



Program	BACHELOR OF TECHNOLOGY (B.Tech)	Semester - 1
Type of Course	Engineering Science Course	
Prerequisite	High School Education & Physics	
Rationale	Electricity has been the main source of energy for the developing and developed countries. Per capita consumption of electricity of a country can be considered as an indicator of the development of the country. In view of this, it is essential for all engineering graduates to know the basic aspects of electrical engineering. This subject deals with basic circuit solution methods and basics of domestic electrical installations.	
Effective From A.Y.	2025-26	

Teaching Scheme (Contact Hours)				Examination Scheme				
Lecture	Tutorial	Lab	Credit	Theory Marks		Practical Marks		Total Marks
				SEE TH	IAT	SEE P	CCE	
3	-	2	4	70	30	50	50	200

SEE - Semester End Examination, IAT - Internal Assessment Test, CCE - Continues & Comprehensive Evaluation

Course Content		T - Teaching Hours W - Weightage	
Sr.	Topics	T	W
1	D. C. Circuits Introduction of Electrical Current, Voltage, Power and Energy; Sources of Electrical Energy ; Ideal electrical circuit elements - Resistor, Inductor and Capacitor; Fundamental laws of electric circuits - Ohm's Law and Kirchoff's Laws; Analysis of series and parallel; Star – Delta conversion; Node and Mesh analysis	10	20
2	Electromagnetism: Faradays Laws; Lenz's Law; Fleming's Rules; Magnetic circuits; Statically and dynamically induced EMF; Concepts of self-inductance, mutual inductance and coefficient of coupling; Inductance in series and parallel; Hysteresis and Eddy current losses; Energy stored in magnetic fields.	8	15
3	Electrostatics Electric charge and Laws of electrostatics; Definitions - Electric field, lines of force, electric field intensity, electric flux and flux density; Capacitor; Capacitor in series and parallel, Energy stored in a capacitor.	5	15
4	Single Phase AC Circuit Generation of sinusoidal voltage; Average value, R.M.S value, form factor, peak factor, Phasor representation of alternating quantities; Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), Series and parallel resonance. Concepts of Real power, Reactive power, Apparent power, Power factor and power factor improvement methods	10	20
5	Three Phase AC Circuit Necessity and Advantages of three phase systems, Generation of three phase power, Phase sequence, Balanced supply and Balanced load; Relationship between line and phase values of balanced three phase circuit; Power Measurement in balanced three phase circuits.	6	15
6	Electrical Installations Single line diagram of domestic wiring, Safety precautions for electrical appliances. Types of Wires and Cables, Safety devices: Switch Fuse Unit (SFU), MCB, Earthing – Types of earthing and its importance. Types of Batteries, calculations of electricity bill.	6	15
Total		45	100



Suggested Distribution Of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyze	Evaluate	Create
Weightage	30	30	20	10	10	0

NOTE : This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcomes

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

CO1	Explain the fundamental electrical laws and its application to electrical circuits.
CO2	Describe principles of electromagnetism.
CO3	Describe principles of electrostatics.
CO4	Analyze AC circuit theory to single-phase circuits with different combinations of elements and resonance.
CO5	Analyze three phase circuits with their voltage and current relationship with phasor diagram.
CO6	Comprehend electrical safety devices their installations, protection and personnel safety.

CO PO Mapping

CO	CO - 1	CO - 2	CO - 3	CO - 4	CO - 5	CO - 6
PO - 1	3	3	2	3	3	3
PO - 2	2	2		2	1	1
PO - 3						
PO - 4	1	1		1		
PO - 5	1	1		1	1	1
PO - 6	1	1	1	1	1	1
PO - 7						
PO - 8	1	1		1	1	1
PO - 9	1	1		1	1	1
PO - 10						
PO - 11	1	1	1	1	1	1



Reference Books

1.	Electrical Technology – Part I and II By B. L. Theraja S. Chand and Co.
2.	Basic Electrical Engineering By Nagsarkar and Sukhija Oxford University Press
3.	3. D C Kulshreshtha, Basic Electrical Engineering, Tata McGraw Hill, 2010.
4.	Basic Electrical Engineering By D. P. Kothari and I. J. Nagrath Tata McGraw Hill
5.	Fundamentals of Electrical Engineering By L. S. Bobrow Oxford University Press
6.	Electrical and Electronics Technology By E. Hughes Pearson
7.	Electrical Engineering Fundamentals By V. D. Toro Prentice Hall India

List of Practical

1.	To study and understand different symbols and units used in electrical circuits.
2.	To verify the ohm's law.
3.	To verify the Kirchoff's current and voltage laws.
4.	To verify Series and Parallel connection of Resistor.
5.	To verify BH-curve
6.	To verify response of RL circuit and its impedance calculation.
7.	To verify response of RC circuit and its impedance calculation.
8.	To verify the current and voltage relationships in three phase star and delta connections.
9.	Demonstration of domestic installations like Fuse, MCB, ELCB, MCCB etc.
10.	Understanding of various safety precautions for electrical installations.
11.	Demonstration of various types of wires and cables.
12.	Understanding of various electricity bills and calculations for energy consumption.

Miscellaneous

Activities suggested under self-learning

Sl. No. Name of the activity No. of hours Evaluation Criteria

1. Industry/Research laboratory visit Visit = 5h, Report preparation = 5h
Total = 10h Based on report submitted. Report should contain observations and calculations based on industry/ lab data.

2. Technical Video based learning related to the subject(NPTEL) Duration of video = 5h
Report preparation = 5h Total = 10h Report /presentation based on the video learning outcomes.

3. Assignment writing. Numerical based assignment is preferable. 5 assignments of 2h each. Total = 10h Based on the assignment submitted.

4. Self learning on-line course (SWAYAM) Minimum duration of the course should be 10h. Examination based assessment at the end of course. Based on the certificate produced.

5. Complex problem solving Maximum 2 problem. Study of the problem and solution finding, Total = 10h Based on the depth of the solution submitted.

6. Videos on Industrial safety aspects based on subject Duration of video = 5h Report preparation = 5h Total = 10h Based on quiz/report submitted

7. Poster/chart/power point preparation on technical topics Duration = 6 h Based on poster/chart preparation



and presentation skills 8 Working/non-working model on technical topics Working = 12 h Non- working = 8 h Based on inter department/external evaluation 9 Industrial exposure for 2-3 days to observe and provide tentative solutions Duration = 15 h for industrial exposure Problem identification and tentative solution = 10 h Total = 20 h Based on evaluation of critical problems and solutions 10 Group Discussion on emerging/trending technical topics based on subject Duration = 1 h each Based on performance in group discussion, technical depth, knowledge etc 11. Real world case studies based learning Duration of data collection/study = 5h Report preparation = 5h Total = 10h Based on in-depth study, technical depth, data collected, fact finding, etc. 12 Blog or Technical Article Writing 10h (Research – 6h, Writing – 4h) Based on originality, technical content, references cited, and clarity of communication. 13 Annotated Video Explanation of Concept/Problem 10h (Preparation + Recording + Submission) Based on accuracy of explanation, clarity, and presentation style. 14 Online Technical Quizzes/Simulations Multiple quizzes summing up to 10h Based on quiz scores and reflection report after each quiz. 15 Tech Blog/YouTube Channel Curation 10h (Content curation + Analysis) Summary report on curated content and learning outcomes. 16 Patent Search and Innovation Gap Identification 10h (Search + Report) Based on number of relevant patents analyzed and identification of innovation scope. 17 Maintenance or Troubleshooting Logbook 10h (For example: lab instruments, computer hardware) Based on documented cases, approach, and resolution. 18 Involvement in Student Chapter (IEI/SPE /IEEE/ISTE) Organizing student chapter activities/workshops (5h)+ Report /writing articles for the chapter newsletter(5h) Based on short activity report and reflection

List of Laboratory/Learning Resources Required:

1. Voltmeter, Ammeter, Multimeter, Rheostate, wires.
2. BH-curve kit.
3. RL and RC circuit kit.
4. Power Supply(DC and AC)
5. Fuse, MCB, ELCB,MCC

Useful Links

1. <https://nptel.ac.in/courses/108105112>
2. www.vlabs.co.in