuits in the sinusoidal steady-state (single-phase and three-phase).
- Analyze two port circuit behavior.

UNIT-I:
NETWORK THEOREMS

UNIT-II:
SOLUTION OF FIRST AND SECOND ORDER NETWORKS
Solution of first and second order differential equations for Series and parallel R-L, R-C, RL-C circuits, initial and final conditions in network elements, forced and free response, time constants, steady state and transient state response for DC and AC Excitations.

UNIT-III:
SINUSOIDAL STEADY STATE ANALYSIS
Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complex power. Three-phase circuits. Mutual coupled circuits, Dot Convention in coupled circuits, Ideal Transformer.

UNIT-IV:
ELECTRICAL CIRCUIT ANALYSIS USING LAPLACE TRANSFORMS

UNIT-V:
TWO PORT NETWORK AND NETWORK FUNCTIONS
Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks.

TEXT BOOKS:
REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. EEE I-Sem

ANALOG ELECTRONICS

L T P C
30 0 3

Prerequisite: -

Course Objectives:

- To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
- Learn the concepts of high frequency analysis of transistors.
- To give understanding of various types of basic and feedback amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
- To introduce the basic building blocks of linear integrated circuits.
- To introduce the concepts of waveform generation and introduce some special function ICs.

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

- Know the characteristics, utilization of various components.
- Understand the biasing techniques
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- A thorough understanding, functioning of OP-AMP, design OP-AMP based circuits with linear integrated circuits.

UNIT-I:

DIODE CIRCUITS

P-N junction diode, I-V characteristics of a diode; review of half-wave and full-wave rectifiers, clamping and clipping circuits. Input output characteristics of BJT in CB, CE, CC configurations, biasing circuits, Load line analysis, common-emitter, common-base and common collector amplifiers; Small signal equivalent circuits,

UNIT-II:

MOSFET CIRCUITS

MOSFET structure and I-V characteristics. MOSFET as a switch. small signal equivalent circuits - gain, input and output impedances, small-signal model and common-source, common-gate and common-drain amplifiers, trans conductance, high frequency equivalent circuit.

UNIT-III:

MULTI-STAGE AND POWER AMPLIFIERS

Direct coupled and RC Coupled multi-stage amplifiers; Differential Amplifiers, Power amplifiers - Class A, Class B, Class C

UNIT-IV:


UNIT-V:

OPERATIONAL AMPLIFIERS

Ideal op-amp, Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product, Inverting and non-inverting amplifier, Differentiator, integrator, Square-wave and triangular-wave generators.

TEXT BOOKS:

REFERENCES:

JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. EEE I-Sem

ELECTRICAL MACHINES-I

L T P C
3 1 0 4

Prerequisite: Basic Electrical Engineering

Course Objectives:
- To study and understand different types of DC generators, Motors and Transformers, their construction, operation and applications.
- To analyze performance aspects of various testing methods.

Course Outcomes:
- Identify different parts of a DC machine & understand its operation
- Carry out different testing methods to predetermine the efficiency of DC machines
- Understand different excitation and starting methods of DC machines
- Control the voltage and speed of a DC machines
- Analyze single phase and three phase transformers circuits.

UNIT-I:
D.C. GENERATORS

UNIT-II:
D.C MOTORS

UNIT-III:
TESTING OF DC MACHINES
Methods of Testing – direct, indirect, and regenerative testing – Brake test – Swinburne’s test – Hopkinson’s test – Field’s test - separation of stray losses in a d.c. motor test.

UNIT-IV:
SINGLE PHASE TRANSFORMERS
Types - constructional details-minimization of hysteresis and eddy current losses- EMF equation - operation on no load and on load - phasor diagrams
Equivalent circuit - losses and efficiency – regulation - All day efficiency - effect of variations of frequency & supply voltage on iron losses.

UNIT-V:
TESTING OF TRANSFORMERS AND POLY-PHASE TRANSFORMERS
OC and SC tests - Sumpner’s test - predetermination of efficiency and regulation-separation of losses test-parallel operation with equal and unequal voltage ratios - auto transformers-equivalent circuit - comparison with two winding transformers.
Poly-phase transformers – Poly-phase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and openΔ
TEXT BOOKS:

REFERENCES:
ELECTROMAGNETIC FIELDS

Prerequisite: Mathematics-II (Ordinary Differential Equations and Multivariable Calculus) & Applied Physics

Course Objectives:
- To introduce the concepts of electric field and magnetic field.
- Applications of electric and magnetic fields in the development of the theory for power transmission lines and electrical machines.

Course Outcomes:
At the end of the course, students will demonstrate the ability
- To understand the basic laws of electromagnetism.
- To obtain the electric and magnetic fields for simple configurations under static conditions.
- To analyze time varying electric and magnetic fields.
- To understand Maxwell’s equation in different forms and different media.
- To understand the propagation of EM waves.

UNIT-I:
STATIC ELECTRIC FIELD
Review of conversion of a vector from one coordinate system to another coordinate system, Coulomb’s law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.

UNIT-II:
CONDUCTORS, DIELECTRICS AND CAPACITANCE
Current and current density, Ohms Law in Point form, Continuity equation, Boundary conditions of conductors and dielectric materials. Capacitance, Capacitance of a two wire line, Poisson’s equation, Laplace’s equation, Solution of Laplace and Poisson’s equation.

UNIT-III:
STATIC MAGNETIC FIELDS AND MAGNETIC FORCES

UNIT-IV:
TIME VARYING FIELDS AND MAXWELL’S EQUATIONS
Faraday’s law for Electromagnetic induction, Displacement current, Point form of Maxwell’s equation, Integral form of Maxwell’s equations, Motional Electromotive forces.

UNIT-V:
ELECTROMAGNETIC WAVES
Derivation of Wave Equation, Uniform Plane Waves, Maxwell’s equation in Phasor form, Wave equation in Phasor form, Plane wave in free space and in a homogenous material. Wave equation for a conducting medium, Plane waves in lossy dielectrics, Propagation in good conductors. Poynting theorem.
TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. EEE I-Sem

ELECTRICAL MACHINES LAB– I

Prerequisite: Electrical Machines-I

Course Objectives:
- To expose the students to the operation of DC Generator
- To expose the students to the operation of DC Motor.
- To examine the self excitation in DC generators.

Course Outcomes: After completion of this lab the student is able to
- Start and control the Different DC Machines.
- Assess the performance of different machines using different testing methods
- Identify different conditions required to be satisfied for self - excitation of DC Generators.
- Separate iron losses of DC machines into different components

The following experiments are required to be conducted compulsory experiments:

1. Magnetization characteristics of DC shunt generator
   (Determination of critical field resistance and critical speed)
2. Load test on DC shunt generator (Determination of characteristics)
3. Load test on DC series generator (Determination of characteristics)
4. Load test on DC compound generator (Determination of characteristics)
5. Hopkinson’s test on DC shunt machines (Predetermination of efficiency)
6. Fields test on DC series machines (Determination of efficiency)
7. Swinburne’s test and speed control of DC shunt motor (Predetermination of efficiencies)
8. Brake test on DC compound motor (Determination of performance curves)

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

9. Brake test on DC shunt motor (Determination of performance curves)
10. Retardation test on DC shunt motor (Determination of losses at rated speed)

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD
II Year B.Tech. EEE I-Sem

ANALOG ELECTRONICS LAB

Prerequisite: Analog Electronics

Course Objectives:
- To introduce components such as diodes, BJTs and FETs their switching characteristics, applications
- Learn the concepts of high frequency analysis of transistors.
- To give understanding of various types of basic and feedback amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
- To introduce the basic building blocks of linear integrated circuits.
- To introduce the concepts of waveform generation and introduce some special function ICs.

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Know the characteristics, utilization of various components.
- Understand the biasing techniques
- Design and analyze various rectifiers, small signal amplifier circuits.
- Design sinusoidal and non-sinusoidal oscillators.
- A thorough understanding, functioning of OP-AMP, design OP-AMP based circuits with linear integrated circuits.

List of Experiments
1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Full Wave Rectifier with & without filters
3. Common Emitter Amplifier Characteristics
4. Common Base Amplifier Characteristics
5. Common Source amplifier Characteristics
6. Measurement of h-parameters of transistor in CB, CE, CC configurations
11. Current Shunt Feedback amplifier
12. RC Phase shift Oscillator
13. Hartley and Colpitt’s Oscillators
14. Class A power amplifier
JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. EEE I-Sem

ELECTRICAL CIRCUITS LAB

Prerequisite: Basic Electrical Engineering, Electrical Circuit Analysis

Course Objectives:
- To design electrical systems
- To analyze a given network by applying various Network Theorems
- To measure three phase Active and Reactive power.
- To understand the locus diagrams

Course Outcomes: After Completion of this lab the student is able to
- Analyze complex DC and AC linear circuits
- Apply concepts of electrical circuits across engineering
- Evaluate response in a given network by using theorems

The following experiments are required to be conducted as compulsory experiments

1. Verification of Thevenin’s and Norton’s Theorems
2. Verification of Superposition, Reciprocity and Maximum Power Transfer theorems
3. Locus Diagrams of RL and RC Series Circuits
4. Series and Parallel Resonance
5. Time response of first order RC / RL network for periodic non - sinusoidal inputs – Time constant and
   Steady state error determination.
7. Two port network parameters – A, B, C, D & Hybrid parameters, Analytical verification

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

9. Verification of compensation & Milliman’s theorems
10. Harmonic Analysis of non-sinusoidal waveform signals using Harmonic Analyzer and plotting frequency
    spectrum.
11. Determination of form factor for non-sinusoidal waveform
12. Measurement of Active Power for Star and Delta connected balanced loads
13. Measurement of Reactive Power for Star and Delta connected balanced loads

TEXT BOOKS:

REFERENCES:
INDIAN CONSTITUTION

Pre-Requisites: Nil

Course Objectives:
Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals’ constitutional role and entitlement to civil and economic rights as well as the emergence of nationalhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes:
Students will be able to:

- Discuss the growth of demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

UNIT – I

History of Making of the Indian Constitution:
- History
- Drafting Committee (Composition & Working)

Philosophy of the Indian Constitution:
- Preamble
- Salient Features

UNIT – II

Contour of Constitutional Rights & Duties:
- Fundamental Rights
- Right to Equality
- Right to Freedom
- Right against Exploitation
- Right to Freedom of Religion
- Cultural and Educational Rights
- Right to Constitutional Remedies
- Directive Principles of State Policy
- Fundamental Duties.

UNIT – III

Organs of Governance:
- Parliament
- Composition
- Qualifications and Disqualifications
- Powers and Functions
- President
- Governor
- Council of Ministers
- Executive Judiciary, Appointment and Transfer of Judges, Qualifications
- Powers and Functions
UNIT – IV
Local Administration:

- District’s Administration head: Role and Importance,
- Municipalities: Introduction, Mayor and role of Elected Representative CEO of Municipal Corporation.
- Elected officials and their roles, CEO ZilaPanchayat: Position and role.
- Block level: Organizational Hierarchy (Different departments),
- Village level: Role of Elected and Appointed officials,
- Importance of grass root democracy

UNIT – V
Election Commission:

- Election Commission: Role and Functioning.
- Chief Election Commissioner and Election Commissioners.
- State Election Commission: Role and Functioning.
- Institute and Bodies for the welfare of SC/ST/OBC and women.

Text Books:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. EEE II-Sem

ENGINEERING MECHANICS

Prerequisites: Nil

Course Objectives:
- Work comfortably with basic engineering mechanics concepts required for analyzing static structures
- Identify an appropriate structural system to studying a given problem and isolate it from its environment.
- Model the problem using good free-body diagrams and accurate equilibrium equations
- Identify and model various types of loading and support conditions that act on structural systems.
- Apply pertinent mathematical, physical and engineering mechanical principles to the system to solve and analyze the problem.
- Understand the meaning of centers of gravity (mass)/centroids and moments of Inertia using integration methods.
- Communicate the solution to all problems in an organized and coherent manner and elucidate the meaning of the solution in the context of the problem.

Course Outcomes: At the end of the course, the student will be able to:
- Solve problems dealing with forces in a plane or in space and equivalent force Systems.
- Solve beam and cable problems and understand distributed force systems.
- Solve friction problems and determine moments of Inertia and centroid using integration methods.
- Understand and know how to solve three-dimension force and moment problems.
- Understand and know how to use vector terminology.

UNIT-I:
INTRODUCTION OF ENGINEERING MECHANICS

UNIT-II:
FRICTION

UNIT-III:
CENTROID AND CENTER OF GRAVITY
Centroids – Theorem of Pappus- Centroids of Composite figures – Centre of Gravity of Bodies.
AREA MOMENT OF INERTIA
Polar Moment of Inertia – Transfer Theorem - Moment of Inertia of Composite Figures.

UNIT-IV:
KINEMATICS
Introduction – Rectilinear motion – Motion with uniform and variable acceleration – Curvilinear motion – Components of motion – Projectiles- Instantaneous centre.

UNIT-V:
KINETICS

TEXT BOOKS:
1. Singers Engineering Mechanics by Dr K. Vijayakumar Reddy and Dr. J. Suresh Kumar, BS Publications
2. Engineering Mechanics by S.Timoshenko and DH Young, Tata Mc Hill
REFERENCES:
2. Engineering Mechanics by M. V. Seshagirirao and Durgaiah; University Press.
4. Engineering Mechanics (Statics and Dynamics) by Hibbler, Pearson Education.
JNTUH COLLEGE OF ENGINEERING HYDERABAD
II Year B.Tech. EEE II-Sem

ELECTRICAL MACHINES – II

Prerequisite: Basic Electrical Engineering, Electrical Machines-I

Course Objectives:
- To deal with the detailed analysis of poly-phase induction motors & Alternators
- To understand operation, construction and types of single phase motors and their applications in household appliances and control systems.
- To introduce the concept of parallel operation of alternators
- To introduce the concept of regulation and its calculations.

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Understand the concepts of rotating magnetic fields.
- Understand the operation of ac machines.
- Analyze performance characteristics of ac machines.

UNIT-I:
POLY-PHASE INDUCTION MACHINES
Constructional details of cage and wound rotor machines-production of a rotating magnetic field - principle of operation - rotor EMF and rotor frequency - rotor reactance, rotor current and Power factor at standstill and during operation.

UNIT-II:
CHARACTERISTICS OF INDUCTION MACHINES
Rotor power input, rotor copper loss and mechanical power developed and their inter relation-torque equation-deduction from torque equation - expressions for maximum torque and starting torque - torque slip characteristic - equivalent circuit - phasor diagram - crawling and cogging - No-load Test and Blocked rotor test – Pre-determination of performance-Methods of starting and starting current and Torque calculations.

Speed Control Methods: Change of voltage, change of frequency, voltage/frequency, injection of an EMF into rotor circuit (qualitative treatment only)-induction generator-principle of operation.

UNIT-III:
SYNCHRONOUS MACHINES

UNIT-IV:
PARALLEL OPERATION OF SYNCHRONOUS MACHINES

UNIT-V:
SINGLE PHASE & SPECIAL MACHINES

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. EEE II-Sem

DIGITAL ELECTRONICS

L T P C
3 0 0 3

Prerequisite: Analog Electronics

Course Objectives:
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits.
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Understand working of logic families and logic gates.
- Design and implement Combinational and Sequential logic circuits.
- Understand the process of Analog to Digital conversion and Digital to Analog conversion.
- Be able to use PLDs to implement the given logical problem.

UNIT-I:
FUNDAMENTALS OF DIGITAL SYSTEMS AND LOGIC FAMILIES
Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one’s and two’s complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT-II:
COMBINATIONAL DIGITAL CIRCUITS
Standard representation for logic functions, K-map representation, and simplification of logic functions using K-map, minimization of logical functions. Don’t care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial ladder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.

UNIT-III:
SEQUENTIAL CIRCUITS AND SYSTEMS
A 1-bit memory, the circuit properties of Bi-stable latch, the clocked SR flip flop, J- K-T and D-types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC’s, asynchronous sequential counters, applications of counters.

UNIT-IV:
A/D AND D/A CONVERTERS
Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs.
UNIT-V:
SEMICONDUCTOR MEMORIES AND PROGRAMMABLE LOGIC DEVICES
Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory (RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).

TEXT BOOKS:

REFERENCES:
II Year B.Tech. EEE II-Sem        L    T     P    C
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CONTROL SYSTEMS

Prerequisite: Linear Algebra and Calculus, Ordinary Differential Equations and Multivariable Calculus Laplace Transforms, Numerical Methods and Complex variables

Course objectives:
- To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
- To assess the system performance using time domain analysis and methods for improving it
- To assess the system performance using frequency domain analysis and techniques for improving the performance
- To design various controllers and compensators to improve system performance

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Understand the modeling of linear-time-invariant systems using transfer function and state-space representations.
- Understand the concept of stability and its assessment for linear-time invariant systems.
- Design simple feedback controllers.

UNT-I: INTRODUCTION TO CONTROL PROBLEM

UNT-II: TIME RESPONSE ANALYSIS OF STANDARD TEST SIGNALS.

UNT-III: FREQUENCY-RESPONSE ANALYSIS

UNT-IV: INTRODUCTION TO CONTROLLER DESIGN

UNT-V: STATE VARIABLE ANALYSIS AND CONCEPTS OF STATE VARIABLES
TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. EEE II-Sem

POWER SYSTEM-I

Prerequisite: Basic Electrical Engineering, Electrical Machines-I, Electrical Machines-II

Course Objectives:
- To understand the different types of power generating stations.
- To examine A.C. and D.C. distribution systems.
- To understand and compare overhead line insulators and insulated cables.
- To illustrate the economic aspects of power generation and tariff methods.
- To evaluate the transmission line parameters calculations
- To understand the concept of corona

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Understand the concepts of power systems.
- Understand the operation of conventional generating stations and renewable sources of electrical power.
- Evaluate the power tariff methods.
- Determine the electrical circuit parameters of transmission lines
- Understand the layout of substation and underground cables and corona.

UNIT-I: GENERATION OF ELECTRIC POWER


UNIT-II: ECONOMICS OF GENERATION

Introduction, definitions of connected load, maximum demand, demand factor, load factor, diversity factor, Load duration curve, number and size of generator units. Base load and peak load plants. Cost of electrical energy-fixed cost, running cost, Tariff on charge to customer.

UNIT-III: OVERHEAD LINE INSULATORS & INSULATED CABLES

Introduction, types of insulators, Potential distribution over a string of suspension insulators, Methods of equalizing the potential, testing of insulators. Introduction, insulation, insulating materials, Extra high voltage cables, grading of cables, insulation resistance of a cable, Capacitance of a single core and three core cables, Overhead lines versus underground cables, types of cables.

UNIT-IV: INDUCTANCE & CAPACITANCE CALCULATIONS OF TRANSMISSION LINES

Line conductors, inductance and capacitance of single phase and three phase lines with symmetrical and unsymmetrical spacing, Composite conductors-transposition, bundled conductors, and effect of earth on capacitance. Corona: Introduction, disruptive critical voltage, corona loss, Factors affecting corona loss and methods of reducing corona loss, Disadvantages of corona, interference between power and Communication lines.

UNIT-V: A.C. DISTRIBUTION

Introduction, AC distribution, Single phase, 3-phase, 3 phase 4 wire system, bus bar arrangement, Selection of site for substation. Voltage Drop Calculations (Numerical Problems) in A.C. Distributors for the following cases: Power Factors referred to receiving end voltage and with respect to respective load voltages.
DC DISTRIBUTION:
Classification of Distribution Systems.- Comparison of DC vs. AC and Under-Ground vs. Over-Head Distribution Systems.- Requirements and Design features of Distribution Systems.- Voltage Drop Calculations (Numerical Problems) in D.C Distributors for the following cases: Radial D.C Distributor fed one end and at the both the ends (equal/unequal Voltages) and Ring Main Distributor.

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. EEE II-Sem

DIGITAL ELECTRONICS LAB

L T P C
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Prerequisite: Digital Electronics, Analog Electronics

Course Objectives:
- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits
- To design combinational logic circuits, sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Understand working of logic families and logic gates.
- Design and implement Combinational and Sequential logic circuits.
- Understand the process of Analog to Digital conversion and Digital to Analog conversion.
- Be able to use PLDs to implement the given logical problem.

List of Experiments:
1. Realization of Boolean Expressions using Gates
2. Design and realization logic gates using universal gates
3. Generation of clock using NAND / NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization a 4 – bit gray to Binary and Binary to Gray Converter
6. Design and realization of a 4-bit pseudo random sequence generator using logic gates.
8. Design and realization aSynchronous and Asynchronous counter using flip-flops
9. Design and realization of Asynchronous counters using flip-flops
10. Design and realization 8x1 using 2x1 mux
11. Design and realization 2-bit comparator
12. Verification of truth tables and excitation tables
13. Realization of logic gates using DTL, TTL, ECL, etc.,
14. State machines

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

II Year B.Tech. EEE II-Sem

ELECTRICAL MACHINES LAB– II

Prerequisite: Electrical Machines – I & Electrical Machines - II

Course Objectives:
- To understand the operation of synchronous machines
- To understand the analysis of power angle curve of a synchronous machine
- To understand the equivalent circuit of a single phase transformer and single phase induction motor
- To understand the circle diagram of an induction motor by conducting a blocked rotor test.

Course Outcomes: After the completion of this laboratory course, the student will be able
- Assess the performance of different machines using different testing methods
- To convert the Phase from three phase to two phase and vice versa
- Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods
- Control the active and reactive power flows in synchronous machines
- Start different machines and control the speed and power factor

The following experiments are required to be conducted as compulsory experiments
1. O.C. & S.C. Tests on Single phase Transformer
2. Sumner’s test on a pair of single phase transformers
3. No-load & Blocked rotor tests on three phase Induction motor
4. Regulation of a three–phase alternator by synchronous impedance &m.m.f. methods
5. V and Inverted V curves of a three—phase synchronous motor.
6. Equivalent Circuit of a single phase induction motor
7. Determination of Xd and Xq of a salient pole synchronous machine
8. Load test on three phase Induction Motor

In addition to the above experiments, at least any two of the following experiments are required to be conducted from the following list
1. Separation of core losses of a single phase transformer
2. Efficiency of a three-phase alternator
3. Parallel operation of Single phase Transformers
4. Regulation of three-phase alternator by Z.P.F. and A.S.A methods
5. Heat run test on a bank of 3 Nos. of single phase Delta connected transformers
7. Vector grouping of Three Transformer
8. Scott Connection of transformer

TEXT BOOKS:

REFERENCES:
CONTROL SYSTEMS LAB

Prerequisite: Control Systems

Course Objectives:
- To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
- To assess the system performance using time domain analysis and methods for improving it
- To assess the system performance using frequency domain analysis and techniques for improving the performance
- To design various controllers and compensators to improve system performance

Course Outcomes: After completion of this lab the student is able to
- How to improve the system performance by selecting a suitable controller and/or a compensator for a specific application
- Apply various time domain and frequency domain techniques to assess the system performance
- Apply various control strategies to different applications (example: Power systems, electrical drives etc)
- Test system controllability and observability using state space representation and applications of state space representation to various systems

The following experiments are required to be conducted compulsory experiments:
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. Transfer function of DC generator
7. Temperature controller using PID
8. Characteristics of AC servo motor

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted
1. Effect of P, PD, PI, PID Controller on a second order systems
2. Lag and lead compensation – Magnitude and phase plot
3. (a) Simulation of P, PI, PID Controller.
4. (b) Linear system analysis (Time domain analysis, Error analysis) using suitable software
5. Stability analysis (Bode, Root Locus, Nyquist) of Linear Time Invariant system using suitable software
6. State space model for classical transfer function using suitable software - Verification.
7. Design of Lead-Lag compensator for the given system and with specification using suitable software

TEXT BOOKS:

REFERENCES:
ENVIRONMENTAL SCIENCE

Pre-Requisites: NIL

Course Objectives:
- Creating the awareness about environmental problems among students.
- Imparting basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.
- Motivating students to participate in environment protection and environment improvement.

Course Outcomes:
At the end of the course, it is expected that students will be able to:
- Identify and analyze environmental problems as well as the risks associated with these problems
- Understand what it is to be a steward in the environment
- Studying how to live their lives in a more sustainable manner

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:
Definition, Scope and Importance - Need for Public Awareness.

NATURAL RESOURCES: Renewable and non-renewable resources - Natural resources and associated problems - Forest resources - Use and over-exploitation, deforestation, case studies - Timber extraction, mining, dams and other effects on forest and tribal people - Water resources - Use and over utilization of surface and ground water - Floods, drought, conflicts over water, dams - benefits and problems - Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

UNIT-II: ECOSYSTEMS:
Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystems:
- Forest ecosystem
- Grassland ecosystem
- Desert ecosystem
- Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT-III: ENVIRONMENTAL POLLUTION:
Definition, Cause, effects and control measures of:
- Air pollution
- Water pollution
- Soil pollution
- Marine pollution
- Noise pollution
- Thermal pollution
- Nuclear hazards

UNIT-IV: SOLID WASTE MANAGEMENT:
Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution - Pollution case studies - Disaster management: floods, earthquakes, cyclones and landslides.
UNIT–V:

Text Books:
1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission., Universities Press
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

Reference Books:
1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BSPublication.
POWER ELECTRONICS

Prerequisite: Analog Electronics, Digital Electronics

Course Objectives:
- To Design/develop suitable power converter for efficient control or conversion of power in drive applications
- To Design / develop suitable power converter for efficient transmission and utilization of power in power system applications.

Course Outcomes: At the end of this course students will demonstrate the ability to
- Understand the differences between signal level and power level devices.
- Analyze controlled rectifier circuits.
- Analyze the operation of DC-DC choppers.
- Analyze the operation of voltage source inverters.

UNIT-I:
POWER SWITCHING DEVICES
Concept of power electronics, scope and applications, types of power converters; Power semiconductor switches and their V-I characteristics - Power Diodes, Power BJT, SCR, Power MOSFET, Power IGBT; Thyristor ratings and protection, methods of SCR commutation, UJT as a trigger source, gate drive circuits for BJT and MOSFETs

UNIT-II:
AC-DC CONVERTERS (PHASE CONTROLLED RECTIFIERS)

UNIT-III:
DC-DC CONVERTERS (CHOPPER/SMPS)
Introduction, elementary chopper with an active switch and diode, concepts of duty ratio, average inductor voltage, average capacitor current. Buck converter - Power circuit, analysis and waveforms at steady state, duty ratio control of output voltage. Boost converter - Power circuit, analysis and waveforms at steady state, relation between duty ratio and average output voltage. Buck-Boost converter - Power circuit, analysis and waveforms at steady state, relation between duty ratio and average output voltage.

UNIT-IV:
AC-DC CONVERTERS (INVERTERS)
Introduction, principle of operation, performance parameters, single phase bridge inverters with R, RL loads, 3-phase bridge inverters - 120 and 180 degrees mode of operation, Voltage control of single phase inverters –single pulse width modulation, multiple pulse width modulation, sinusoidal pulse width modulation.

UNIT-V:
AC-AC CONVERTERS
TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE I-Sem

POWER SYSTEM – II

Prerequisite: Power System –I and Electro Magnetic Fields

Course Objectives:
- To analyze the performance of transmission lines.
- To understand the voltage control and compensation methods.
- To understand the per unit representation of power systems.
- To examine the performance of travelling waves.
- To know the methods of overvoltage protection and Insulation coordination of transmission lines
- To know the symmetrical components and fault calculation analysis

Course Outcomes:
- Analyze transmission line performance.
- Apply load compensation techniques to control reactive power
- Understand the application of per unit quantities.
- Design over voltage protection and insulation coordination
- Determine the fault currents for symmetrical and unbalanced faults

UNIT-I:
PERFORMANCE OF LINES

Representation of lines, short transmission lines, medium length lines, nominal T and PI- representations, long transmission lines. The equivalent circuit representation of a long Line, A, B, C, D constants, Ferranti Effect, Power flow through a transmission line, receiving end power circle diagram.

UNIT-II:
VOLTAGE CONTROL

Introduction – methods of voltage control, shunt and series capacitors / Inductors, tap changing transformers, synchronous phase modifiers.

COMPENSATION IN POWER SYSTEMS:
Introduction - Concepts of Load compensation – Load ability characteristics of overhead lines – Uncompensated transmission line – Symmetrical line – Radial line with asynchronous load – Compensation of lines.

UNIT-III:
PER UNIT REPRESENTATION OF POWER SYSTEMS

The one line diagram, impedance and reactance diagrams, per unit quantities, changing the base of per unit quantities, advantages of per unit system.

TRAVELLING WAVES ON TRANSMISSION LINES:

Production of travelling waves, open circuited line, short circuited line, line terminated through a resistance, line connected to a cable, reflection and refraction at T-junction line terminated through a capacitance, capacitor connection at a T-junction, Attenuation of travelling waves.

UNIT-IV:
OVERVOLTAGE PROTECTION AND INSULATION COORDINATION

Over voltage due to arcing ground and Peterson coil, lightning, horn gaps, surge diverters, rod gaps, expulsion type lightning arrester, valve type lightning arrester, ground wires, ground rods, counter poise, surge absorbers, insulation coordination, volt-time curves.
UNIT-V:
SYMMETRICAL COMPONENTS AND FAULT CALCULATIONS
Significance of positive, negative and zero sequence components, Average 3-phase power in terms of symmetrical components, sequence impedances and sequence networks, fault calculations, sequence network equations, single line to ground fault, line to line fault, double line to ground fault, three phase fault, faults on power systems, faults with fault impedance, reactors and their location, short circuit capacity of a bus.

TEXT BOOKS:

REFERENCES:
MEASUREMENTS AND INSTRUMENTATION

Pre-requisite: Basic Electrical Engineering, Analog Electronics, Electrical Circuit Analysis & Electro Magnetic fields.

Course objectives:
- To introduce the basic principles of all measuring instruments
- To deal with the measurement of voltage, current, Power factor, power, energy and magnetic measurements.
- To understand the basic concepts of smart and digital metering.

Course Outcomes: After completion of this course, the student able to
- Understand different types of measuring instruments, their construction, operation and characteristics
- Identify the instruments suitable for typical measurements
- Apply the knowledge about transducers and instrument transformers to use them effectively.
- Apply the knowledge of smart and digital metering for industrial applications

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

UNIT-III:  MEASUREMENT OF POWER & ENERGY

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.
UNIT-V:
TRANSDUCERS
Definition of transducers, Classification of transducers, Advantages of Electrical transducers, Characteristics and choice of transducers; Principle operation of LVDT and capacitor transducers; LVDT Applications, Strain gauge and its principle of operation, gauge factor, Thermistors, Thermocouples, Piezo electric transducers, photovoltaic, photo conductive cells, and photo diodes.

INTRODUCTION TO SMART AND DIGITAL METERING: Digital Multi-meter, True RMS meters, Clamp-on meters, Digital Storage Oscilloscope

TEXT BOOKS:

REFERENCES:
JNTU COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE I-Sem

COMPUTER ARCHITECTURE
(Professional Elective-I.1)

Prerequisite: Digital Electronics

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

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Understand the concepts of microprocessors, their principles and practices.
- Write efficient programs in assembly language of the 8086 family of microprocessors.
- Organize a modern computer system and be able to relate it to real examples.
- Develop the programs in assembly language for 80286, 80386 and MIPS processors in real and protected modes.
- Implement embedded applications using ATOM processor.

UNIT-I:
INTRODUCTION TO COMPUTER ORGANIZATION
Architecture and function of general computer system, CISC Vs RISC, Data types, Integer Arithmetic - Multiplication, Division, Fixed and Floating point representation and arithmetic, Control unit operation, Hardware implementation of CPU with Micro instruction, microprogramming, System buses, Multi-bus organization.

UNIT-II:
MEMORY ORGANIZATION
System memory, Cache memory - types and organization, Virtual memory and its implementation, Memory management unit, Magnetic Hard disks, Optical Disks.

INPUT – OUTPUT ORGANIZATION

UNIT-III:
16 AND 32 MICROPROCESSORS
80x86 Architecture, IA – 32 and IA – 64, Programming model, Concurrent operation of EU and BIU, Real mode addressing, Segmentation, Addressing modes of 80x86, Instruction set of 80x86, I/O addressing in 80x86

UNIT-IV:
PIPELINING
Introduction to pipelining, Instruction level pipelining (ILP), compiler techniques for ILP, Data hazards, Dynamic scheduling, Dependability, Branch cost, Branch Prediction, Influence on instruction set.

UNIT-V:
DIFFERENT ARCHITECTURES
VLIW Architecture, DSP Architecture, SoC architecture, MIPS Processor and programming
TEXT BOOKS:


REFERENCES:

JNTU COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE I-Sem

HIGH VOLTAGE ENGINEERING
(Professional Elective-I.2)

Prerequisite: Power Systems – I, Electro Magnetic Fields

Course Objectives:
- To deal with the detailed analysis of Breakdown occurring in gaseous, liquids and solid dielectrics
- To inform about generation and measurement of High voltage and current
- To introduce High voltage testing methods

Course outcomes: At the end of the course, the student will demonstrate
- Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.
- Knowledge of generation and measurement of D. C., A.C., & Impulse voltages.
- Knowledge of tests on H. V. equipment and on insulating materials, as per the standards.
- Knowledge of how over-voltages arise in a power system, and protection against these over-voltages.

UNIT-I:
BREAKDOWN IN ГASES
Ionization processes and de-ionization processes, Types of Discharge, Gases as insulating materials, Breakdown in Uniform gap, non-uniform gaps, Townsend’s theory, Streamer mechanism, Corona discharge

BREAKDOWN IN LIQUID AND SOLID INSULATING MATERIALS
Breakdown in pure and commercial liquids, Solid dielectrics and composite dielectrics, intrinsic breakdown, electromechanical breakdown and thermal breakdown, Partial discharge, applications of insulating materials.

UNIT-II:
GENERATION OF HIGH VOLTAGES
Generation of high voltages, generation of high D. C. and A.C. voltages, generation of impulse voltages, generation of impulse currents, tripping and control of impulse generators.

UNIT-III:
MEASUREMENTS OF HIGH VOLTAGES AND CURRENTS
Peak voltage, impulse voltage and high direct current measurement method, cathode ray oscillographs for impulse voltage and current measurement, measurement of dielectric constant and loss factor, partial discharge measurements.

UNIT-IV:
LIGHTNING AND SWITCHING OVER-VOLTAGES
Charge formation in clouds, Stepped leader, Dart leader, Lightning Surges. Switching overvoltages, Protection against over-voltages, Surge diverters, Surge modifiers.

UNIT-V:
HIGH VOLTAGE TESTING OF ELECTRICAL APPARATUS AND HIGH VOLTAGE LABORATORIES
Various standards for HV Testing of electrical apparatus, IS, IEC standards, Testing of insulators and bushings, testing of isolators and circuit breakers, testing of cables, power transformers and some high voltage equipment, High voltage laboratory layout, indoor and outdoor laboratories, testing facility requirements, safety precautions in H. V. Labs.
TEXT BOOKS:

REFERENCES:
4. Various IS standards for HV Laboratory Techniques and Testing
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE I-Sem

ELECTRICAL MACHINE DESIGN
(Professional Elective-I.3)

Prerequisite: Electrical Machines-I, Electrical Machines-II

Course Objectives:

- To know the major considerations in electrical machine design, electrical engineering materials, space factor, choice of specific electrical and magnetic loadings.
- To analyze the thermal considerations, heat flow, temperature rise, rating of machines.
- To understand the design of transformers
- To study the design of induction motors
- To know the design of synchronous machines
- To understand the CAD design concepts

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

- Understand the construction and performance characteristics of electrical machines.
- Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines
- Understand the principles of electrical machine design and carry out a basic design of an ac machine.
- 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 poly-phase 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 airgap length, design of rotor, design of damper winding, determination of full load field mmf, design of field winding, design of turbo alternators, rotor design.

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 complex structures of modern machines-PMSMs, BLDCs, SRM and claw-pole machines.
TEXT BOOKS:

REFERENCES:
5. Electrical machines and equipment design exercise examples using Ansoft’s Maxwell 2D machine design package.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE I-Sem

BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:
- To prepare engineering students to analyze cost/ revenue/ financial data
- To make economic and financial analysis in decision making process
- To examine the performance of companies engaged in engineering.

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Perform and evaluate present and future worth of the alternate projects
- Appraise projects by using traditional and DCF Methods.
- Carry out cost benefit analysis of projects
- Calculate BEP of different alternative projects.

UNIT-I:

UNIT-II:

UNIT-III:

UNIT-IV:
CAPITAL BUDGETING TECHNIQUES: Significance of Capital Budgeting - cash flows-Time Value of Money- Choosing between alternative investment proposals- Methods of Appraisal Techniques- Pay Back Period - Average Rate of Return – Net Present Value- Internal Rate of Return – Profitability Index.

UNIT-V:

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE I-Sem

ELECTRICAL SIMULATION LAB

Prerequisite: Basic Electrical Engineering, Electrical Circuit Analysis, Control Systems, Power Electronics, Measurements and Instrumentation

Course Objectives:
- To develop the simulation skills.
- To generate various signals and synthesis for the engineering systems.
- To analyze harmonics in the systems.
- To analyze electrical circuit in simulation environment.

Course Outcomes: After going through this lab the student will be able to
- Apply signal generation in different systems.
- Analyze networks by various techniques
- Analyze circuit responses
- Analyze bridge rectifiers
- Analyze control systems problems
- Analyze basic converters and inverters

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
5. Application of Network Theorems to Electrical Networks
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.
9. Simulation of DC Circuits
10. Transient Analysis
11. Measurement of active Power of three phase circuit for balanced and unbalanced load
12. Simulation of single phase diode bridge rectifiers with filter for R & RL load
13. Simulation of three phase diode bridge rectifiers with R, RL load
14. Design of Low Pass and High Pass filters
15. Finding the Even and Odd parts of Signal / Sequence and Real and imaginary parts of Signal
16. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum
17. Design of first and second order circuits in time and frequency domain
18. Design and analysis of feedback control systems
19. Design of Single Phase Inverters
20. Design of Single Phase Converters
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE I-Sem

POWER ELECTRONICS LAB

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:
- Understand the operating principles of various power electronic converters.
- Use power electronic simulation packages & hardware to develop the power converters.
- Analyze and choose the appropriate converters for various applications

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

Any two experiments should be conducted
9. DC Jones chopper with R and RL Loads
10. Three Phase half controlled bridge converter with R-load
11. Single Phase dual converter with RL loads
12. (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
13. (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
14. Simulation of Buck chopper
15. Simulation of single phase Inverter with PWM control
17. Study of PWM techniques

TEXT BOOKS:
2. User’s manual of related software’s

REFERENCES:
1. Reference guides of related software’s
2. Rashid, Spice for power electronics and electric power, CRC Press
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE I-Sem

MEASUREMENTS AND INSTRUMENTATION LAB

Pre-requisite: Measurements and Instrumentation

Course Objectives:
- To calibrate LPF Watt Meter, energy meter, P. F Meter using electro dynamo meter type instrument as the standard instrument
- To determine unknown inductance, resistance, capacitance by performing experiments on D.C Bridges & A. C Bridges
- To determine three phase active & reactive powers using single wattmeter method practically
- To determine the ratio and phase angle errors of current transformer and potential transformer.

Course Outcomes: After completion of this lab the student is able to
- to choose instruments
- test any instrument
- find the accuracy of any instrument by performing experiment
- calibrate PMMC instrument using D.C potentiometer

The following experiments are required to be conducted as compulsory experiments
2. Calibration of dynamometer power factor meter.
5. Dielectric oil testing using H.T. testing Kit.
7. Measurement of 3 - Phase reactive power with single-phase wattmeter.
8. Measurement of displacement with the help of LVDT.

In addition to the above eight experiments, at least any two of the experiments from the following list are required to be conducted
9. Calibration LPF wattmeter – by Phantom testing.
10. Measurement of 3-phase power with single watt meter and two CTs.
11. C.T. testing using mutual Inductor – Measurement of % ratio error and phase angle of given CT by Null method.
12. PT testing by comparison – V. G. as Null detector – Measurement of % ratio error and phase angle of the given PT
14. Transformer turns ratio measurement using AC bridges.
15. Measurement of % ratio error and phase angle of given CT by comparison.

TEXT BOOKS:

REFERENCES:
I. INTRODUCTION:
The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use ‘good’ English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:
This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students’ fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. SYLLABUS:
The following course content to conduct the activities is prescribed for the Advanced English Communication Skills (AECS) Lab:

1. Activities on Fundamentals of Inter-personal Communication and Building Vocabulary - Starting a conversation – responding appropriately and relevantly – using the right body language – Role Play in different situations & Discourse Skills- using visuals - Synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, business vocabulary, analogy, idioms and phrases, collocations & usage of vocabulary.
2. Activities on Reading Comprehension – General Vs Local comprehension, reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading& effective googling.
4. Activities on Presentation Skills – Oral presentations (individual and group) through JAM sessions/seminars/PPTs and written presentations through posters/projects/reports/ e-mails/assignments etc.
5. Activities on Group Discussion and Interview Skills – Dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and organization of ideas and rubrics for evaluation- Concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele-conference & video-conference and Mock Interviews.
4. MINIMUM REQUIREMENT:
The 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.
- Round Tables with movable chairs
- Audio-visual aids
- LCD Projector
- Public Address system
- T. V, a digital stereo & Camcorder
- Headphones of High quality

5. SUGGESTED SOFTWARE:
The software consisting of the prescribed topics elaborated above should be procured and used.

- Oxford Advanced Learner’s Compass, 7th Edition
- DELTA’s key to the Next Generation TOEFL Test: Advanced Skill Practice.
- Lingua TOEFL CBT Insider, by Dreamtech
- TOEFL & GRE( KAPLAN, AARCO&BARRONS, USA, Cracking GRE by CLIFFS)

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE II-Sem        L    T     P    C
3      0     0    3

RELIABILITY ENGINEERING
(Open Elective-I.1)

Prerequisite: Mathematics-III (Laplace Transforms, Numerical Methods and Complex variables)

Course Objectives:
- To introduce the basic concepts of reliability, various models of reliability
- To analyze reliability of various systems
- To introduce techniques of frequency and duration for reliability evaluation of repairable systems

Course Outcomes: After completion of this course, the student will be able to
- model various systems applying reliability networks
- evaluate the reliability of simple and complex systems
- estimate the limiting state probabilities of repairable systems
- apply various mathematical models for evaluating reliability of irreparable systems

UNIT-I:

UNIT-II:
NETWORK MODELING AND EVALUATION OF SIMPLE SYSTEMS: Basic concepts- Evaluation of network Reliability / Unreliability - Series systems, Parallel systems - Series-Parallel systems- Partially redundant systems- Examples.

UNIT-III:

UNIT-IV:
Continuous Markov Processes: Modeling concepts- State space diagrams- Unreliability evaluation of single and two component repairable systems

UNIT-V:
FREQUENCY AND DURATION TECHNIQUES: Frequency and duration concepts, application to multi state problems, Frequency balance approach.

APPROXIMATE SYSTEM RELIABILITY EVALUATION: Series systems – Parallel systems- Network reduction techniques- Cut set approach- Common mode failures modeling and evaluation techniques- Examples.
TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE II-Sem

L  T  P  C
3  0  0  3

RENEWABLE ENERGY SOURCES
(Open Elective-I.2)

Pre-requisites: None

Course Objectives:
• To recognize the awareness of energy conservation in students
• To identify the use of renewable energy sources for electrical power generation
• To collect different energy storage methods
• To detect about environmental effects of energy conversion

Course Outcomes: At the end of the course the student will be able to:
• Understand the principles of wind power and solar photovoltaic power generation, fuel cells.
• Assess the cost of generation for conventional and renewable energy plants
• Design suitable power controller for wind and solar applications
• Analyze the issues involved in the integration of renewable energy sources to the grid

UNIT-I:
INTRODUCTION
Renewable Sources of Energy-Grid-Supplied Electricity-Distributed Generation-Renewable Energy Economics-
Calculation of Electricity Generation Costs –Demand side Management Options –Supply side Management
Options-Modern Electronic Controls of Power Systems.

WIND POWER PLANTS:
Appropriate Location -Evaluation of Wind Intensity -Topography -Purpose of the Energy Generated -General
Classification of Wind Turbines-Rotor Turbines-Multiple-Blade Turbines Drag Turbines -Lifting Turbines-
Generators and Speed Control used in Wind Power Energy Analysis of Small Generating Systems.

UNIT-II:
PHOTOVOLTAIC POWER PLANTS
Solar Energy-Generation of Electricity by Photovoltaic Effect -Dependence of a PV Cell Characteristic on
Temperature-Solar cell Output Characteristics-Equivalent Models and Parameters for Photovoltaic Panels-

FUEL CELLS: The Fuel Cell-Low and High Temperature Fuel Cells-Commercial and Manufacturing Issues
Constructional Features of Proton Exchange-Membrane Fuel Cells –Reformers-Electrolyzer Systems and Related
Precautions-Advantages and Disadvantages of Fuel Cells-Fuel Cell Equivalent Circuit-Practical Determination of

UNIT-III:
INDUCTION GENERATORS
Principles of Operation-Representation of Steady-State Operation-Power and Losses Generated-Self-Excited
Induction Generator-Magnetizing Curves and Self-Excitation Mathematical Description of the Self-Excitation
Process-Interconnected and Stand-alone operation -Speed and Voltage Control -Economical Aspects.

UNIT-IV:
STORAGE SYSTEMS
Energy Storage Parameters-Lead–Acid Batteries-Ultra Capacitors-Flywheels –Superconducting Magnetic Storage
System-Pumped Hydroelectric Energy Storage - Compressed Air Energy Storage -Storage Heat -Energy Storage as
an Economic Resource.

UNIT-V:
INTEGRATION OF ALTERNATIVE SOURCES OF ENERGY
Principles of Power Injection-Instantaneous Active and Reactive Power Control Approach Integration of Multiple
Renewable Energy Sources-Islanding and Interconnection Control-DG Control and Power Injection.
INTERCONNECTION OF ALTERNATIVE ENERGY SOURCES WITH THE GRID:
Interconnection Technologies - Standards and Codes for Interconnection - Interconnection Considerations -
Interconnection Examples for Alternative Energy Sources.

TEXT BOOKS:

REFERENCES:
**Pre-requisites:** Laplace Transforms, Numerical Methods and Complex variables, Control Systems

**Course Objectives:**
- To provide background and fundamental material for the analysis and processing of digital signals.
- To familiarize the relationships between continuous-time and discrete time signals and systems.
- To study fundamentals of time, frequency and Z-plane analysis and to discuss the inter-relationships of these analytic method.
- To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
- The impetus is to introduce a few real-world signal processing applications.
- To acquaint in FFT algorithms, Multi-rate signal processing techniques and finite word length effects.

**Course Outcomes:** On completion of this subject, the student should be able to:
- Perform time, frequency, and Z-transform analysis on signals and systems.
- Understand the inter-relationship between DFT and various transforms.
- Understand the significance of various filter structures and effects of round off errors.
- Design a digital filter for a given specification.
- Understand the fast computation of DFT and appreciate the FFT processing.
- Understand the tradeoffs between normal and multi rate DSP techniques and finite length word effects.

**UNIT-I:**
**INTRODUCTION**
Introduction to Digital Signal Processing: Discrete Time Signals & Sequences, conversion of continuous to discrete signal, Normalized Frequency, Linear Shift Invariant Systems, Stability, and Causality, linear differential equation to difference equation, Linear Constant Coefficient Difference Equations, Frequency Domain Representation of Discrete Time Signals and Systems


**UNIT-II:**
**DISCRETE FOURIER TRANSFORMS**

**Fast Fourier Transforms:** Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in-Frequency FFT Algorithms, Inverse FFT, and FFT with General Radix-N.

**UNIT-III:**
**IIR DIGITAL FILTERS**

**UNIT-IV:**
**FIR DIGITAL FILTERS**
UNIT-V:
MULTI-RATE DIGITAL SIGNAL PROCESSING
Introduction, Down Sampling, Decimation, Upsampling, Interpolation, Sampling Rate Conversion, Conversion of Band Pass Signals, Concept of Resampling, Applications of Multi Rate Signal Processing.

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, Measurement of Coefficient Quantization Effects through Pole-Zero Movement, Dead Band Effects.

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE II-Sem

POWER SEMICONDUCTOR DRIVES
(Professional Elective-II.2)

Prerequisite: Power Electronics, Electrical Machines – I, Electrical Machines – II

Course Objectives:

- To introduce the drive system and operating modes of drive and its characteristics
- To understand Speed – Torque characteristics of different motor drives by various power converter topologies
- To appreciate the motoring and braking operations of drive
- To differentiate DC and AC drives

Course Outcomes: After completion of this course the student is able to

- Identify the drawbacks of speed control of motor by conventional methods.
- Differentiate Phase controlled and chopper controlled DC drives speed-torque characteristics merits and demerits
- Understand AC motor drive speed-torque characteristics using different control strategies its merits and demerits
- Describe Slip power recovery schemes

UNIT-I:
CONTROL OF DC MOTORS
Introduction to Thyristor controlled Drives, Single Phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – continuous current operation – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque Characteristics- Problems on Converter fed d.c motors.
Three phase semi and fully controlled converters connected to d.c separately excited and d.c series motors – output voltage and current waveforms – Speed and Torque expressions – Speed – Torque characteristics – Problems.

UNIT-II:
FOUR QUADRANT OPERATION OF DC DRIVES
Introduction to Four quadrant operation – Motoring operations, Electric Braking – Plugging, Dynamic, and Regenerative Braking operations. Four quadrant operation of D.C motors by single phase and three phase dual converters – Closed loop operation of DC motor (Block Diagram Only)
CONTROL OF DC MOTORS BY CHOPPERS: Single quadrant, Two quadrant and four quadrant chopper fed d.c separately excited and series motors – Continuous current operation – Output voltage and current wave forms – Speed and torque expressions – speed-torque characteristics – Problems on Chopper fed D.C Motors – Closed Loop operation (Block Diagram Only)

UNIT-III:
CONTROL OF INDUCTION MOTOR
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 torque characteristics – numerical problems on induction motor drives – Closed loop operation of induction motor drives (Block Diagram Only)
UNIT-IV:
ROTOR SIDE CONTROL OF INDUCTION MOTOR

UNIT-V:
CONTROL OF SYNCHRONOUS MOTORS
Separate control and self-control of synchronous motors – Operation of self-controlled synchronous motors by VSI, CSI and cyclo converters. 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 based VSI&CSI.

TEXT BOOKS:

REFERENCES:
WIND AND SOLAR ENERGY SYSTEMS
(Professional Elective-II.3)

Prerequisite: Renewable Energy Systems

Course Objectives:

- To study the physics of wind power and energy
- To understand the principle of operation of wind generators
- To know the solar power resources
- To analyze the solar photo-voltaic cells
- To discuss the solar thermal power generation
- To identify the network integration issues

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

- Understand the energy scenario and the consequent growths of the power generate renewable energy sources.
- Understand the basic physics of wind and solar power generation.
- Understand the power electronic interfaces for wind and solar generation.
- Understand the issues related to the grid-integration of solar and wind energy systems

UNIT-I:
PHYSICS OF WIND POWER
History of wind power, Indian and Global statistics, Wind physics, Betz limit ratio, stall and pitch control, Wind speed statistics-probability distributions, and Wind power-cumulative distribution functions.

UNIT-II:
WIND GENERATOR TOPOLOGIES

UNIT-III:
THE SOLAR RESOURCE
Introduction, solar radiation spectra, solar geometry, Earth Sun angles, observer Sun angles, solar day length, Estimation of solar energy availability.

SOLAR PHOTOVOLTAIC

UNIT-IV:
NETWORK INTEGRATION ISSUES
Overview of grid code technical requirements. Fault ride-through for wind farms - real and reactive power regulation, voltage and frequency operating limits, solar PV and wind farm behavior during grid disturbances. Power quality issues. Power system interconnection experiences in the world. Hybrid and isolated operations of solar PV and wind systems.

UNIT-V:
SOLAR THERMAL POWER GENERATION
Technologies, Parabolic trough, central receivers, parabolic dish, Fresnel, solar pond, elementary analysis.

TEXT BOOKS:
REFERENCES:

JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE II-Sem

SIGNALS AND SYSTEMS

Prerequisite: Digital Signal Processing, Control Systems, Laplace Transforms, Numerical Methods and Complex variables

Course Objectives:

- To develop ability to analyze linear systems and signals
- To develop critical understanding of mathematical methods to analyze linear systems and signals
- To know the various transform techniques
- To analyze sampling principles

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

- Understand the concepts of continuous time and discrete time systems.
- Analyze systems in complex frequency domain.
- Understand sampling theorem and its implications.

UNIT-I:
INTRODUCTION TO SIGNALS AND SYSTEMS
Signals and systems as seen in everyday life, and in various branches of engineering and science. Signal properties: periodicity, absolute integrability, determinism and stochastic character. Some special signals of importance: the unit step, the unit impulse, the sinusoid, the complex exponential, some special time-limited signals; continuous and discrete time signals, continuous and discrete amplitude signals. System properties: linearity: additivity and homogeneity, shift-invariance, causality, stability, reliability. Examples.

UNIT-II:
BEHAVIOR OF CONTINUOUS AND DISCRETE-TIME LTI SYSTEMS

UNIT-III:
FOURIER TRANSFORMS

UNIT-IV:
LAPLACE AND Z-TRANSFORMS
Review of the Laplace Transform for continuous time signals and systems, system functions, poles and zeros of system functions and signals, Laplace domain analysis, solution to differential equations and system behavior. The z-Transform for discrete time signals and systems, system functions, poles and zeros of systems and sequences, z-domain analysis.
UNIT-V:
SAMPLING AND RECONSTRUCTION

TEXT BOOKS:

REFERENCES:
MICROPROCESSORS AND MICROCONTROLLERS

Prerequisite: Computer Architecture, Digital Electronics

Course Objectives:
- To develop an understanding of the operations of microprocessors and micro controllers; machine language programming and interfacing techniques.

Course Outcomes:
- Understands the internal architecture and organization of 8086, 8051 and ARM processors/controllers.
- Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor/ micro controller based systems.

UNIT-I:
8086 Architecture-Pin diagram, Register Organization, Memory Segmentation, Programming Model, Modes of operation, Timing diagrams, Memory addresses, Physical Memory Organization, 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, Software Debugging tools, MDS.

UNIT-II:
I/O INTERFACE: 8255 PPI, Various modes of operations and interface of I/O devices to 8086, A/D, D/A Converter Interfacing.

INTERFACING WITH ADVANCED DEVICES: 8086 System bus structure, Memory and I/O Interfacing with 8086, Interfacing through various IC Peripheral Chips, 8257 (DMA Controller), 8259 (Interrupt Priority Control).

UNIT-III:

UNIT-IV:
INTRODUCTION TO MICRO CONTROLLERS: Overview of 8051 Micro Controller, Architecture, I/O ports and Memory Organization, Addressing modes and Instruction set of 8051, Simple Programs using Stack Pointer, Assembly language programming of 8051


UNIT-V:
INTERFACING AND INDUSTRIAL APPLICATIONS: Applications of Micro Controllers, Interfacing 8051 to LED’s, Keyboard Interfacing, Interfacing Seven Segment Display, ADC and DAC Interfacing, Stepper Motor Interfacing

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE II-Sem

POWER SYSTEM PROTECTION

Pre-requisites: Power Systems-I, Power Systems-II

Course Objectives:
- To introduce all kinds of circuit breakers and relays for protection of Generators, Transformers and feeder bus bars from Over voltages and other hazards.
- To describe neutral grounding for overall protection.
- To understand the phenomenon of Over Voltages and its classification.

Course Outcomes: At the end of the course the student will be able to:
- Compare and contrast electromagnetic, static and microprocessor-based relays
- Apply technology to protect power system components.
- Select relay settings of over current and distance relays.
- Analyze quenching mechanisms used in air, oil and vacuum circuit breakers

UNTI-I:
PROTECTIVE RELAYS
Introduction, Need for power system protection, effects of faults, evolution of protective relays, zones of protection, primary and backup protection, essential qualities of protection, classification of protective relays and schemes, current transformers, potential transformers, basic relay terminology.

OPERATING PRINCIPLES AND RELAY CONSTRUCTION: Electromagnetic relays, thermal relays, static relays, microprocessor based protective relays.

UNTI-II:
OVER-CURRENT PROTECTION
Time-current characteristics, current setting, over current protective schemes, directional relay, protection of parallel feeders, protection of ring mains, Phase fault and earth fault protection, Combined earth fault and phase fault protective scheme, Directional earth fault relay.

DISTANCE PROTECTION: Impedance relay, reactance relay, MHO relay, input quantities for various types of distance relays, Effect of arc resistance, Effect of power swings, effect of line length and source impedance on the performance of distance relays, selection of distance relays, MHO relay with blinders, Reduction of measuring units, switched distance schemes, auto re-closing.

UNTI-III:
PILOT RELAYING SCHEMES
Wire Pilot protection, Carrier current protection.

AC MACHINES AND BUS ZONE PROTECTION: Protection of Generators, Protection of transformers, Bus-zone protection, frame leakage protection.

UNTI-IV:
STATIC RELAYS
Amplitude and Phase comparators, Duality between AC and PC, Static amplitude comparator, integrating and instantaneous comparators, static phase comparators, coincidence type of phase comparator, static over current relays, static directional relay, static differential relay, static distance relays, Multi input comparators, concept of Quadrilateral and Elliptical relay characteristics.

MICROPROCESSOR BASED RELAYS: Advantages, over current relays, directional relays, distance relays.
UNTI-V:  
CIRCUIT BREAKERS  
Introduction, arcing in circuit breakers, arc interruption theories, re-striking and recovery voltage, resistance switching, current chopping, interruption of capacitive current, oil circuit breaker, air blast circuit breakers, SF6 circuit breaker, operating mechanism, selection of circuit breakers, high voltage d.c. breakers, ratings of circuit breakers, testing of circuit breakers.  
FUSES: Introduction, fuse characteristics, types of fuses, application of HRC fuses, discrimination.  

TEXT BOOKS:  

REFERENCES:  
2. L.P.Singh “Protective relaying from Electromechanical to Microprocessors”, New Age International
III Year B.Tech. EEE II-Sem

POWER SYSTEM OPERATION AND CONTROL

Pre-requisites: Power System-I, Power System-II

Course Objectives:
- To understand real power control and operation
- To know the importance of frequency control
- To analyze different methods to control reactive power
- To understand unit commitment problem and importance of economic load dispatch
- To understand real time control of power systems

Course Outcomes: At the end of the course the student will be able to:
- Understand operation and control of power systems.
- Analyze various functions of Energy Management System (EMS) functions.
- Analyze whether the machine is in stable or unstable position.
- Understand power system deregulation and restructuring

UNIT-I:
LOAD FLOW STUDIES

UNIT-II:
ECONOMIC OPERATION OF POWER SYSTEMS
Distribution of load between units within a plant-Transmission loss as a function of plant generation, Calculation of loss coefficients-Distribution of load between plants.

UNIT-III:
LOAD FREQUENCY CONTROL
Introduction, load frequency problem-Megawatt frequency (or P-f) control channel, MVAR voltages (or Q-V) control channel-Dynamic interaction between P-f and Q-V loops. Mathematical model of speed-governing system- Turbine models, division of power system into control areas, P-f control of single control area (the uncontrolled and controlled cases)-P-f control of two area systems (the uncontrolled cases and controlled cases)

UNIT-IV:
POWER SYSTEM STABILITY

UNIT-V:
COMPUTER CONTROL OF POWER SYSTEMS
Need of computer control of power systems. Concept of energy control centre (or) load dispatch centre and the functions - system monitoring - data acquisition and control. System hardware configuration – SCADA and EMS functions. Network topology – Importance of Load Forecasting and simple techniques of forecasting.
TEXT BOOKS

REFERENCES:
III Year B.Tech. EEE II-Sem

POWER SYSTEM LAB

Prerequisite: Power System-I, Power System-II, Power System Protection, Power System Operation and Control, Electrical Machines

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

Course Outcomes: After completion of this lab, the student will be able to
- Perform various load flow techniques
- Understand Different protection methods
- Analyze the experimental data and draw the conclusions.

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

Part - A
2. Differential protection of 1-Φ transformer.
4. A,B,C,D constants of a Long Transmission line
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 YBUS.
4. Formation of ZBUS.
5. Simulation of Compensated Line

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE II-Sem

MICROPROCESSORS AND MICROCONTROLLERS LAB

Prerequisites:
Digital Electronics, Microprocessors and Microcontrollers

Course Objectives:
- To develop an understanding of the operations of microprocessors and micro controllers; machine language programming and interfacing techniques.

Course Outcomes:
- Understands the internal architecture and organization of 8086, 8051 and ARM processors/controllers.
- Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor/ micro controller based systems.

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 for 8086.
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.
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 controller 8237/8257

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

III Year B.Tech. EEE II-Sem

SIGNALS AND SYSTEMS LAB

Prerequisites: Signals and Systems

Course Objectives:
- To develop ability to analyze linear systems and signals
- To develop critical understanding of mathematical methods to analyze linear systems and signals
- To know the various transform techniques
- To analyze sampling principles

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Understand the concepts of continuous time and discrete time systems.
- Analyze systems in complex frequency domain.
- Understand sampling theorem and its implications.

List of Experiments:
1. Frequency Spectrum of continuous signal
2. Frequency Spectrum of impulse signals (Time Bounded signals)
3. Frequency Response Analysis using any Software
4. Frequency Response Analysis for any Transfer Function (Preferably Transformer)
5. Write a program to generate the discrete sequences (i) Unit step (ii) Unit impulse (iii) Ramp (iv) Periodic sinusoidal sequences. (Plot the sequences).
6. Find the Fourier transforms of square pulse. (Plot its amplitude and phasespectrum).
7. Write a program to convolve two discrete time sequences. (Plot all the sequences). Verify the result by analytical calculation.
8. Write a program to find the trigonometric Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings.
9. Write a program to find the trigonometric and exponential Fourier series coefficients of a periodic rectangular signal. Plot the discrete spectrum of the signal.
10. Generate a discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
11. Write a program to find the magnitude and phase response of a first order low pass and high pass filter. Plot the responses in logarithmic scale.
12. Write a program to find the impulse response of a low pass and high pass filter when a speech signal is passed through these filters.

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE I-Sem

UTILIZATION OF ELECTRICAL ENERGY
(Open Elective-II.1)

Pre-requisites: Electrical Machines-I and Electrical Machines-II

Course Objectives: Objectives of this course are

- To understand the fundamentals of illumination and good lighting practices
- To understand the methods of electric heating and welding.
- To understand the concepts of electric drives and their application to electrical traction systems.

Course Outcomes: At the end of the course the student will be able to:

- Understand basic principles of electric heating and welding.
- Determine the lighting requirements for flood lighting, household and industrial needs.
- Calculate heat developed in induction furnace.
- Evaluate speed time curves for traction

UNIT-I:
ELECTRICAL HEATING
Advantages and methods of electric heating, resistance heating, induction heating and dielectric heating.

UNIT-II:
ELECTRIC WELDING
Electric welding equipment, resistance welding and arc welding, comparison between AC and DC welding. Electrolysis process: principle of electrolysis, electroplating, metal extraction and metal processing, electromagnetic stirrs.

UNIT-III:
ILLUMINATION
Terminology, Laws of illumination, coefficient of Utilization and depreciation, Polar curves, Photometry, integrating sphere, sources of light, fluorescent lamps, compact fluorescent lamps, LED lamps, discharge lamps, mercury vapor lamps, sodium vapor lamps and neon lamps, comparison between tungsten filament lamps and fluorescent tubes. Basic principles of light control, Types and design of lighting scheme, lighting calculations, factory lighting, streetlighting and flood lighting.

UNIT-IV:
ELECTRIC TRACTION
Systems of electric traction and track electrification- DC system, single phase and 3-phase low frequency and high frequency system, composite system, kando system, comparison between AC and DC systems, problems of single-phase traction with current unbalance and voltage unbalance. Mechanics of traction movement, speed – time curves for different services, trapezoidal and quadrilateral speed – time curves, tractive effort, power, specific energy consumption, effect of varying acceleration and braking, retardation, adhesive weight and braking retardation, coefficient of adhesion.

UNIT-V:
SYSTEMS OF TRAIN LIGHTING
special requirements of train lighting, methods of obtaining unidirectional polarity constant output- single battery system, Double battery parallel block system, coach wiring, lighting by making use of 25KV AC supply.

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE O ENGINEERING HYDERABAD

IV Year B.Tech. EEE I-Sem

ELECTRIC DRIVES AND CONTROL
(Open Elective-II.2)

Pre-requisites: Electrical Machines-I, Electrical Machines-II, Power Electronics

Course Objectives:
- To understand basics of electric drives
- To know the dynamics and control of various drive mechanisms
- To know the principle of operations of DC and AC motor drives
- To understand the energy conversion in electric drives

Course Outcomes: At the end of the course the student will be able to:
- Understand the various drive mechanisms and methods for energy conservation.
- Apply power electronic converters to control the speed of DC motors and induction motors.
- Evaluate the motor and power converter for a specific application.
- Develop closed loop control strategies of drives

UNIT-I:
INTRODUCTION TO ELECTRIC DRIVES
Electrical Drives, Advantages of Electric drives, Parts of Electrical Drives, Electric Motors, Power Modulators, Sources, Control unit, Choice of Electric Drives and Losses.

UNIT-II:
DYNAMICS OF ELECTRICAL DRIVES

CONTROL OF ELECTRICAL DRIVES
Modes of operation, speed control and drive classifications, closed loop control of drives.

UNIT-III:
DC MOTOR DRIVES
Starting, Braking, Speed control of DC motors using single phase fully controlled and half controlled rectifiers. Three phases fully controlled and half controlled converter fed DC motor drives. Chopper controlled DC drives.

UNIT-IV:
INDUCTION MOTOR DRIVES
Speed control using pole changing, stator voltage control, AC voltage controllers. Variable frequency and variable voltage control from inverter. Different types of braking, dynamic, regenerative and plugging.

UNIT-V:
ENERGY CONSERVATION IN ELECTRIC DRIVES
Losses in Electric drive systems, measurement of Energy conservation in Electric drives. Use of efficient converters, energy efficient operation of drives, Improvement of p.F., improvement of quality of supply, maintenance of motors

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE I-Sem

DIGITAL CONTROL SYSTEMS
(Professional Elective-III.1)

Prerequisite: Control Systems

Course Objectives:
- To understand the fundamentals of digital control systems, z-transforms
- To understand state space representation of the control systems, concepts of controllability and observability
- To study the estimation of stability in different domains
- To understand the design of discrete time control systems, compensators, state feedback controllers, state observers through various transformations

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Obtain discrete representation of LTI systems.
- Analyze stability of open loop and closed loop discrete-time systems.
- Design and analyze digital controllers.
- Design state feedback and output feedback controllers.

UNIT-I:
DISCRETE REPRESENTATION OF CONTINUOUS SYSTEMS

UNIT-II:
DISCRETE SYSTEM ANALYSIS

STABILITY OF DISCRETE TIME SYSTEM

UNIT-III:
STATE SPACE APPROACH FOR DISCRETE TIME SYSTEMS

UNIT-IV:
DESIGN OF DIGITAL CONTROL SYSTEM

UNIT-V:
DISCRETE OUTPUT FEEDBACK CONTROL
Design of discrete output feedback control. Fast output sampling (FOS) and periodic output feedback controller design for discrete time systems.
TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE I-Sem

OPTIMIZATION TECHNIQUES
(Professional Elective-III.2)

Prerequisite: Mathematics –I, Mathematics –II

Course Objectives:
- To introduce various optimization techniques i.e classical, linear programming, transportation problem, simplex algorithm, dynamic programming
- Constrained and unconstrained optimization techniques for solving and optimizing an electrical and electronic engineering circuits design problems in real world situations.
- To explain the concept of Dynamic programming and its applications to project implementation.

Course Outcomes: After completion of this course, the student will be able to
- explain the need of optimization of engineering systems
- understand optimization of electrical and electronics engineering problems
- apply classical optimization techniques, linear programming, simplex algorithm, transportation problem
- apply unconstrained optimization and constrained non-linear programming and dynamic programming
- Formulate optimization problems.

UNIT-I:
INTRODUCTION AND CLASSICAL OPTIMIZATION TECHNIQUES

CLASSICAL OPTIMIZATION TECHNIQUES:
Single variable Optimization – multi variable Optimization
- necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints.

UNIT-II:
LINEAR PROGRAMMING (8 hours)

TRANSPORTATION PROBLEM:
Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel’s approximation method – testing for optimality of balanced transportation problems.

UNIT-III:
UNCONSTRAINED NONLINEAR PROGRAMMING
One dimensional minimization methods, Classification, Fibonacci method and Quadratic interpolation method

UNCONSTRAINED OPTIMIZATION TECHNIQUES:
- Uni-variant method, Powell’s method and steepest descent method.

UNIT-IV:
CONSTRAINED NONLINEAR PROGRAMMING
UNIT-V:
DYNAMIC PROGRAMMING

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE I-Sem

ELECTRICAL AND HYBRID VEHICLES
(Professional Elective-III.3)

Prerequisite: Power Semiconductor Drives, Electrical Drives and Control, Utilization of Electric Energy

Course Objectives:
- To understand the fundamental concepts, principles, analysis and design of hybrid and electric vehicles.
- To know the various aspects of hybrid and electric drive train such as their configuration, types of electric machines that can be used energy storage devices, etc.

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Understand the models to describe hybrid vehicles and their performance.
- Understand the different possible ways of energy storage.
- Understand the different strategies related to energy storage systems.

UNIT-I:
INTRODUCTION
Conventional Vehicles: Basics of vehicle performance, vehicle power source characterization, transmission characteristics, mathematical models to describe vehicle performance.

UNIT-II:
INTRODUCTION TO HYBRID ELECTRIC VEHICLES
History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.
HYBRID ELECTRIC DRIVE-TRAINS: Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

UNIT-III:
ELECTRIC TRAINS
Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis.
ELECTRIC PROPULSION UNIT: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.

UNIT-IV:
ENERGY STORAGE
Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems

UNIT-V:
ENERGY MANAGEMENT STRATEGIES
Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies.
TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD
IV Year B.Tech. EEE I-Sem

BASIC ELECTRICAL & ELECTRONICS DESIGN LAB

Prerequisite: Basic of Electrical Engineering

Course Objectives:

- To enhance practical knowledge related to different subjects
- To develop hardware skills such as soldering, winding etc.
- To develop debugging skills.
- To increase ability for analysis and testing of circuits.
- To give an exposure to market survey for available components
- To develop an ability for proper documentation of experimentation.
- To enhance employability of a student.
- To prepare students for working on different hardware projects.

Course Outcomes: After completion of course, student will be able to

- Get practical knowledge related to electrical
- Fabricate basic electrical circuit elements/networks
- Trouble shoot the electrical circuits
- Design filter circuit for application
- Get hardware skills such as soldering, winding etc.
- Get debugging skills.

Group A:
1. Design and fabrication of reactor/ electromagnet for different inductance values.
2. Design and fabrication of single phase Induction/three phase motor stator.
4. Wiring of distribution box with MCB, ELCB, RCCB and MCCB.
5. Wiring of 40 W tube, T-5, LED, Metal Halide lamps and available latest luminaries.
6. Assembly of various types of contactors with wiring.
7. Assembly of DOL and 3 point starter with NVC connections and overload operation.

Group B: This group consists of electronic circuits which must be assembled and tested on general purpose PCB or bread boards.

1. Design and development of 5 V regulated power supply.
2. Design and development of precision rectifier.
3. Design and development of first order/ second order low pass/high pass filters with an application.
5. Peak detector using op-amplifiers.
7. PCB design and layout.
IV Year B.Tech. EEE I-Sem  

**POWER ELECTRONIC CONVERTERS**  
(PGCore-I)  

**Prerequisite:** Power Electronics  

**Course Objectives:**  
- To understand the characteristics and principle of operation of modern power semiconductor devices.  
- To comprehend the concepts of different power converters and their applications  
- To analyze and design switched mode regulators for various industrial applications.  

**Course Outcomes:** At the end of the course, the student is able to:  
- Choose appropriate device for a particular converter topology.  
- Use power electronic simulation packages for analyzing and designing power converters.  

**UNIT-I:**  
**AC VOLTAGE CONTROLLERS**  
Single phase AC voltage controllers with Resistive, Resistive-inductive and Resistive-inductive-induced e.m.f. loads – AC voltage controllers with PWM Control – Effects of source and load inductances - Synchronous tap changers.  
Three phase AC voltage controllers – Analysis of controllers with star and delta Connected Resistive, Resistive-inductive loads – Effects of source and load Inductances – Applications & Problems.  

**UNIT-II:**  
**CYCLO-CONVERTERS**  

**UNIT-III:**  
**SINGLE PHASE & THREE PHASE CONVERTERS**  

**UNIT-IV:**  
**D.C. TO D.C. CONVERTERS**  

**UNIT-V:**  
**PULSE WIDTH MODULATED INVERTERS**  
techniques for improved performance – Trapezoidal, staircase, stepped, harmonic injection and delta modulation – Advantages – Applications & Problems.


TEXT BOOKS:

REFERENCES:
1. Milliman Shepherd and Lizang – “Power converters circuits” – Chapter 14 (Matrix converter) PP- 415-444,
2. M.H.Rashid - Power electronics hand book –
MACHINE MODELING AND ANALYSIS

Course Objectives:
- Identifying the methods and assumptions in modeling of machines.
- Recognize the different frames for modeling of AC machines.
- To write voltage and torque equations in state space form for different machines.

Course Outcomes: At the end of the course, the student is able to:
- Develop the mathematical models of various machines like, induction motor and Synchronous machines.
- Permanent magnet synchronous motor, brushless DC motor using modeling equations.
- Analyze the developed models in various reference frames.

UNIT-I:

UNIT-II:
Linear transformation – Phase transformation (a, b, c to α, β, ω) – Active transformation (α, β, ω to d, q). Circuitmodel of a 3 phase Induction motor – Linear transformation - Phase Transformation – Transformation to a Reference frame – Two axis models for induction motor - dq model based DOL starting of Induction Motors

UNIT-III:

UNIT-IV:

UNIT-V:
Modeling of Permanent Magnet Synchronous motor – Modeling of Brushless DC Motor.

TEXT BOOKS:
2. Analysis of electric machinery and Drives systems - Paul C. Krause, Oleg wasynezuk, Scott D. Sudhoff.

REFERENCES:
1. Thyristor control of Electric Drives - VedamSubramanmanyam.
2. Power System Stability and Control –Prabha Kundur, EPRI.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE I-Sem

POWER ELECTRONIC CONVERTERS LAB
(PG Lab - I)

Prerequisite: Power Electronic Converters

Course Objectives:
- Simulation of various AC-AC, AC-DC, DC-DC, DC-AC converter topologies

Course Outcomes: At the end of the course, the student should be able to:
- Simulate AC-AC Converters
- Simulate AC-DC Converters
- Simulate DC-DC Converters
- Simulate DC-AC Converters
- Analysis of various converter topologies developed

PART-A

2. Single phase semi converter using RL and E loads.
3. Three phase full converter using RL and E loads.
4. Three phase semi converter using RL and E loads.
7. Three phase six stepped inverter
8. Three-phase inverter with PWM controller.
9. BUCK, BOOST and CUCK regulators
10. Space vector PWM converter

Note: Conduct any 5 hardware experiments from PART-A

PART-B:

2. Single phase semi converter using RL and E loads.
3. Three phase full converter using RL and E loads.
4. Three phase semi converter using RL and E loads.
7. Three phase six stepped inverter
8. Three-phase inverter with PWM controller.
9. BUCK, BOOST and CUCK regulators
10. Space vector PWM converter

Note: Conduct any 5 experiments from PART-B using any simulation tool
Prerequisite: Electrical Machines-I, Electrical Machines-II,

Course Objectives:
- Identifying the methods and assumptions in modeling of machines.
- Recognize the different frames for modeling of AC machines.
- To write voltage and torque equations in state space form for different machines.

Course Outcomes: At the end of the course, the student is able to:
- Develop the mathematical models of various machines like, induction motor and Synchronous machines, permanent magnet synchronous motor, brushless DC motor using modeling equations.
- Analyze the developed models in various reference frames.

1. Develop a dynamic model of open loop controlled dc motor
2. Develop a dynamic model of closed loop controlled dc motor
3. Convert ABC voltages into stationary frame
4. Convert ABC voltages into synchronous frames
5. Convert ABC voltages into rotor reference frames
6. Develop dynamic model of 3-phase Induction motor and generator
7. Develop a mathematical model for V/f controlled 3-phase Induction motor
8. Develop a mathematical model for 3-phase Synchronous motor
9. Develop a mathematical model for 3-phase Permanent Magnet Synchronous motor
10. Develop a mathematical model for Brushless DC Motor
11. Develop a dynamic model for closed loop control of Induction Motor
12. Develop a dynamic model for closed loop control of Synchronous motor

Note: Conduct any 10 experiments from the above using any simulation tool
Prerequisite: Nil

Course objectives: Students will be able to:
- Understand that how to improve your writing skills and level of readability
- Learn about what to write in each section
- Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission

Course Outcomes:

UNIT-I:
Planning and Preparation, Word Order, breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT-II:

UNIT-III:
Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-IV:
key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,

UNIT-V:
skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT-VI:
useful phrases, how to ensure paper is as good as it could possibly be the first-time submission

TEXT BOOKS/REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD
IV Year B.Tech. EEE I-Sem

DISASTER MANAGEMENT
(Audit-1.2)

Prerequisite: Nil

Course Objectives: Students will be able to
- learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- critically understand the strengths and weaknesses of disaster management approaches,
- planning and programming in different countries, particularly their home country or the countries they work in

Course Outcomes:

UNIT-I:
Introduction:
Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.

UNIT-II:
Repercussions Of Disasters And Hazards:
Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT-III:
Disaster Prone Areas In India:
Study Of Seismic Zones; Areas Prone To Floods And Droughts, LandslidesAnd Avalanches; Areas Prone To Cyclonic And Coastal Hazards With SpecialReference To Tsunami; Post-Disaster Diseases And Epidemics

UNIT-IV:
Disaster Preparedness And Management:
Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard;Evaluation Of Risk: Application Of Remote Sensing, Data FromMeteorological And Other Agencies, Media Reports: Governmental AndCommunity Preparedness.

UNIT-V:
Risk Assessment Disaster Risk:

UNIT-VI:
Disaster Mitigation:
Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends InMitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.
TEXT BOOKS/ REFERENCES:
2. Sahni, Pardeep Et.Al. (Eds.),” Disaster Mitigation Experiences And Reflections”, Prentice Hall Of India, New Delhi.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE I-Sem

SANSKRIT FOR TECHNICAL KNOWLEDGE
(Audit-1.3)

Prerequisite: Nil

Course Objectives:
- To get a working knowledge in illustrious Sanskrit, the scientific language in the world
- Learning of Sanskrit to improve brain functioning
- Learning of Sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power
- The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Course Outcomes:
Students will be able to
- Understanding basic Sanskrit language
- Ancient Sanskrit literature about science & technology can be understood
- Being a logical language will help to develop logic in students

UNIT-I:
Alphabets in Sanskrit,

UNIT-II:
Past/Present/Future Tense, Simple Sentences

UNIT-III:
Order, Introduction of roots,

UNIT-IV:
Technical information about Sanskrit Literature

UNIT-V:
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

TEXT BOOKS/ REFERENCES:
1. “Abhyaspustakam” – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. “Teach Yourself Sanskrit” Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
VALUE EDUCATION
(Audit-I.4)

Prerequisite: Nil

Course Objectives: Students will be able to
- Understand value of education and self-development
- Imbibe good values in students
- Let the should know about the importance of character

Course outcomes: Students will be able to
- Knowledge of self-development
- Learn the importance of Human values
- Developing the overall personality

UNIT-I:

UNIT-II:

UNIT-III:
Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness.

UNIT-IV:

UNIT-V:

TEXT BOOKS/REFERENCES:
Prerequisite: Nil

Course Objectives: Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals’ constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes: Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

UNIT-I:
**History of Making of the Indian Constitution:** HistoryDrafting Committee, (Composition & Working)

UNIT-II:
**Philosophy of the Indian Constitution:** Preamble, Salient Features

UNIT-III:

UNIT-IV:
**Organs of Governance:** Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualification, Powers and Functions

UNIT-V:
**Local Administration:** District’s Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative,CEO of Municipal Corporation.Pachayati raj: Introduction, PRI: ZilaPachayat.Elected officials and their roles, CEO ZilaPachayat: Position and role.Block level: Organizational Hierarchy (Different departments),Village level: Role of Elected and Appointed officials,Importance of grass root democracy

UNIT-VI:
**Election Commission:** Election Commission: Role and Functioning.Chief Election Commissioner and Election Commissioners.State Election Commission: Role and Functioning. Institute and Bodies for the welfare of SC/ST/OBC and women.
TEXT BOOKS/ REFERENCES:
1. The Constitution of India, 1950 (Bare Act), Government Publication.
Prerequisite: Nil

Course Objectives: Students will be able to:
- Review existing evidence on the review topic to inform programme design and policy making undertaken by the DFID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Course Outcomes: Students will be able to understand:
- What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

UNIT-I:

UNIT-II:
Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.

UNIT-III:
Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers’ attitudes and beliefs and Pedagogic strategies.

UNIT-IV:
Professional development: alignment with classroom practices and followup support, Peer support, Support from the head teacher and the community. Curriculum and assessment, Barriers to learning: limited resources and large class sizes.

UNIT-V:
Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.

TEXT BOOKS/REFERENCES:
STRESS MANAGEMENT BY YOGA
(Audit-1.7)

Prerequisite: Nil

Course Objectives:
- To achieve overall health of body and mind
- To overcome stress

Course Outcomes:
Students will be able to:
- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

UNIT-I:
Definitions of Eight parts of yog. (Ashtanga)

UNIT-II:
Yam and Niyam.

UNIT-III:
Do’s and Don’t’s in life.
i) Ahinsa, satya, astheya, bramhacharya and aparigraha
ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT-IV:
Asan and Pranayam

UNIT-V:
i) Various yog poses and their benefits for mind & body
ii) Regularization of breathing techniques and its effects-Types of pranayam

TEXT BOOKS/REFERENCES:
1. ‘Yogic Asanas for Group Training-Part-I’ : Janardan Swami Yogabhyasi Mandal, Nagpur
2. “Rajayoga or conquering the Internal Nature” by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata
PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS
(Audit-1.8)

Prerequisite: Nil

Course Objectives:
- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

Course Outcomes: Students will be able to
- Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- Study of Neetishatakam will help in developing versatile personality of students

UNIT-I:
Neetisatakam-Holistic development of personality
- Verses- 19,20,21,22 (wisdom)
- Verses- 29,31,32 (pride & heroism)
- Verses- 26,28,63,65 (virtue)

UNIT-II:
Neetisatakam-Holistic development of personality
- Verses- 52,53,59 (dont’s)
- Verses- 71,73,75,78 (do’s)

UNIT-III:
Approach to day to day work and duties.
- Shrimad Bhagwad Geeta : Chapter 2-Verses 41, 47,48,
- Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35,
- Chapter 18-Verses 45, 46, 48.

UNIT-IV:
Statements of basic knowledge.
- Shrimad Bhagwad Geeta: Chapter 2-Verses 56, 62, 68
- Chapter 12 -Verses 13, 14, 15, 16,17, 18
- Personality of Role model. Shrimad Bhagwad Geeta:
- Chapter2-Verses 17, Chapter 3-Verses 36,37,42,
- Chapter 4-Verses 18, 38,39
- Chapter18 – Verses 37,38,63

TEXT BOOKS/REFERENCES:
1. “Srimad Bhagavad Gita” by Swami SwarupanandaAdwaita Ashram (Publication Department), Kolkata.
2. Bhartrihari’s Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, New Delhi.
IV Year II-Sem | L T P C
---|---|---|---
HVDC TRANSMISSION | 30 | 0 | 3
(Professional Elective-IV.1)

**Prerequisite:** Power System-I, Power System-II, Power System Operation and Control, Power Electronics

**Course Objectives:**
- To compare EHV AC and HVDC systems
- To analyze Graetz circuit and also explain 6 and 12 pulse converters
- To control HVDC systems with various methods and to perform power flow analysis in AC/DC systems
- To describe various protection methods for HVDC systems and Harmonics

**Course Outcomes:** After completion of this course the student is able to
- Compare EHV AC and HVDC system and to describe various types of DC links
- Analyze Graetz circuit for rectifier and inverter mode of operation
- Describe various methods for the control of HVDC systems and to perform power flow analysis in AC/DC systems
- Describe various protection methods for HVDC systems and classify Harmonics and design different types of filters

**UNIT-I:**
**BASIC CONCEPTS**

**ANALYSIS OF HVDC CONVERTERS:**

**UNIT-II:**
**CONVERTER AND HVDC SYSTEM CONTROL**
Principle of DC Link Control, Converters Control Characteristics, Firing angle control, Current and extinction angle control, Effect of source inductance on the system, Starting and stopping of DC link, Power Control.

**REACTIVE POWER CONTROL IN HVDC:**
Introduction, Reactive Power Requirements in steady state, sources of reactive power- Static VAR Compensators, Reactive power control during transients.

**UNIT-III:**
**POWER FLOW ANALYSIS IN AC/DC SYSTEMS**

**UNIT-IV:**
**CONVERTER FAULTS AND PROTECTION**
Converter faults, protection against over current and over voltage in converter station, surge arresters, smoothing reactors, DC breakers, Audible noise, space charge field, corona effects on DC lines, Radio interference.

**UNIT-V:**
**HARMONICS**
Generation of Harmonics, Characteristics harmonics, calculation of AC Harmonics, Non- Characteristics harmonics, adverse effects of harmonics, Calculation of voltage and Current harmonics, Effect of Pulse number on harmonics

**FILTERS:**
Types of AC filters, Design of Single tuned filters – Design of High pass filters.
TEXT BOOKS:

REFERENCES:
Prerequisite: Reliability Engineering, Power System-I, Power System-II, Power System Operation and Control

Course Objectives:

- To describe the generation system model and recursive relation for capacitive model building
- To explain the equivalent transitional rates, cumulative probability and cumulative frequency
- To develop the understanding of risk, system and load point reliability indices
- To explain the basic and performance reliability indices

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

- Estimate loss of load and energy indices for generation systems model
- Describe merging generation and load models
- Apply various indices for distribution systems
- Evaluate reliability of interconnected systems

UNIT-I: BASIC PROBABILITY THEORY
Elements of probability, probability distributions, Random variables, Density and Distribution functions- Binomial distribution- Expected value and standard deviation - Binomial distribution, Poisson distribution, normal distribution, exponential distribution, Weibull distribution.

DEFINITION OF RELIABILITY: Definition of terms used in reliability, Component reliability, Hazard rate, derivation of the reliability function in terms of the hazard rate. Hazard models - Bath tub curve, Effect of preventive maintenance. Measures of reliability: Mean Time to Failure and Mean Time between Failures.

UNIT-II: GENERATING SYSTEM RELIABILITY ANALYSIS

UNIT-III: OPERATING RESERVE EVALUATION

BULK POWER SYSTEM RELIABILITY EVALUATION:
Basic configuration – conditional probability approach – system and load point reliability indices – weather effects on transmission lines – Weighted average rate and Markov model – Common mode failures.

INTER CONNECTED SYSTEM RELIABILITY ANALYSIS
Probability array method – Two inter connected systems with independent loads – effects of limited and unlimited tie capacity - imperfect tie – Two connected Systems with correlated loads – Expression for cumulative probability and cumulative frequency.
UNIT-IV:
DISTRIBUTION SYSTEM RELIABILITY ANALYSIS

UNIT-V:
SUBSTATIONS AND SWITCHING STATIONS

TEXT BOOKS:

REFERENCES:
3. Reliability Engineering by E. Balaguruswamy, TMH Publications.
INDUSTRIAL ELECTRICAL SYSTEMS
(Professional Elective-IV.3)

Prerequisite: Utilization of Electric Energy

Course Objectives:
- To understand the various electrical system components
- To know the residential and commercial electrical systems
- To study the illumination systems
- To discuss about the industrial electrical systems

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Understand the electrical wiring systems for residential, commercial and industrial consumers, representing the systems with standard symbols and drawings, SLD.
- Understand various components of industrial electrical systems.
- Analyze and select the proper size of various electrical system components.

UNIT-I:
ELECTRICAL SYSTEM COMPONENTS
LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, protection components- Fuse, MCB, MCCB, ELCB, inverse current characteristics, symbols, single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices

UNIT-II:
RESIDENTIAL AND COMMERCIAL ELECTRICAL SYSTEMS
Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation and sizing of wire, rating of main switch, distribution board and protection devices, earthing system calculations, requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.

UNIT-III:
ILLUMINATION SYSTEMS
Understanding various terms regarding light, lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, energy saving in illumination systems, design of a lighting scheme for a residential and commercial premises, flood lighting.

UNIT-IV:
INDUSTRIAL ELECTRICAL SYSTEMS I
HT connection, industrial substation, Transformer selection, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components.

UNIT-V:
INDUSTRIAL ELECTRICAL SYSTEMS II
DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks.

TEXT BOOKS:

REFERENCES:
2. Web site for IS Standards.
JNTUH COLLEGE OF ENGINEERING HYDERABAD
IV Year B.Tech. EEE II-Sem

POWER QUALITY AND FACTS
(Professional Elective-V.1)

Prerequisite: Power Electronics, Power System Operation and Control, HVDC Transmission

Course Objectives:
- Definition of power quality and different terms of power quality.
- Study of voltage power quality issue – short and long interruption.
- Detail study of characterization of voltage sag magnitude and three phase unbalanced voltage sag.
- Know the behaviour of power electronics loads; induction motors, synchronous motor etc by the power quality issues.
- Overview of mitigation of power quality issues by the VSI converters.
- To understand the fundamentals of FACTS Controllers,
- To know the importance of controllable parameters and types of FACTS controllers & their benefits
- To understand the objectives of Shunt and Series compensation
- To Control STATCOM and SVC and their comparison and the regulation of STATCOM, Functioning and control of GCSC, TSSC and TCSC

Course Outcomes: After completion of this course, the student will be able to:
- Know the severity of power quality problems in distribution system
- Understand the concept of voltage sag transformation from up-stream (higher voltages) to down-stream (lower voltage)
- Concept of improving the power quality to sensitive load by various mitigating custom power devices
- Choose proper controller for the specific application based on system requirements
- Understand various systems thoroughly and their requirements
- Understand the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping
- Understand the Power and control circuits of Series Controllers GCSC, TSSC and TCSC

UNIT-I:
POWER QUALITY PROBLEMS IN DISTRIBUTION SYSTEMS

UNIT-II:
TRANSMISSION LINES AND SERIES/SHUNT REACTIVE POWER COMPENSATION

UNIT-III:
STATIC SHUNT COMPENSATORS
Objectives of shunt compensation, Methods of controllable VAR generation, Static Var Compensator, its characteristics, TCR, TSC, FC-TCR configurations, STATCOM, basic operating principle, control approaches and characteristics

UNIT-IV:
STATIC SERIES COMPENSATORS
Objectives of series compensator, variable impedance type of series compensators, TCSC, TSSC-operating principles and control schemes, SSSC, Power Angle characteristics, Control range and VAR rating, Capability to provide reactive power compensation, external control
UNIT-V:
COMBINED COMPENSATORS
Introduction to Unified Power Flow Controller, Basic operating principles, Conventional control capabilities, Independent control of real and reactive power.

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE II-Sem

CONTROL SYSTEM DESIGN
(Professional Elective-V.2)

Prerequisite: Control Systems

Course Objectives:
- To know the time and frequency domain design problem specifications.
- To understand the design of classical control systems in time-domain
- To analyze the design aspects of classical control systems in frequency-domain
- To know the design of various compensator controllers
- To identify the performance of the systems by design them in state-space
- To study the effects of nonlinearities on various systems performance

Course Outcomes: At the end of this course, students will demonstrate the ability to
- Understand various design specifications.
- Design controllers to satisfy the desired design specifications using simple controller structures (P, PI, PID, compensators).
- Design controllers using the state-space approach.

UNTI-I:
DESIGN SPECIFICATIONS
Introduction to design problem and philosophy. Introduction to time domain and frequency domain design specification and its physical relevance. Effect of gain on transient and steady state response. Effect of addition of pole on system performance. Effect of addition of zero on system response.

UNTI-II:
DESIGN OF CLASSICAL CONTROL SYSTEM IN THE TIME DOMAIN

UNTI-III:
DESIGN OF CLASSICAL CONTROL SYSTEM IN FREQUENCY DOMAIN
Compensator design in frequency domain to improve steady state and transient response. Feedback and Feed forward compensator design using bode diagram.

UNTI-IV:
DESIGN OF PID CONTROLLERS
Design of P, PI, PD and PID controllers in time domain and frequency domain for first, second and third order systems. Control loop with auxiliary feedback – Feed forward control.

UNTI-V:
CONTROL SYSTEM DESIGN IN STATE SPACE

NONLINEARITIES AND ITS EFFECT ON SYSTEM PERFORMANCE

TEXT BOOKS:
REFERENCES:
IV Year B.Tech. EEE II-Sem

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JNTUH COLLEGE OF ENGINEERING HYDERABAD

AI TECHNIQUES IN ELECTRICAL ENGINEERING
(Professional Elective-V.3)

Pre-requisites: Power Systems Operation and Control

Course Objectives:
- To locate soft commanding methodologies, such as artificial neural networks, Fuzzy logic and genetic Algorithms.
- To observe the concepts of feed forward neural networks and about feedback neural networks.
- To practice the concept of fuzziness involved in various systems and comprehensive knowledge of fuzzy logic control and to design the fuzzy control
- To analyze genetic algorithm, genetic operations and genetic mutations.

Course Outcomes:
- Upon the completion of this course, the student will be able to
  - Understand feed forward neural networks, feedback neural networks and learning techniques.
  - Understand fuzziness involved in various systems and fuzzy set theory.
  - Develop fuzzy logic control for applications in electrical engineering
  - Develop genetic algorithm for applications in electrical engineering.

UNIT-I:
ARTIFICIAL NEURAL NETWORKS

UNIT-II:
ANN PARADIGMS
Multi-layer perceptron using Back propagation Algorithm (BPA), Self –Organizing Map (SOM), Radial Basis Function Network-Functional Link Network (FLN), Hopfield Network.

UNIT-III:
FUZZY LOGIC

UNIT-IV:
GENETIC ALGORITHMS
Introduction-Encoding –Fitness Function-Reproduction operators, Genetic Modeling –Genetic operators-Cross over-Single site cross over, Two point cross over –Multi point cross over Uniform cross over, Matrix cross over-Cross over Rate-Inversion & Deletion, Mutation operator –Mutation –Mutation Rate-Bit-wise operators, Generational cycle-convergence of Genetic Algorithm.

UNIT-V:
APPLICATIONS OF AI TECHNIQUES
Load forecasting, Load flow studies, Economic load dispatch, Load frequency control, Single area system and two area system, Reactive power control, Speed control of DC and AC Motors.

TEXT BOOKS
REFERENCES:

2. Bart Kosko; Neural Network & Fuzzy System, Prentice Hall, 1992
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE II-Sem

ADVANCED POWER ELECTRONIC CONVERTERS
(PGCore -III)

L T P C
3003

Prerequisite: Power Electronic Converters

Course Objectives:
- To understand various advanced power electronics devices.
- To describe the operation of multi level inverters with switching strategies for high power applications.
- To comprehend the design of resonant converters and switched mode power supplies.

Course Outcomes: After taking this course, student will be able to:
- Develop and analyze various converter topologies.
- Design AC or DC switched mode power supplies.

UNIT-I:
MODERN POWER SEMICONDUCTOR DEVICES
Modern power semiconductor devices – Insulated Gate Bipolar Transistor (IGBT) –MOSFET-MOS Turn off Thyristor (MTO) – Emitter Turn Off Thyristor (ETO) – Integrated Gate-Commutated Thyristor (IGCTs) – MOS-controlled thyristors(MCTs)– Power integrated circuits (PICs) – symbol, structure and equivalent circuit – comparison of their features.

UNIT-II:
RESONANT PULSE INVERTERS

UNIT-III:
RESONANT CONVERTERS

UNIT-IV:
MULTILEVEL INVERTERS
UNIT-V:
D.C & A.C POWER SUPPLIES

TEXT BOOKS:

REFERENCES:
1. Milliman Shepherd and Lizang – “Power converters circuits” – Chapter 14 (Matrix converter) PP- 415-444,
2. M.H.Rashid - Power electronics hand book –
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE II-Sem

POWER ELECTRONICS FOR RENEWABLE ENERGY SYSTEMS
(Program Elective - 1.1)

Prerequisite: Power Electronics, Renewable Energy Systems

Course Objectives:
- To provide knowledge about the stand alone and grid connected renewable energy systems.
- To equip with required skills to derive the criteria for the design of power converters for renewable energy applications.
- To analyze and comprehend the various operating modes of wind electrical generators and solar energy systems.
- To design different power converters namely AC to DC, DC to DC and AC to AC converters for renewable energy systems. To develop maximum power point tracking algorithms.

Course Outcomes: At the end of the course, the student is able to:
- Ability to understand and analyze power system operation, stability, control and protection.
- Ability to handle the engineering aspects of electrical energy generation and utilization.

UNIT-I:
INTRODUCTION
Environmental aspects of electric energy conversion: impacts of renewable energy generation on environment (cost-GHG Emission) - Qualitative study of different renewable energy resources: Solar, wind, ocean, Biomass, Fuel cell, Hydrogen energy systems and hybrid renewable energy systems.

UNIT-II:
ELECTRICAL MACHINES FOR RENEWABLE ENERGY CONVERSION
Reference theory fundamentals-principle of operation and analysis: IG, PMSG, SCIG and DFIG.

UNIT-III:
POWER CONVERTERS

UNIT-IV:
ANALYSIS OF WIND AND PV SYSTEMS
Stand alone operation of fixed and variable speed wind energy conversion systems and solar system Grid connection Issues -Grid integrated PMSG, SCIG Based WECS, grid Integrated solar system

UNIT-V:
HYBRID RENEWABLE ENERGY SYSTEMS
Need for Hybrid Systems- Range and type of Hybrid systems- Case studies of Wind-PV Maximum Power Point Tracking (MPPT).

TEXT BOOKS:
REFERENCES:
IV Year B.Tech. EEE II-Sem

SMART GRID SYSTEMS
(Program Elective - 1.2)

Prerequisite: Power Systems, Measurements and Instrumentation, Power Quality

Course Objectives:
- Understand concept of smart grid and its advantages over conventional grid
- Know smart metering techniques
- Learn wide area measurement techniques
- Understanding the problems associated with integration of distributed generation & its solution through smart grid.

Course Outcomes: At the end of the course, the student is able to:
- Appreciate the difference between smart grid & conventional grid
- Apply smart metering concepts to industrial and commercial installations
- Formulate solutions in the areas of smart substations, distributed generation and wide area measurements
- Come up with smart grid solutions using modern communication technologies

UNIT-I:
Introduction to Smart Grid, Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Concept of Robust & Self Healing Grid Present development & International policies in Smart Grid. Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading (AMR), Outage Management System (OMS), Plug in Hybrid Electric Vehicles (PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Smart Substations, Substation Automation, Feeder Automation.

UNIT-II:
Geographic Information System (GIS), Intelligent Electronic Devices (IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System (WAMS), Phase Measurement Unit (PMU).

UNIT-III:

UNIT-IV:

UNIT-V:
Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighborhood Area Network (NAN), Wide Area Network (WAN), Bluetooth, ZigBee, GPS, Wi-Fi, Wi-Max based communication, Wireless Mesh Network, Basics of CLOUD Computing & Cyber Security for Smart Grid, Broadband over Power line (BPL), IP based protocols.

TEXT BOOKS:

REFERENCES:
JNTU COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE II-Sem

MODERN CONTROL THEORY
(Program Elective - 1.3)

Prerequisite: Control Systems

Course Objectives:
- To explain the concepts of basics and modern control system for the real time analysis and design of control systems.
- To explain the concepts of state variables analysis.
- To study and analyze non linear systems.
- To analyze the concept of stability for nonlinear systems and their categorization.
- To apply the comprehensive knowledge of optimal theory for Control Systems.

Course Outcomes: Upon completion of this course, students should be able to
- Various terms of basic and modern control system for the real time analysis and design of control systems.
- To perform state variables analysis for any real time system.
- Apply the concept of optimal control to any system.
- Able to examine a system for its stability, controllability and observability.
- Implement basic principles and techniques in designing linear control systems.
- Formulate and solve deterministic optimal control problems in terms of performance indices.
- Apply knowledge of control theory for practical implementations in engineering and network analysis.

UNIT-I:
MATHEMATICAL PRELIMINARIES AND STATE VARIABLE ANALYSIS

UNIT-II:
CONTROLLABILITY AND OBSERVABILITY
General concept of controllability – Controllability tests, different state transformations such as diagonalization, Jordon canonical forms and Controllability canonical forms for Continuous-Time Invariant Systems – General concept of Observability – Observability tests for Continuous-Time Invariant Systems – Observability of different State transformation forms.

UNIT-III:
STATE FEEDBACK CONTROLLERS AND OBSERVERS
State feedback controller design through Pole Assignment, using Ackkermans formula– State observers: Full order and Reduced order observers.

UNIT-IV:
NON-LINEAR SYSTEMS
UNIT-V:
STABILITY ANALYSIS

TEXT BOOKS:
1. M.Gopal, Modern Control System Theory, New Age International - 1984

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE II-Sem

RESEARCH METHODOLOGY AND IPR

2002

Prerequisite: --

Course Objectives:
- To understand the research problem
- To know the literature studies, plagiarism and ethics
- To get the knowledge about technical writing
- To analyze the nature of intellectual property rights and new developments
- To know the patent rights

Course Outcomes: At the end of this course, students will be able to
- Understand research problem formulation.
- Analyze research related information
- Follow research ethics
- Understand that today’s world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
- Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
- Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT-I:

UNIT-II:
Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT-III:

UNIT-IV:

UNIT-V:
New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.
TEXT BOOKS:
2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

IV Year B.Tech. EEE II-Sem

ADVANCED POWER ELECTRONIC CONVERTERS LAB
(PG Lab -III)

Prerequisite: Advanced Power Electronic Converters

Course Objectives:
- Speed control techniques of DC and AC drives
- Gate drive circuit configurations for converter circuits
- Advanced converter topologies
- Open loop and closed loop speed control analysis of AC and DC drives

Course Outcomes: At the end of the course, the student should be able to:
- Know the speed control strategies of AC and DC drives
- Design speed, current controllers for AC and DC drives
- Get the knowledge on multi-level inverter/converter topologies
- Perform the open loop and closed loop speed control analysis of AC and DC drives
- Design the gate driver circuits for converter topologies
- Know the complete study of advanced converter technologies

PART-A:
1. Single phase diode clamped multilevel inverter.
2. Single phase flying capacitor Multilevel inverter
3. Single phase cascaded Multilevel inverter
4. Push pull converter
5. Fly back converter
6. Forward converter
7. Series resonant converter
8. Parallel resonant converter
9. ZVS
10. ZCS

Note: Conduct any 5 hardware experiments from the above

PART-B:
1. Single phase diode clamped multilevel inverter.
2. Single phase flying capacitor Multilevel inverter
3. Single phase cascaded Multilevel inverter
4. Push pull converter
5. Fly back converter
6. Forward converter
7. Series resonant converter
8. Parallel resonant converter
9. ZVS
10. ZCS

Note: Conduct any 5 experiments using any simulation tool
**JNTUH COLLEGE OF ENGINEERING HYDERABAD**

V Year B.Tech. EEE I-Sem  L T P C  3 0 0 3

**ELECTRICAL DRIVES**  
(EE Core - IV)

**Prerequisite:** Power Electronic Converters, Electrical Machines

**Course Objectives:**
- To understand principle operation of scalar control of ac motor and corresponding speed-torque characteristics
- To comprehend the vector control for ac motor drive (IM and SM)
- To explain the static resistance control and Slip power recovery drive
- To explain synchronous motor drive characteristics and its control strategies
- To comprehend the brushless dc motor principle of operation.

**Course Outcomes:** After taking this course, student will be able to:
- Develop induction motor for variable speed operations using scalar and vector control techniques.
- Identify the difference between the rotor resistance control and static rotor resistance control method and significance of slip power recovery drives.
- Develop controllers for synchronous motor and variable reluctance motor.

**UNIT–I:**
**RECTIFIER CONTROLLED DC MOTOR:**

**CLOSED LOOP CONTROL OF DC DRIVE:**

**UNIT–II:**
**CHOPPER CONTROLLED DC MOTOR DRIVES:**
Principle of operation of the chopper – Chopper with other power devices – model of the chopper – input to the chopper – steady state analysis of chopper-controlled DC motor drives –

**Closed loop operation:** Speed controlled drive system – current control loop – pulse width modulated current controller – hysteresis current controller – modeling of current controller – design of current controller.

**UNIT–III:**
**CONTROL OF INDUCTION MOTOR:**
Introduction to motor drives – Torque production – Equivalent circuit analysis – Speed – Torque Characteristics with variable voltage operation Variable frequency operation constant v/t operation – Variable stator current operation – Induction motor characteristics in constant torque and field weakening regions.

**STATOR SIDE CONTROL:**
Scalar control – Voltage fed inverter control – Open loop volts/Hz control – speed control slip regulation – speed control with torque and flux control – current controlled voltage fed inverter drive –

**ROTOR SIDE CONTROL OF INDUCTION MOTOR DRIVES:**

**UNIT–IV:**
**VECTOR CONTROL OF INDUCTION MOTOR DRIVES:**
UNIT–V:
CONTROL OF SYNCHRONOUS MOTOR DRIVES:
Synchronous motor and its characteristics – Control strategies – Constant torque angle control – Unity power factor control – Constant mutual flux linkage control – closed loop operation.

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. EEE I-Sem

POWER SEMICONDUCTOR DEVICES AND MODELLING
(Program Elective - II.1)

Prerequisite: Power Electronics

Course Objectives:
- To improve power semiconductor device structures for adjustable speed motor control applications.
- To understand the static and dynamic characteristics of current controlled power semiconductor devices.
- To understand the static and dynamic characteristics of voltage controlled power semiconductor devices.
- To enable the students for the selection of devices for different power electronics applications.
- To understand the control and firing circuit for different devices.

Course Outcomes: Upon completion of this course, students should be able to
- Know the operating characteristics of various basic semiconductor devices and switches.
- Understand the advanced power semiconductor devices operation.
- Know the modeling of basic and advanced semiconductor devices and switches through simulation.
- Analyze the applications of various power semiconductor switches.

UNIT-I:
POWER DIODES:
Basic structure and V-I characteristics, breakdown voltages and control, on-state losses, switching characteristics-turn-on transient, turn-off transient and reverse recovery transient, Schottky diodes, snubber requirements for diodes, diode snubber, modeling and simulation of Power diodes. 5 Hrs.

POWER BJT’S:
Basic structure and V-I characteristics, breakdown voltages and control, secondary breakdown and it’s control- FB SOA and RBS OA curves - on state losses, switching characteristics, resistive switching specifications, clamped inductive switching specifications, turnon transient, turn-off transient, storage time, base drive requirements, switching losses.

UNIT-II:
POWER BJT’S: Device protection- snubber requirements for BJT’S and snubber design switching aids, modeling and simulation of power BJT’S.
SILICON CONTROLLED RECTIFIERS (THYRISTORS):
Basic structure, V-I characteristics, turn-on process, on-state operation, turn -off process, switching characteristics, turn-on transient and di/dt limitations, turn-off transient, turnoff time and reapplied dv/dt limitations, gate drive requirements, ratings of thyristors, snubber requirements and snubber design, modeling and simulation of Thyristor.
TRIACS:
Basic structure and operation-l characteristics, ratings, snubber requirements, modeling and simulation of triacs.

UNIT-III:
GATE TURNOFF THYRISTOR (GTO):
Basic structure and operation, GTO switching characteristics, GTO turn-on transient, GTO turn-off transient, minimum on and off state times, gate drive requirements, maximum controllable anode current, over current protection of GTO’S, modeling and simulation of GTO’S.
POWER MOSFET’S:
Basic structure, V-I characteristics, turn-on process, on state operation, turnoff process, switching characteristics, resistive switching specifications, clamped inductive switching specifications - turn-on transient and di/dt limitations, turn-off transient, turn off time, switching losses, effect of reverse recovery transients on switching stresses and losses - dv/dt limitations, gating requirements, gate charge - ratings of MOSFET’S, FB SOA and RBS OA curves, device protection - snubber requirements, modeling and simulation of Power MOSFET’S.
UNIT-IV:
INSULATED GATE BIPOLAR TRANSISTORS (IGBT’S): Basic structure and operation, latch up IGBT, switching characteristics, resistive switching specifications, clamped inductive switching specification – IGBT turn-on transient, IGBT turn off transient- current tailing - gating requirements, ratings of IGBT’S, FBSOA and RBSOA curves, switching losses – minimum on and off state times, switching frequency capability – over-current protection of IGBT’S, short circuit protection, snubber requirements and snubber design.

UNIT-V:
ADVANCED POWER SEMICONDUCTOR DEVICES: MOS gated thyristors, MOS controlled thyristors or MOS GTO’S, base resistance controlled thyristors, emitter switched thyristor, thermal design of power electronic equipment, modeling and simulation, heat transfer by conduction, transient thermal impedance, heat sinks, heat transfer by radiation and convection - heat sink selection for power semiconductor devices.

TEXT BOOKS:

REFERENCES:
Prerequisite: Power Systems

Course Objectives:
- To identify the necessity of reactive power compensation
- To describe load compensation
- To select various types of reactive power compensation in transmission systems
- To illustrate reactive power coordination system
- To characterize distribution side and utility side reactive power management.

Course Outcomes: Upon the completion of this course, the student will be able to
- Distinguish the importance of load compensation in symmetrical as well as unsymmetrical loads
- Observe various compensation methods in transmission lines
- Construct model for reactive power coordination
- Distinguish demand side reactive power management & user side reactive power management

UNIT-I:
LOAD COMPENSATION
Objectives and specifications – reactive power characteristics – inductive and capacitive approximate biasing – Load compensator as a voltage regulator – phase balancing and power factor correction of unsymmetrical loads examples.

UNIT-II:
STEADY–STATE REACTIVE POWER COMPENSATION IN TRANSMISSION SYSTEM
Uncompensated line – types of compensation – Passive shunt and series and dynamic shunt compensation – examples

Transient state reactive power compensation in transmission systems:

UNIT-III:
REACTIVE POWER COORDINATION
Objective – Mathematical modeling – Operation planning – transmission benefits – Basic concepts of quality of power supply – disturbances- steady –state variations – effects of under voltages – frequency –Harmonics, radio frequency and electromagnetic interferences

UNIT-IV:
DEMAND SIDE MANAGEMENT
Load patterns – basic methods load shaping – power tariffs- KVAR based tariffs penalties for voltage flickers and Harmonic voltage levels

Distribution side Reactive power Management:

UNIT-V:
USER SIDE REACTIVE POWER MANAGEMENT
KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations
REACTIVE POWER MANAGEMENT IN ELECTRIC TRACTION SYSTEMS AND ARE FURNACES:
Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer –filter requirements – remedial measures –power factor of an arc furnace

TEXT BOOKS:

REFERENCES:
HIGH FREQUENCY MAGNETIC COMPONENTS
(Program Elective - II.3)

Prerequisite: None

Course Objectives:
- To have a knowledge on magnetic circuits
- To know the skin effect and proximity effect

Course Outcomes: Upon the completion of this course, the student will be able to
- Design of magnetic components (i.e., inductor and transformer) in a converter.
- Perform steady-state analysis of switched mode power supply.
- Understand core loss in an electromagnetic device, recognize & describe its effect.
- Describe the engineering uses of electromagnetic waves, by frequency band, and the respective hazards associated with them

UNIT-I:


UNIT-II:


UNIT-III:


UNIT-IV:
INTEGRATED INDUCTORS: Introduction, Resistance of Rectangular Trace, Inductance of Straight Rectangular Trace, Construction of Integrated Inductors, Meander Inductors, Inductance of Straight Round Conductor, Inductance of Circular Round Wire Loop, Inductance of Two-Parallel Wire Loop, Inductance of Rectangle of Round

**DESIGN OF INDUCTORS:** Introduction, Restrictions on Inductors, Window Utilization Factor, Temperature Rise of Inductors, Mean Turn Length of Inductors, Area Product Method, AC Inductor Design, Inductor Design for Buck Converter in CCM, Inductor Design for Buck Converter in DCM method.

**UNIT-V:**


**TEXT BOOKS:**

**REFERENCES:**
3. “Thompson --- Electrodyncam Magnetic Suspension.pdf”
5. P. L. Dowell, "Effects of eddy currents in transformer windings.pdf"
8. Texas Instruments --- “Windings.pdf”
JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. EEE I-Sem

ADVANCED DIGITAL SIGNAL PROCESSING
(Program Elective - III.1)

Prerequisite: Digital Signal Processing

Course Objectives:
- To understand the difference between discrete-time and continuous-time signals
- To understand and apply Discrete Fourier Transforms (DFT)

Course Outcomes: After taking this course, student will be able to:
- Knowledge about the time domain and frequency domain representations as well analysis of discrete time signals and systems
- Study the design techniques for IIR and FIR filters and their realization structures.
- Acquire knowledge about the finite word length effects in implementation of digital filters.
- Knowledge about the various linear signal models and estimation of power spectrum of stationary Random signals
- Design of optimum FIR and IIR filters

UNIT-I:
Discrete time signals, Linear shift invariant systems-Stability and causality, Sampling of continuous time signals-
Discrete time Fourier transform- Discrete Fourier series- Discrete Fourier transform, Z transform-Properties of different transforms

UNIT-II:
Linear convolution using DFT, Computation of DFT Design of IIR digital filters from analog filters, Impulse invariance method, Bilinear transformation method

UNIT-III:
FIR filter design using window functions, Comparison of IIR and FIR digital filters, Basic IIR and FIR filter realization structures, Signal flow graph representations Quantization process and errors, Coefficient quantisation effects in IIR and FIR filters

UNIT-IV:
A/D conversion noise- Arithmetic round-off errors, Dynamic range scaling, Overflow oscillations and zeroInput limit cycles in IIR filters, Linear Signal Models

UNIT-V:
All pole, All zero and Pole-zero models, Power spectrum estimation- Spectral analysis of deterministic signals, Estimation of power spectrum of stationary random signals. Optimum linear filters, Optimum signal estimation, Mean square error estimation, Optimum FIR and IIR Filters

TEXT BOOKS:

REFERENCES:
7. Auntoniam, Digital Filter Analysis and Design, TMH.
JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. EEE I-Sem

SCADA SYSTEMS AND APPLICATIONS
(Program Elective - III.2)

Prerequisite: None

Course Objectives:
- To understand what is meant by SCADA and its functions.
- To know SCADA communication.
- To get an insight into its application.

Course Outcomes: After taking this course, student will be able to:
- Describe the basic tasks of Supervisory Control Systems (SCADA) as well as their typical applications.
- Acquire knowledge about SCADA architecture, various advantages and disadvantages of each system.
- Knowledge about single unified standard architecture IEC 61850.
- To learn about SCADA system components: remote terminal units, PLCs, intelligent electronic devices, HMI systems, SCADA server.
- Learn and understand about SCADA applications in transmission and distribution sector, industries etc.

UNIT-I:
Introduction to SCADA: Data acquisition systems, Evolution of SCADA, Communication technologies. Monitoring and supervisory functions, SCADA applications in Utility Automation, Industries SCADA

UNIT-II:
Industries SCADA System Components: Schemes- Remote Terminal Unit (RTU), Intelligent Electronic Devices (IED), Programmable Logic Controller (PLC), Communication Network, SCADA Server, SCADA/HMI Systems

UNIT-III:
SCADA Architecture: Various SCADA architectures, advantages and disadvantages of each system - single unified standard architecture –IEC 61850.

UNIT-IV:
SCADA Communication: various industrial communication technologies-wired and wireless methods and fiber optics. Open standard communication protocols.

UNIT-V:
SCADA Applications: Utility applications- Transmission andDistribution sector- operations, monitoring, analysis and improvement. Industries - oil, gas and water, Case studies, Implementation, Simulation Exercises

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD
V Year B.Tech. EEE I-Sem
PWM CONVERTERS AND APPLICATIONS
(Pragram Elective - III.3)

Prerequisite: Power Electronic Converters

Course Objectives:
- Understand the concepts and basic operation of PWM converters, including basic circuit operation and design.
- Understand the steady-state and dynamic analysis of PWM converters along with the applications like solid state drives and power quality.

Course Outcomes: After taking this course, student will be able to:
- Knowledge concepts and basic operation of PWM converters, including basic circuit operation and design
- Learn the steady-state and dynamic analysis of PWM converters along with the applications like solid state drives and power quality
- Able to recognize and use the following concepts and ideas: Steady-State and transient modeling and analysis of power converters with various PWM techniques.

UNIT-I:
AC/DC and DC/AC power conversion, Overview of applications of voltage source converters and current source converters.

UNIT-II:
Pulse width modulation techniques for bridge converters, Bus clamping PWM. Space vector based PWM. Advanced PWM techniques.

UNIT-III:
Practical devices in converter, Calculation of switching and conduction power losses.

UNIT-IV:
Compensation for dead time and DC voltage regulation, Dynamic model of PWM converter, Multilevel converters, Constant V/F induction motor drives.

UNIT-V:

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. EEE I-Sem

DISTRIBUTED GENERATION
(Program Elective - IV.1)

L  T  P  C
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Prerequisite: Power Systems, Power Electronic Converters

Course Objectives:
- To understand renewable energy sources.
- To gain understanding of the working of off-grid and grid-connected renewable energy generation schemes.

Course Outcomes: After taking this course, student will be able to:
- To understand the planning and operational issues related to Distributed Generation.
- Acquire Knowledge about Distributed Generation Learn Micro-Grids

UNIT-I:
Need for Distributed generation, Renewable sources in distributed generation and current scenario in Distributed Generation.

UNIT-II:
Planning of DGs, Sitting and sizing of DGs optimal placement of DG sources in distribution systems, Grid integration of DGs Different types of interfaces, Inverter based DGs and rotating machine based interfaces, Aggregation of multiple DG units.

UNIT-III:

UNIT-IV:
Economic and control aspects of DGs Market facts, Issues and challenges Limitations of DGs, Voltage control techniques, Reactive power control, Harmonics Power quality issues, Reliability of DG based systems.

UNIT-V:

TEXT BOOKS:

REFERENCES:
V Year B.Tech. EEE I-Sem

INDUSTRIAL LOAD MODELLING AND CONTROL
(Program Elective - IV.2)

Prerequisite: Power Systems

Course Objectives:
- To understand the energy demand scenario
- To understand the modeling of load and its ease to study load demand industrially
- To know Electricity pricing models
- Study Reactive power management in Industries

Course Outcomes: After taking this course, student will be able to:
- Knowledge about load control techniques in industries and its application.
- Different types of industrial processes and optimize the process using tools like LINDO and LINGO.
- Apply load management to reduce demand of electricity during peak time.
- Apply different energy saving opportunities in industries.

UNIT-I:
Electric Energy Scenario-Demand Side Management-Industrial Load Management, Load Curves-Load Shaping
Objectives-Methodologies, Barriers; Classification of Industrial Loads- Continuous and Batch processes -Load
Modeling.

UNIT-II:
Electricity pricing – Dynamic and spot pricing –Models, Direct load control- Interruptible load control, Bottom up
approach- scheduling- Formulation of loadmodels- Optimization and control algorithms - Case studies.

UNIT-III:
Reactive power management in industries-controls-power quality impactsapplication of filters Energy saving in
industries.

UNIT-IV:
Captive power units- Operating and control strategies- Power Pooling- Operation models, Energy banking-Industrial
Cogeneration

UNIT-V:
Selection of Schemes Optimal Operating Strategies, Peak load saving-Constraints-Problem formulation- Case study,
Integrated Load management for Industries

TEXT BOOKS:

REFERENCES:
4. IEEE Bronze Book- “Recommended Practice for Energy Conservation and cost effective planningin
Industrial facilities”, IEEE Inc, USA.
INTEGRATION OF ENERGY SOURCES
(Program Elective - IV.3)

Prerequisite: Power Electronic Converters, Renewable Energy Systems

Course Objectives:
- To introduce the characteristics of various types of renewable energy sources and converters.
- To explain the importance of storage and sizing of hybrid systems.
- To introduce the control issues of isolated systems.
- To explain the harmonics, power quality, voltage imperfections, power injection issues on the grid by integrating renewable energy sources.

Course Outcomes: At the end of the course, the student should be able to:
- Identify the characteristics of renewable energy sources and converters.
- Analyze the importance of storage and sizing of hybrid systems.
- Realize the problems related to isolated systems.
- Analyze the challenges faced by the grid by integrating renewable energy sources.

UNIT- I:
REVIEW OF CHARACTERISTICS OF POWER SOURCES: Basic review of power generation from wind - Solar PV - Thermal - Small hydro - Biomass power strategies in each of these energy conversion systems - Review of maximum power point tracking techniques in solar PV and wind (perturb & observe, hill climbs, incremental conductance).

UNIT-II:
CONVERTER TOPOLOGIES: DC/DC converter (buck, boost, buck boost) - DC/AC inverters (sine, triangular, PWM techniques) - Phase locked loop for inverters.

UNIT-III:
HYBRID SYSTEMS: Advantages of hybrid power systems - Importance of storage in hybrid power systems - Design of hybrid power system based on load curve - Sizing of hybrid power systems.

UNIT-IV:
ISOLATED SYSTEMS: Control issues in isolated systems for voltage and frequency - Small signal stability in isolated power systems - Importance of storage and dump load in isolated systems.

UNIT-V:
ISSUES IN INTEGRATION OF RENEWABLE ENERGY SOURCES: Overview of challenges in integrating renewable sources to the grid - Impact of harmonics on power quality - Need to maintain voltage within a band and fluctuations in voltage because of renewable integration - Power inverter and converter technologies - Mechanism to synchronize power from renewable sources to the grid - Overview of challenges faced in designing power injection from offshore generation sources - Challenges in modeling intermittent nature of renewable power in a power system.

TEXT BOOKS:
2. Renewable Energy Integration Challenges and Solutions Series: Green Energy and TechnologyHossain, Jahangir, Mahmud, Apel (Eds.).

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD

V Year B.Tech. EEE I-Sem

BUSINESS ANALYTICS
(Open Elective PG.1)

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Prerequisite: -

Course objectives:
- Understand the role of business analytics within an organization.
- Analyze data using statistical and data mining techniques and understand relationships between the underlying business processes of an organization.
- To gain an understanding of how managers use business analytics to formulate and solve business problems and to support managerial decision making.
- To become familiar with processes needed to develop, report, and analyze business data.
- Use decision-making tools/Operations research techniques.
- Manage business process using analytical and management tools.
- Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc.

Course Outcomes:
- Students will demonstrate knowledge of data analytics.
- Students will demonstrate the ability of think critically in making decisions based on data and deep analytics.
- Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.
- Students will demonstrate the ability to translate data into clear, actionable insights.

UNIT-I:

UNIT-II:

UNIT-III:
Organization Structures of Business analytics, Team Management, Management Issues, Designing Information Policy, Outsourcing, Ensuring Data Quality, Measuring contribution of Business analytics, Managing Changes. Descriptive Analytics, predicative analytics, predicative Modelling, Predictive analytics analysis, Data Mining, Data Mining Methodologies, Prescriptive analytics and its step in the business analytics Process, Prescriptive Modelling, nonlinear Optimization.

UNIT-IV:

UNIT-V:
TEXT BOOKS:
2. Business Analytics by James Evans, persons Education.

REFERENCES:
1. Business Analytics with Management Science Models and Methods by ArbeenAsllani, Pearson
3. R for Business Analytics, by A.Ohri
JNTUH COLLEGE OF ENGINEERING HYDERABAD
V Year B.Tech. EEE I-Sem

INDUSTRIAL SAFETY
(Open Elective PG.2)

Prerequisite: -

UNIT-I:
INDUSTRIAL SAFETY: Accident, causes, types, results and control, mechanical and electrical hazards, types, causes and preventive steps/procedure, describe salient points of factories act 1948 for health and safety, wash rooms, drinking water layouts, light, cleanliness, fire, guarding, pressure vessels, etc, Safety color codes. Fire prevention and firefighting, equipment and methods.

UNIT-II:
FUNDAMENTALS OF MAINTENANCE ENGINEERING: Definition and aim of maintenance engineering, Primary and secondary functions and responsibility of maintenance department, Types of maintenance, Types and applications of tools used for maintenance, Maintenance cost & its relation with replacement economy, Service life of equipment.

UNIT-III:

UNIT-IV:
FAULT TRACING: Fault tracing-concept and importance, decision treeconcept, need and applications, sequence of fault finding activities, show as decision tree, draw decision tree for problems in machine tools, hydraulic, pneumatic,automotive, thermal and electrical equipment’s like, i. Any one machine tool, ii. Pump iii. Air compressor, iv. Internal combustion engine, v. Boiler, vi. Electrical motors, Types of faults in machine tools and their general causes.

UNIT-V:

TEXT BOOKS:

REFERENCES:
OPERATIONS RESEARCH
(Open Elective PG.3)

Prerequisite:-
Course Outcomes:
At the end of the course, the student should be able to
- Students should be able to apply the dynamic programming to solve problems of discrete and continuous variables.
- Students should be able to apply the concept of non-linear programming
- Students should be able to carry out sensitivity analysis
- Students should be able to model the real world problem and simulate it.

UNIT-I:
Optimization Techniques, Model Formulation, models, General L.R Formulation, Simplex Techniques, Sensitivity Analysis, Inventory Control Models

UNIT-II:
Formulation of a LPP - Graphical solution revised simplex method - duality theory – dual simplex method - sensitivity analysis - parametric programming

UNIT-III:
Nonlinear programming problem - Kuhn-Tucker conditions min cost flow problem – max flow problem - CPM/PERT

UNIT-IV:
Scheduling and sequencing - single server and multiple server models – deterministic inventory models - Probabilistic inventory control models - Geometric Programming.

UNIT-V:
Competitive Models, Single and Multi-channel Problems, Sequencing Models, Dynamic Programming, Flow in Networks, Elementary Graph Theory, Game Theory Simulation

TEXT BOOKS:

REFERENCES:
Prerequisite: -

UNIT-I:

UNIT-II:
Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process.

UNIT-III:

UNIT-IV:
Activity-Based Cost Management, Bench Marking; Balanced Score Card and Value-Chain Analysis. Budgetary Control; Flexible Budgets; Performance budgets; Zero-based budgets. Measurement of Divisional profitability pricing decisions including transfer pricing.

UNIT-V:

TEXT BOOKS:
1. Cost Accounting A Managerial Emphasis, Prentice Hall of India, New Delhi
2. Charles T. Horngren and George Foster, Advanced Management Accounting

REFERENCES:
1. Robert S Kaplan Anthony A. Alkinson, Management & Cost Accounting
JNTUH COLLEGE OF ENGINEERING HYDERABAD
V Year B.Tech. EEE I-Sem

COMPOSITE MATERIALS
(Open Elective PG.5)

L T P C
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Prerequisite:

UNIT – I:

UNIT – II:

UNIT – III:

UNIT – IV:

UNIT – V:
Strength: Laminar Failure Criteria-strength ratio, maximum stress criteria, maximum strain criteria, interacting failure criteria, hygrothermal failure. Laminate first play failure-insight strength; Laminate strength-ply discount truncated maximum strain criterion; strength design using caplet plots; stress concentrations.

TEXT BOOKS:

REFERENCES:
JNTUH COLLEGE OF ENGINEERING HYDERABAD
V Year B.Tech. EEE I-Sem
ENERGY FROM WASTE
(Open Elective PG.6)

Prerequisite:

UNIT-I:
Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors

UNIT-II:

UNIT-III:

UNIT-IV:
Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, Fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.

UNIT-V:
Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

TEXT BOOKS:

REFERENCES:
### Course Overview

**Dept. of EEE/JNTUHCEH**

**B.Tech+M.Tech - EEE- (IDP) w.e.f. 2019-20**

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**JNTUH COLLEGE OF ENGINEERING HYDERABAD**

**V Year B.Tech. EEE I-Sem**

**ELECTRICAL DRIVES LAB**

**(PG Lab - IV)**

**Prerequisite:** Power Electronic Converters, Advanced Power Electronic Converters Electrical Machines

**Course Objectives:**

- To understand principle operation of scalar control of ac motor and corresponding speed-torque characteristics
- To comprehend the vector control for ac motor drive (IM and SM)
- To explain the static resistance control and Slip power recovery drive
- To explain synchronous motor drive characteristics and its control strategies
- To comprehend the brushless dc motor principle of operation.

**Course Outcomes:** After taking this course, student will be able to:

- Develop induction motor for variable speed operations using scalar and vector control techniques.
- Identify the difference between the rotor resistance control and static rotor resistance control method and significance of slip power recovery drives.
- Develop controllers for synchronous motor and variable reluctance motor.

**List of Experiments:**

1. Speed control of separately excited DC Motor Drive with 1 quadrant chopper.
2. Speed control of separately excited DC Motor Drive with 4 quadrant chopper.
3. Speed control of BLDC Motor Drive.
4. Multi-level inverter based AC Induction Motor Drive control equipment.
5. Speed control of 3-phase wound rotor Induction Motor Drive.
7. Speed control of 5-phase Induction Motor Drive.
8. Speed control of 3-phase Induction Motor Drive using V/F control.
9. Speed control of 3-phase Induction Motor Drive using Vector Control technique.
10. Speed Measurement and closed loop control using PMDC Motor Drive.
11. Speed measurement and closed loop control of PMDC Motor Drive with thyristor circuit.
12. Matrix Converter
13. Speed measurement and closed loop control of IGBT used single 4 quadrant chopper for PMDC Motor Drive.

**Note:** Any ten experiments can be conducted.