COURSE CODE	COURSE NAME	L	T	P	CREDIT	YEAR OF INTRODUCTION
101009/EE100D	PRINCIPLES OF ELECTRICAL ENGINEERING	2	0	0	2	2021

1. Preamble

This course aims to (1) equip the students with an understanding of the fundamental principles of electrical engineering (2) provide an overview of evolution of electronics, and introduce the working principle and examples of fundamental electronic devices and circuits (3) provide an overview of evolution of communication systems, and introduce the basic concepts in radio communication.

2. Prerequisite

Physics and Mathematics (Pre-university level).

3. Syllabus

Module 1 : Introduction:

Concept of Potential difference, voltage, current, Fundamental linear passive and active elements to their functional current-voltage relation, Terminology and symbols in order to describe electric networks, voltage source and current sources, ideal and practical sources, concept of dependent and independent sources, Kirchhoff-s laws and applications to network solutions using mesh and nodal analysis, Concept of work, power, energy, and conversion of energy.

Module 2 : DC Circuits

Current-voltage relations of the electric network by mathematical equations to analyze the network (Thevenin's theorem, Norton's Theorem, Maximum Power Transfer theorem) Simplifications of networks using series-parallel, Star/Delta transformation. Superposition theorem.

Module 3 : AC Circuits

AC waveform definitions, form factor, peak factor, study of R-L, R-C,RLC series circuit, R-L-C parallel circuit, phasor representation in polar and rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, 3 phase Balanced AC Circuits (ϒ-Δ & ϒ-ϒ).

Module 4 : Electrostatics and Electro-Mechanics

Electrostatic field, electric field strength, concept of permittivity in dielectrics, capacitor composite, dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors, Electricity and Magnetism, magnetic

field and Faraday's law, self and mutual inductance, Ampere's law, Magnetic circuit, Single phase transformer, principle of operation, EMF equation, voltage ratio, current ratio, KVA rating, efficiency and regulation, Electromechanical energy conversion.

Module 5 : Measurements and Sensors

Introduction to measuring devices/sensors and transducers (Piezoelectric and thermo-couple) related to electrical signals, Elementary methods for the measurement of electrical quantities in DC and AC systems (Current & Single-phase power). Electrical Wiring and Illumination system: Basic layout of the distribution system, Types of Wiring System & Wiring Accessories, Necessity of earthing, Types of earthing, Safety devices & system.

For Further Reading - Principle of batteries, types, construction and application, Magnetic material and B-H Curve, Basic concept of indicating and integrating instruments.

4. Text Books

1. A. E. Fitzgerald, Kingsely Jr Charles, D. Umans Stephen, '*Electric Machinery'*, 6th Edition, Tata McGraw Hill.
2. B. L. Theraja, Chand and Company Ltd., *A Textbook of Electrical Technology*, Vol. I, New Delhi.
3. V. K. Mehta, S. Chand and Company Ltd., '*Basic Electrical Engineering*',New Delhi.
4. J. Nagrath and Kothari, '*Problems of Basic Electrical Engineering'*, 2nd Edition, Prentice Hall of India Pvt. Ltd.

5. Reference Books (Minimum 5)

1. T. K. Nagsarkar and M. S. Sukhija, '*Basic of Electrical Engineering*', Oxford University Press.
2. D. J. Griffiths, '*Introduction to Electrodynamics*', 4th Edition, Cambridge University Press.
3. William H. Hayt & Jack E. Kemmerly, ' *Engineering Circuit Analysis*', McGraw-Hill Book Company Inc.
4. Smarjith Ghosh, '*Fundamentals of Electrical and Electronics Engineering*',Prentice Hall (India) Pvt. Ltd.

6. Course Outcomes

After the completion of the course the student will be able to

CO1: Apply fundamental concepts and circuit laws.
CO2: Able to analyse DC circuits.
CO3: Understand simple AC circuits.
CO4: Understand electrostatic and electro mechanical systems.
CO5: Understand the basic measuring devices and sensors.

7. Mapping of Course Outcomes with Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1										2
CO2	3	1										2
CO3	2	1										2
CO4	2											
CO5	2											2

8. Assessment Pattern

Learning Objectives	Basic Electrical Engineering		
	Continuous Internal Evaluation (CIE)		End Semester Examination (ESE out of 100)
	Internal Examination 1 (25)	Internal Examination 2 (25)	
Remember	0	0	10
Understand	12.5	12.5	40
Apply	12.5	12.5	50
Analyze			
Evaluate			

***Internal examination (offline): 50 and Internal examination (online): 25**

9. Mark Distribution

Total	CIE				ESE
	Attendance	Internal Examination	Assignment/Quiz/ Course Project	Total	
150	10	25 (Average of two scores)	15	50	100

10. End Semester Examination Pattern

There will be two parts; Part A and Part B.
Part A contains 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions.
Part B contains 2 questions from each module of which student should answer any one. Each question can have a maximum 2 subdivisions and carry 14 marks.

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