K. S. INSTITUTE OF TECHNOLOGY

An Autonomous Institution under VTU, Approved by AICTE
Department of Electronics & Communication Engineering
FIRST / SECOND SEMESTER SYLLABUS

Name of the Course: **Basics of Electrical Engineering**		Semester	1/2
Course Code	**25BPSC105/205C**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40 hours	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	Theory		

Course objectives:

- To explain basic laws used in the analysis of DC circuits, Electrostatics and Electromagnetism.
- To explain electromagnetic induction.
- To explain the behavior of circuit elements in single-phase circuits.
- To explain the behavior of circuit elements in three-phase circuits.
- To explain circuit protective devices, earthing. electricity billing.

Teaching-Learning Process Pedagogy
(General Instructions):

Teaching-Learning Process
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Chalk and talk
2. Visual Based Learning
3. Cut sections
4. Flipped Classroom

Module-1

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits. Power and energy. Problems. (Text1: 1.13,1.14,1.15,1.16,1.25,2.2,2.3,2.4)

Electrostatics: Coulombs law, definitions of absolute and relative permittivity, electric field, electric flux, electric field strength, flux density. Capacitor: Expression of parallel plate capacitor, factors affecting capacitance, capacitors in series and capacitors in parallel, energy stored in an electrostatic field, problems.

Electromagnetism: Electromagnets-direction of flux produced, right-hand rule, definition-magnetic circuit, mmf, magnetic field strength, free space and relative permeability, reluctance, permeance, useful and leakage flux, simple series circuits and parallel circuit problems.

(Text 1: 4.1,4.2,4.3,4.4,4.5,4.6,4.7,4.8,5.5,5.6,5.11,5.12,5.15)

Number of Hours:8

Module-2

Electromagnetic Induction: Faraday's law of electromagnetic induction, Lenz's law, dynamically and statically induced emf, Fleming's right-hand rule. Simple problems. Inductance and mutual inductance, coefficient of coupling, energy stored and its applications. Force experienced by a current-carrying conductor placed in the magnetic field. Fleming's left-hand rule. Force between conductors carrying current in the same and in the opposite directions. (Text1: 7.3, 7.5,7.7,7.8,7.9,7.10,7.11,7.12,7.13)

Number of Hours:8

Module-3

Single-phase Circuits: Generation of sinusoidal voltage, frequency of generated voltage, Expression of average value, RMS value, form factor and peak factor of sinusoidal voltage and current. Phasor representation of alternating quantities. Analysis of R, L and C circuits. Series and parallel R-L, R-C and R-L-C circuits with phasor diagrams, calculation of real power, reactive power, apparent power, and power factor, illustrative examples. (Text1: 11.1,11.2,11.8,11.11,11.12, Text:9.2,9.7,10.1,10.2, 10.4, 10.6)

Number of Hours:8

Module-4

Three- phase Circuits: Generation of three-phase system, definition of phase sequence, star and delta (mesh) connections, relation between phase and line values of voltages and of currents of star and delta connections, considering the phasor diagram. Definition of balanced and unbalanced source and load. Power, reactive power and power factor. Problems on balanced loads. Measurement of 3-phase power by 2-wattmeter method. Expression of power factor in terms wattmeter readings. Effect of power factor on wattmeter readings. Comparison between single phase and three-phase systems. (Text2:12.1, 12.2,12.3,12.4,12.5,12.6,12.7,12.8,12.9,12.11)

Number of Hours:8

Module-5

Domestic Wiring: Service mains – overhead and underground. Types of wiring: Exposed to open space – wooden batten wiring and casing and capping. Concealed wiring: conduit wiring. Wiring for two-way and three-way control of load.

Domestic Electricity Bill: Power-rating of household connected loads. Sanctioned Load. Practical unit of measuring energy, energy expressed for commercial purposes - Unit, its definition. Electricity bill [as per Electricity Supply Companies (escoms)]: Tariff method considered: two-part tariff. Particulars considered for billing: sanctioned load and units consumed. Calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principles of fuse and miniature circuit breaker (MCB), the merits and demerits of fuse and MCB.

Personal safety measures: Electric shock, possible effects of shocks. Safety precautions to avoid personal shock while dealing with electricity. Permanent measure: Earthing: Pipe and plate**.**
(Text2:19.1,19.4,19.519.9)

Number of Hours:8

Course outcomes (Course Skill Set):

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

CO1: Explain and apply the fundamental laws used in the analysis of DC circuits, electrostatics, and electromagnetism.

CO2: Summarize and evaluate the principles and implications of electromagnetic induction.

CO3: Understand and analyze the operation and behavior of single-phase circuits.

CO4: Interpret and analyze the performance of three-phase circuits and measure electrical power accurately.

CO5: Summarize and demonstrate the procedures involved in electricity billing, domestic wiring, and implementing electrical safety measures.

Assessment Structure: The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

- To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.
- To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks.
- Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks

Continuous Comprehensive Assessments (CCA):

CCA will be conducted for a total of 25 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.
Learning Activity -1: (Marks- 15) Learning Activity -2 (optional): (Marks- 10)

Suggested Learning Resources:

Textbooks:

1. A textbook of Electrical Technology by B.L. Theraja, Volume-1, S Chand and Company, Reprint Edition 2014. [Covers modules 1 to 4]
2. Basic Electrical Engineering, D.C. Kulshreshtha, McGraw Hill, 2nd Edition, 2024. [Covers all modules]

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw Hill 2 nd edition, 3 rd Reprint 2024.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Electrical Technology by E. Hughes, Pearson, 12th Edition, 2016.
4. Basic Electrical and Electronics Engineering, S.K Bhattacharya, et al, Pearson. 2 nd edition, 2017.
5. Handbook of Electrical Engineering formulae, Harish C Rai, CBS Publications, 2018.

Web links and Video Lectures (e-Resources):

- http://nptel.ac.in/courses./108108076/
- http://elearning.vtu.ac.in/content/BS.php

Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning

- Quizzes
- Assignments
- Seminar
- Activity based learning (Poster presentation, model making)

Signatures:

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3. Dr. PARAMESHACHARI B D
4. Dr. ABDUL HAQ NALBAND
5. Mr. SOMASHEKAR YAMANI
6. One Senior Member
7. Chair Person