GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Bachelor of Technology	Branch/Spec.	Computer Science and Business Systems
Semester	I	Version	1.0.0.0
Effective from Academic Year	2026-27	Effective from the batch admitted in	July 2026
Course Code	2ESC1112	Course Name	Principles of Electrical Engineering
Course Category	Engineering Science Courses (ESC)		

Teaching Scheme						Examination scheme (Marks)			
(Per week)	Lecture (DT)		Practical (Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	2	0	1	0	3	Theory	50	50	100
Hours	2	0	2	0	4	Practical	25	25	50

Pre-requisites:

Students should know about basic elements of electrical circuits, electrostatics, magnetics and fundamentals of charge, work, energy, power.

Course Outcomes

COs	Description
CO1	Analyze electrical circuits and their elements using fundamental laws and network analysis techniques.
CO2	Apply circuit theorems to electrical networks and interpret AC circuit concepts.
CO3	Understand the concepts of electrostatics and electro-mechanic
CO4	Measure and analyze electrical parameters using measuring instruments, and understand electrical wiring systems and various sensors.

Theory Syllabus

Unit	Content	Hours
1	**Introduction:** Fundamental linear passive and active elements to their functional current- voltage relation, voltage source and current sources, ideal and practical sources, Kirchhoff-s laws and applications to network solutions using mesh and nodal analysis, Concept of work, power, energy, and conversion of energy.	05
2	**Basic network:** 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.	05
3	**Concept of AC:** AC waveform definitions, form factor, peak factor, phasor representation in polar and rectangular form, concept of impedance, admittance, complex power, power factor, single phase and three phase concept.	06
4	**Electrostatics and Electro-Mechanics:** Electrostatic field, electric field strength, concept of permittivity in dielectrics, energy stored in capacitors, charging and discharging of capacitors. ElectroMagnetism, magnetic field and Faraday's law. Magnetic materials and B-H curve. Self and mutual inductance, Ampere's law, Study of R-L, R-C, RLC series circuit, R-L-C parallel circuit. Electromechanical energy conversion.	08
5	**Measurements and Sensors:** Measuring devices/sensors and transducers	04

	(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). Concept of indicating and integrating instruments.	
6	**Practical considerations:** Electrical Wiring types and accessories, Illumination system, Basic layout of the distribution system, Types of earthing, Safety devices & systems. Battery principles and types.	02
Practical and Self Learning Content		
Practical, assignments, quiz, industrial visit, field survey and tutorials are based on the above syllabus.		
Text Books		
1	Basic of Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press.	
2	Introduction to Electrodynamics, D. J. Griffiths, (Fourth Edition), Cambridge University Press	
3	Engineering Circuit Analysis, William H. Hayt & Jack E. Kemmerly, McGraw-Hill Book Company Inc.	
4	Fundamentals of Electrical and Electronics Engineering, Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd.	
Reference Books		
1	Basic of Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press.	
2	Introduction to Electrodynamics, D. J. Griffiths, (Fourth Edition), Cambridge University Press	
3	Engineering Circuit Analysis, William H. Hayt & Jack E. Kemmerly, McGraw-Hill Book Company Inc.	
4	Fundamentals of Electrical and Electronics Engineering, Smarjith Ghosh, Prentice Hall (India) Pvt. Ltd.	
ICT/MOOCs Reference		
1	https://nptel.ac.in/courses/108105112	
2	https://nptel.ac.in/courses/117106108	

Mapping of COs, POs, and PSOs														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	3	2	1	2	0	0	0	1	0	2	3	3	2
CO2	3	3	2	1	2	0	0	0	1	0	2	3	3	2
CO3	3	2	1	0	1	0	0	0	1	0	2	3	2	1
CO4	3	2	2	2	3	0	2	0	1	0	2	3	2	2

Bloom's Taxonomy Level				
Unit	**Unit Title**	**Aligned COs**	**Learning Hours**	**BTL Level**
1	Introduction	CO1	5	U, N
2	Basic network	CO2	5	A,E
3	Concept of AC	CO2	6	A,E
4	Electrostatics and Electro-Mechanics	CO3	8	U, A
5	Measurements and Sensors	CO4	4	N,A
6	Practical considerations	CO4	2	N,A

Note:

- Version 1.0.0.0 (First Digit= New syllabus/Revision in Full Syllabus, Second Digit=Revision in Teaching Scheme, Third Digit=Revision in Exam Scheme, Forth Digit= Content Revision)

- 1 Hour Lecture = 1 Credit, 1 Hour Tutorial = 1 Credit, 2 Hours Practical = 1 Credit, 2 Hours Internship/Project/Seminar = 1 Credit
- Bloom's Taxonomy Level (BTL): R: Remember, U: Understand, A: Apply, N: Analyze, E: Evaluate, and C: Create