|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
Approved by AICTE, New Delhi.
Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi
Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Semester:	**I/II**	**Course Type:**	**ESC**		
Course Title: Introduction to Electrical Engineering					
Course Code:	**25EET13/23**			**Credits:**	3
Teaching Hours/Week (L:T:P:S)			3:0:0:1	**Total Hours:**	40
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:	Theory			**Exam Hours:**	03

I. Course Objectives: At the end of the course student will be able to

- Explain insights of energy sources and general structure of power system.
- Study & analyse fundamentals of DC &AC circuits.
- Understand the construction, working principle and applications of electrical machines.
- Study the domestic wiring, tariff and electrical safety practices
- Explore fundamentals of EV, Batteries, UPS and its applications.

II. Teaching-Learning Process (General Instructions):

- Chalk and talk method/Smart interactive panel
- Power point presentation / keynotes
- Videos
- Demo models
- Animations
- Self-learning

III. COURSE CONTENT

Module-1: DC Circuits & AC Fundamentals — **8 Hours**

DC circuits: Introduction to DC circuits, ohms law, Kirchhoff's laws, concept of power and energy. Analysis of series parallel circuits and numerical**.**

AC fundamentals: Generation of sinusoidal voltage, concept of phasors, time period, frequency, instantaneous values, peak, average, RMS value, peak factor, and form factor, Simple Numerical.

Textbook: Chapter: Sections: Basic Electrical Engineering, D C Kulshreshtha: Chapter 2, Section-2.1,2.2, Chapter-3, Section-3.6, 3.7,3.8, Chapter-9, Section- 9.1,9.2,9.3

Pre-requisites: Faraday's Laws of Electromagnetic Induction

RBT Levels: L1, L2,L3

Module-2: Single phase & Three phase AC circuits — **8 Hours**

Single-phase AC Circuits: Analysis of R, L, C circuits with phasor diagrams and numerical.
Three phase AC Circuits: Generation of three phase AC quantities, advantages and limitations. star and delta connections, relationship between line and phase quantities. Measurement of 3-phase power by 2-wattmeter method. Numerical

Textbook: Chapter: Sections: Basic Electrical Engineering, D C Kulshreshtha: Chapter-9, Section-9.7, Chapter 12, Section- 12.3 to 12.9, 12.11

Pre-requisites: Acquaintance of circuit parameters R, L and C

RBT Levels: L1, L2, L3

Module-3: DC Motor & Single-phase Transformers — **8 Hours**

DC Motor: Construction & working principle of operation, back emf and its significance. Torque equation types & characteristics of DC motors (Series and shunt only), applications. numerical.

Single-phase Transformers: Construction and types, operating principle, EMF equations, losses, and efficiency, numerical.

Textbook: Chapter: Sections:

1. Basic electrical engineering, D C Kulshreshtha, Chapter-16: Section-16.2, 16.12, 16.13, Chapter-13, Section-13.1,13.2,13.5,13.10

Pre-requisites: Mutual Induction principle, Fleming's rule

RBT Levels:L1, L2, L3

Module-4: Energy Resources & Domestic Wiring — **8 Hours**

Energy Resources: Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.

Domestic Wiring: Introduction, Service mains, meter board and distribution board. Types of domestic wiring (Casing-Capping and Conduit). Two way and three-way control of load. Definition of electrical unit, two-part electricity tariff, calculation of electricity bill for domestic consumers**.** Safety measure**-**Working principle of fuse and miniature circuit breaker (MCB), merits and demerits of fuse and MCB, Earthing and its types (Pipe & Plate Earthing only).

Textbook: Chapter: sections:

1. A Course in Power Systems, J B Gupta: Part-1, Chapter-1, section-1.3, Chapter-7, section 7.1, Part-2, Chapter-1, section-1.6
2. Basic Electrical Engineering, D C Kulshreshtha: Chapter 19: Section 19.2, 19.3,19.4,19.6,19.7,19.9

Pre-requisites: Fundamentals of AC supply.

RBT Levels: L1, L2, L3

Module-5: Basics of Electric Vehicle & UPS — **8 Hours**

Electric Vehicle: Introduction to Electric Vehicles, Hybrid Electric Vehicles (series HEV, Parallel HEV, Series–parallel combination HEV only).

UPS Basics: Introduction, types of UPS, applications, Basics of Batteries, types and it's parameters, applications of batteries. UPS and battery calculations.

Textbook: Chapter: sections:

1. Electric & Hybrid Vehicles – Design Fundamentals, Iqbal Hussain: Chapter 1: Section 1.1, Chapter 3: section 3.1,3.2.
2. Uninterrupted power supply system, Kamal Maity: Chapter 1: section 1.1, Chapter 4: 4.1 to 4.5, Chapter 5: section 5.3.7, Chapter 6: section 6.6

Pre-requisites: Fundamentals of DC &single-phase AC supply.

RBT Levels: L1, L2, L3

IV. COURSE OUTCOMES

At the end of the course students will be able to:

CO1	Apply the basic electrical laws to solve DC and AC circuits.
CO2	Explain the construction, types and working of electrical machines.
CO3	Illustrate concepts of domestic wiring, safety measures.
CO4	Discuss the various energy sources, basic concepts of Electric Vehicles and UPS.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	S1	S2	S3	S4

CO1	3	1													
CO2	3	1													
CO3	3					2									
CO4	3					2									

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure Section 1

Continuous Internal Evaluation (CIE): Refer Annexure Section 1

Semester End Examination (SEE): Refer Annexure Section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Basic electrical engineering	D C Kulshreshtha	Revised 1st edition	Tata McGraw Hill.
2	A Course in Power Systems	J B Gupta	11th Edition, Reprint 2021	S.K. Kataria & Sons
3	Uninterrupted power supply system	Kamal Maity	1st Edition, 2017	Independently Published
4	Electric and Hybrid Vehicles Design Fundamentals	Iqbal Husain	Third Edition, 2021	CRC Press

VII(b): Reference Books:

1	A Textbook of electrical technology	B.L.Theraja	Reprint edition 2014	S Chand and Company

VII(c): Web links and Video Lectures (e-Resources):

https://www.youtube.com/@eeedepartment4878
https://www.youtube.com/watch?v=6p5WXzrYYiI
https://www.youtube.com/watch?v=0wkjlSZt0ko

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Activities like seminar, assignments, quiz, self-study activities, group discussions, Field visits, etc