Vision and Mission of Electrical and Electronics Engineering

Vision

To impart knowledge of Electrical and Electronics Engineering and prepare graduates to achieve excellence in engineering education and research.

Mission

- Students with deep understanding of fundamentals of Electrical and Electronics Engineering.
- To prepare professionals with positive attitude, values and vision.
- To collaborate with industry, research organizations and academia to encourage innovation.
- To provide a platform for engineering graduates to create and design new products and systems that can help industry and society as a whole.

PEO’s

- To prepare students to achieve excellence in the field of higher education/industry globally.
- To provide students with basic fundamentals of mathematics, science and technology to design/solve engineering related problems.
- To inculcate in students professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach and ability to relate engineering issues to broader social context.
- To provide students a congenial environment for achieving excellence, leadership and life-long learning required for a successful professional career.

PO’S

1. Graduates will have an ability to apply knowledge of mathematics, science and engineering in all aspects of electrical and electronics engineering.
2. Graduates will have an ability to identify, formulate and solve electrical and electronics engineering problems.
3. Graduates will have ability to design/ develop components and processes which meet needs of society rationally.
4. Graduates will have an ability to apply theoretical knowledge of electrical and electronics engineering and to conduct experiments with electrical systems, analyze and interpret data for conclusions.

5. Graduates will have ability to model real life problems using software and hardware platforms both offline and in real time.

6. Graduates will have ability to design and construct a system, component or process to meet desired needs within realistic constraints.

7. Graduates will possess leadership and managerial skills with professional ethical practices and social concerns.

8. Graduates will demonstrate an ability to visualize and work as individual or leader in multidisciplinary tasks.

9. Graduates will be able to communicate effectively in both verbal and written form.

10. Graduate will show understanding of impact of engineering solutions on society and also will be aware of contemporary issues.

11. Graduates will have ability to align to and upgrade to higher learning and research.

12. Graduate will have ability to participate and succeed in competitive examinations like GATE, GRE.
## BACHELOR OF ENGINEERING (ELECTRICAL & ELECTRONICS)
### III SEMESTER

<table>
<thead>
<tr>
<th>Ref No.</th>
<th>Subject</th>
<th>SCHEDULE OF TEACHING</th>
<th>SCHEME OF EXAMINATION</th>
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<td>Engineering Mathematics-III</td>
<td>3  1  -  4</td>
<td>50  50  3  100</td>
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<td>Electric Machinery-I</td>
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<td>EE351</td>
<td>Electric Machinery-I Lab</td>
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<tr>
<td>EE302</td>
<td>Electrical Measurements &amp; Instrumentation</td>
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<td>50  50  3  100</td>
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<td>Electrical Measurements &amp; Instrumentation lab.</td>
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<td>EE305</td>
<td>Network Analysis and Synthesis</td>
<td>3  1  -  4</td>
<td>50  50  3  100</td>
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<td>EE356</td>
<td>Network Analysis and Synthesis Lab</td>
<td>-  -  3  3</td>
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<td>EE306</td>
<td>Digital Electronics</td>
<td>3  1  -  4</td>
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<td>15  5  10  30</td>
<td>250  250  500  200</td>
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**Note:**
*marks refer to mid semester evaluation and end semester evaluation.
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<thead>
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<th>Credits</th>
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<td>L T P</td>
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<td>Contact Hours</td>
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<td>Max Marks-50</td>
<td>Internal Assessment-50</td>
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<tr>
<td>Pre-requisites</td>
<td>Knowledge of Integration, Differential</td>
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| Course Objectives          | 1. Present basic concepts of sequences and series, namely limit of sequence, convergence and divergence of an infinite series, error estimates.  
2. Present an introduction to the fundamental concepts of Linear algebra, namely linear dependence and independence of vectors, rank of matrix, solution of a system of linear equations by Gauss elimination method and inverse of a matrix by Gauss-Jordan elimination method, eigen value problem, Cayley-Hamilton theorem, similarity of matrices etc.  
3. Present an introduction to the basic concepts of complex functions, namely continuity, differentiability of complex functions, analytic function, Cauchy-Riemann equations, Taylor and Laurent series, concept of residue, conformal mappings and linear fractional transformations etc. |
| Course Outcome (s)         | 1. Demonstrate ability to deal with sequence and series.  
2. Demonstrate ability to deal with matrix manipulations for example finding eigen values and eigen vectors, solution of system of linear equations.  
3. Demonstrate ability to deal complex function theory. It will help the students to solve various problems which can not be solved or very difficult to tackle in real variable theory. |

**Note for Examiner**- Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 5 conceptual questions of 2 marks each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.

**PART-A**

1. **Sequences and Series**
   (Scope as in Chapter 8, Sections 8.1 – 8.10 of Book 2).  
   (8 hours)

2. **Linear Algebra**
   (Scope as in Chapter 6, Sections 6.3 – 6.5, 6.7 of Book 1).
Eigen values, eigen vectors, Cayley – Hamilton theorem (statement only). Similarity of matrices, Basis of eigenvectors, diagonalization
(Scope as in Chapter 7, Sections 7.1, 7.5 of Book 1).

PART B

3. Complex Functions

Definition of a Complex Function, Concept of continuity and differentiability of a complex function, Cauchy – Riemann equations, necessary and sufficient conditions for differentiability (Statement only). Study of complex functions: Exponential function, Trigonometric functions, Hyperbolic functions, real and imaginary part of trigonometric and hyperbolic functions, Logarithmic functions of a complex variable, complex exponents
(Scope as in Chapter 12, Sections 12.3 – 12.4, 12.6 – 12.8 of Book 1).

Laurent Series of function of complex variable, Singularities and Zeros, Residues at simple poles and Residue at a pole of any order, Residue Theorem (Statement only) and its simple applications
(Scope as in Chapter 15, Sections 15.1 – 15.3 of Book 1).

Conformal Mappings, Linear Fractional Transformations
(Scope as in Chapter 12, Sections 12.5, 12.9 of Book 1).

TEXT BOOKS

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Electric Machinery-I</th>
<th>Credits</th>
<th>04</th>
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<td>Contact Hours</td>
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<td>Max Marks-50</td>
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<tr>
<td>Pre-requisites</td>
<td>Basic Electrical Engineering</td>
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<tr>
<td>Course Objectives</td>
<td>1. To understand the working and constructional features of transformer and Electric machines.</td>
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<td>2. To understand the process to test, control and analyze the performances various electric machines.</td>
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<td>3. To understand the applications of transformer and electric machines in the field.</td>
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<tr>
<td>Course Outcome (s)</td>
<td>1. To be able to explain the principle of operation of various electric machines</td>
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<td>2. To be able to identify and select machines for specific applications.</td>
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<td>3. To be able to apply control procedures for machines during operation.</td>
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<td>4. To analyze the characteristics of electrical machinery.</td>
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**Note for Examiner-** Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 5 conceptual questions of 2 marks each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.

**PART-A**

1. **Transformers**

   (10 hours)

2. **Direct Current Machines**
   **Generators:** Mechanical construction, Armature windings, Induced emf equation, Developed torque, Magnetization characteristics, Theory of commutation, Armature reaction, Types of d.c. generators, Voltage regulation, Losses, Separately excited, shunt, series and compound generators and characteristics, Maximum efficiency criterion.

   **Motors:** Operation, Speed regulation, Losses, Series, shunt and compound motors, methods of speed control, Ward Leonard method, Braking or Reversing d.c. motors.

   (10 hours)

**PART-B**

3. **Polyphase Induction Machines**
   **Induction Motor:** Construction, Principle of operation, Equivalent circuit, Power relations, Speed torque characteristics. Maximum power criterion, Maximum torque criterion and maximum

**Induction Generator:** Motor to generator transition, Induction generator starting and operation with other three phase sources, isolated generator operation and voltage build up. 

(15 hours)

**4. Single Phase Induction Motors**

Double revolving field theory, Analysis of single phase induction motor and speed torque characteristics, Split Phase, Capacitor start, Capacitor start capacitor run motor, Permanent split capacitor motor, Shaded pole motor, Testing of single phase induction motor: No load and block rotor tests. [Guru-Hiziroglu:10.1-10.4, 10.6-10.7]

(10 hours)

**Text book:**

3. 

**Other Recommended Books:**

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Electric Machinery-I (Lab)</th>
<th>Credits</th>
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<tr>
<td>Course Code</td>
<td>EE-351</td>
<td>Max Marks-50</td>
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</table>

**Note:** At least eight experiments to be done.

1. Open circuit and short circuit test of single phase/ three phase transformer and obtain its equivalent circuit.
2. Parallel operation of two single phase transformers.
4. Different winding connections of three phase two winding transformer and to identify proper combination for parallel operation.
5. Parallel operation of two three phase transformers.
8. Efficiency at different loads of the given dc shunt machine through swinburne / load test.
9. Speed control characteristics of a given dc shunt motor by (i) Armature control (ii) Field control.
10. No load and blocked rotor test on a three phase induction motor and to obtain its Equivalent circuit
11. Torque speed characteristics of three phase induction motor.
Course Title | Electrical Measurements and Instrumentations | Credits | 04
--- | --- | --- | ---
Course Code | EE-302 | L T P | 3 1 0
Contact Hours | 45 | Max Marks-50 | Internal Assessment-50 | Elective | N
Pre-requisites | Knowledge of basic electrical engineering.
Course Objectives | 1. To understand the need of units and standards of measuring quantities.
2. To understand the working of various measuring meters.
3. To understand the concept of bridges used for measuring electrical components.
4. To study the working and applications of various sensors and transducers.
5. To study instrument and logarithmic amplifiers.
Course Outcome(s) | Students would be able to apply the knowledge gained through this course to the practical works related to the measurements of various electrical and electronics quantities.

**Note for Examiner**- Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 5 conceptual questions of 2 marks each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.

**PART-A**

1. **Units, Standards & Errors**
   Different types of unit systems: cgs, mks and SI units, Standards of EMF, Resistance, Capacitance and inductance, Systematic errors.
   
   (6 hours)

2. **Analog Measuring Instruments**
   Different types of analog instruments, Operating torques and their systems, T/W ratio, Pointers & scales, Principles of operation of various types of electro mechanical indicating instruments viz. PMMC, Moving iron, Dynamometer and Induction for measurement of various electrical quantities, Sources of errors & their compensation, Shunts & multipliers.
   
   (12 hours)

3. **Potentiometers**
   Basic potentiometer circuit, Lab type potentiometer, Multiple range potentiometer, Constructional details of potentiometers, Applications of d-c potentiometers; Self balancing potentiometers, AC potentiometers: Polar and Coordinate types.
   
   (6 hours)
PART-B

4. **Bridges**
   (10 hours)

5. **Sensors and Transducers**
   Sensors: Primary sensing elements, Their characteristics and classification.
   Passive transducers: Configurations, Analysis and applications of Resistive, Inductive and Capacitive transducers.
   Active transducers: Principle, Construction, Analysis and Applications of thermoelectric, Electromagnetic, Piezo-electric and photoelectric transducers.
   (6 hours)

6. **Analog Signal Conditioning**
   Instrumentation amplifiers: Circuit diagram, Working, Uses and applications.
   Logarithmic amplifiers: Circuit diagram, Operating principle, Working and applications.
   (5 hours)

**TEXT BOOK**


**OTHER RECOMMENDED BOOKS**

W.D. Cooper, “*Electronic Instrumentation & Measurement Techniques,*” PHI.
Course Title: Electrical Measurements and Instrumentations (Lab)

Course Code: EE-352  Max Marks: 50  Credits: 01

Note: At least eight experiments to be done.

5. To measure the characteristics of strain gauge as a transducer using half bridge and full bridge.
6. To measure the characteristics of pressure sensor as a transducer.
7. To study piezoelectric effect and perform tests on piezoelectric transducer.
8. To measure the characteristics of displacement transducer using LVDT & inductive transducer.
9. To study various features of LabVIEW software.
10. To perform arithmetic & logical operations using LabVIEW.
11. To generate a graph & sub-VI using Lab VIEW.
12. Using case structure, generate a program to A.P. & G.P. in Lab VIEW.
Course Title | Network Analysis and Synthesis | Credits | 04
---|---|---|
Course Code | EE-305 | L T P | 3 1 0
Contact Hours | 45 | Max Marks-50 | Internal Assessment-50 | Elective | N

Pre-requisites | Basic fundamentals and concepts of basic Electrical Engineering.

Course Objectives
1. To provide the various Basic concepts, laws and various circuit analyzing methods applied in solving Electrical Circuits.
2. To provide the concept of three phase supply systems.
3. To understand the concept of graph theory and Laplace transform to analyze the Electrical Circuits.
4. To provide the basic knowledge of Network Functions and their stability in frequency domain.
5. To understand the concepts of stability and methods to check the stability.

Course Outcome(s)
1. Students will understand the basic concepts, laws used in the Electrical Circuits.
2. Students will understand the procedures to solve the various Electrical Circuit problems using different methods of analysis.
3. Students will understand and use the Graph theory and Laplace transformation to solve the Electrical Circuit problems.
4. Students will understand the behavior of the different networks in frequency domain and stability of networks.

Note for Examiner- Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 5 conceptual questions of 2 marks each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.

**PART-A**

1. **Methods of analyzing A.C. Circuits**
   Formulation of network equations, Source transformation Nodal Analysis: Node voltages, matrix node equations, Mesh Analysis: Mesh currents, matrix mesh equations, Network Theorems: Superposition, Thevenin’s, Norton’s, Maximum Power Transfer theorem, three phase unbalanced circuit analysis, Solution of Problems with DC & AC sources.

   (10 hours)

2. **Network Topology**
   Introduction, Network Graph, Tree and Co-tree, Twigs and Links, Incidence Matrices and its properties, Link currents: Tie-Set Matrix, Cut-Set and Tree Branch Voltages, Solution of Problems.

   (7 hours)

3. **Two-Port Networks**
   Introduction, Open Circuit Impedance Parameter, Short Circuit Admittance Parameter, Transmission Parameter, Inverse Transmission Parameter, Hybrid Parameter, Interrelationship of different parameters, Inter-Connection of Two-Port Networks, Terminated Two-Port Network, T and Π representation, solution of problems.

   (8 hours)
PART-B

4. Laplace Transform Analysis
Definition of Laplace Transform, Step function, Impulse function, Periodic function, Inverse transform, initial and final value theorem, Circuit Elements in the S-Domain, Solution of problems with DC & AC sources. Transfer Functions: Circuit Analysis, Convolution and Impulse Response.

(10 hours)

5. Network Functions and s-Domain Analysis

(10 hours)

TEXT BOOKS


Other Recommended Books
2. Find impedance, admittance, transmission and hybrid parameters of the two port network.
4. To determine phase sequence of three phase supply system and to find the line currents for three phase three wire load when the sequence is i) RYB ii) RBY.
5. To make 3-phase unbalanced network with neutral return of known impedance. Measure phase currents, neutral currents and the potential difference between the load and supply neutral.
6. To check the polarity marking of a transformer and to determine self inductance of each winding and mutual inductance between the windings.
8. To obtain capacitor voltage vs. time curve and time constant of an RC circuit when It is switched on to dc supply. Capacitor is discharged through the resistance
9. study the current build up and current decay in RL / RC circuit by obtaining its response to a square wave input.
10. Simulation of dc circuits using Pspice.
11. DC Transient response using Pspice.
Course Title | Digital Electronics | Credits | 04
Course Code | EE-306 | L T P | 3 1 0
Contact Hours | 45 | Max Marks-50 |Internal Assessment-50 | Elective | N
Pre-requisites | Knowledge of Basic Electronics
Course Objectives
1. To inculcate understanding of digital devices and digital logic Families.
2. To understand the concept of data converters.
3. Introduction to semiconductor memories.
Course Outcome
1. Students should be able to apply the knowledge and understanding gained about digital devices to practical Projects.
2. To create a foundation for Subjects like Microprocessor and Microcontrollers

Note for Examiner- Examiner will set 7 questions of equal marks. First question will cover whole syllabus, having 5 conceptual questions of 2 marks each and is compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt at least two questions from each part.

**PART-A**

1. **Introduction**
   Concept of digitisation, Representation of Logic, Logic Variables, Boolean Algebra, Boolean Expressions and minimization of Boolean expression using K-Map(up to five variables), Review of Logic Gates, design & Implementation of Adder, Subtractor, Multiplexer, DeMultiplexer, Encoder, Decoder, ROM, Digital Comparators, Code Converters using gate, multiplexers / decoders

   (10 hours)

3. **Flip-Flops**
   A 1- bit memory cell, clocked & unclocked flip flop, S-R Flip-Flop, JK Flip-Flop, Race around Condition , Master Slave Flip-Flop, D&T type Flip-Flop

   (04 hours)

4. **Counters & Shift Registers**
   Ripple Counters, Design of Modulo-N ripple counter ,Presettable Counters, Up-Down counter, design of synchronous counters with and without lockout conditions, design of shift registers with shift-left, shift-right & parallel load facilities, Universal shift Registers.

   (10 hours)

**PART-B**

5. **Data Converters**
Sample & Hold switch, D/A converters: weighted resistor type, R-2R Ladder type; A/D Converters: Counter-Ramp type, Dual Slope Type, Successive approximation type, flash type; Specifications of ADC & DAC (6 hours)

6. Digital Logic families

Characteristics of digital circuits: fan in, fan-out, power dissipation, propagation delay, noise margin; Transistor-transistor Logic (TTL), manufacturer Data Sheets & Specifications, Types of TTL Gates (Schottky, standard, low power, high speed). Emitter Coupled Logic (ECL), Manufacturers Data sheets & Specifications, Comparison of Characteristics of TTL and ECL, Tristate Logic & its applications. (5 hours)

7. Semiconductor Memories & Programmable Logic

ROM, PROM, EPROM, EEPROM; RAM: Static RAM, Typical Memory Cell, Memory Organisation, Dynamic RAM cell, Reading, & Writing Operation in RAM, PLA, PAL & FPGA (10 hours)

TEXT BOOKS RECOMMENDED:
1. T. Schilling, “Digital Electronics”

OTHER RECOMMENDED BOOK
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<th>Credits</th>
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<tr>
<td>Course Code</td>
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<td>Max Marks-50</td>
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**Note:** At least eight experiments are to be done.

**List of Experiments**
1. To verify the truth tables of basic gates.
2. To verify NAND and NOR as universal gates.
3. To realize adder and subtractor using logic gates.
4. To design and implement SR, JK, D and T flip flops.
5. To perform arithmetic & Logic operations on two 4-bit binary numbers using an ALU.
6. To design and implement synchronous counter.
7. To design and implement a Modulo N counter.
9. To design and implement a universal shift register.
10. To convert 8 bit Digital data to Analog value using DAC
11. To convert Analog value into 8 bit Digital data using ADC