



INSTITUTE OF ENGINEERING & MANAGEMENT

(School of University of Engineering and Management, Kolkata)

DEPARTMENT OF ELECTRICAL ENGINEERING

SEMESTER WISE CURRICULAM

2nd YEAR- 3rd SEMESTER

Syllabus for B. Tech Admission Batch 2025-29



University of Engineering and Management
Institute of Engineering & Management, Salt Lake Campus
University of Engineering & Management, Jaipur



Syllabus for B.Tech Admission Batch 2025-29

Syllabus Structure

Sl. No	Type of Course	Course Code	Course Name	L	T	P	S	Total Contact Hours	Credit Points
1	Basic Science Courses	BSM301	Mathematics-III	2	1	0	0	3	3
2	Professional Core Courses	PCCEE301	Electrical Circuit Analysis	2	1	0	0	3	3
3	Professional Core Courses	PCCEE302	Analog Electronics	3	1	0	0	4	3
4	Professional Core Courses	PCCEE303	Electromagnetic Field theory	3	1	0	0	4	4
5	Professional Core Courses	PCCEE304	Measurement and Instrumentation	3	1	0	0	4	3
6	Humanities and social sciences including Management	MC301	Indian Constitution	0	0	0	2	2	0
7	Humanities and social sciences including Management	ESP301	Essential Studies for Professionals III	2	0	0	0	2	0.5
8	Professional Core Courses	PCCEE391	Electrical Circuit Analysis Laboratory	0	0	3	0	3	1
9	Professional Core Courses	PCCEE392	Analog Electronics Lab	0	0	3	0	3	1
10	Professional Core Courses	PCCEE393	Data Structure and Algorithm Lab	0	1	3	0	4	3
11	Professional Core Courses	PCCEE394	Measurement and Instrumentation Lab	0	0	3	0	3	1
12	Humanities and social sciences including Management	SDP381	Skill Development for Professionals III				2	2	0.5
13	Project. Seminar and Industrial Training	PWEE381	Mini Project I				1	1	1

14	Massive Open Online Courses (MOOCs)	MOOCs	Massive Open Online Courses (MOOCs)						
15	Industry and Foreign Certification (IFC)	IFC	Industry and Foreign Certification (IFC)						
16	Mandatory Additional Requirements (MAR)	MAR381	Mandatory Additional Requirements (MAR)						
Total Credit Points of Semester				15	6	12	5	38	24



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Syllabus for B.Tech Admission Batch 2025-29

Subject Name: Mathematics - III

Credit: 3

Subject Code: BSM301

Lecture Hours: 42

Pre-Requisites: Permutation & Combination, Concept of Basic Probability, Evaluation of definite, improper and infinite integrals, Concept of β & Γ functions.

Relevant Links:

Coursera: Probability & Statistics <https://www.coursera.org/learn/machine-learning-probability-and-statistics>

NPTEL Advanced Engineering Mathematics https://onlinecourses.nptel.ac.in/noc24_ma03/preview

Study Material Link (BL 4, 5, 6)

<https://drive.google.com/drive/folders/19umqy3stib1-wuHy0h-p0arM0NkIzdxC?usp=sharing>

COURSE OBJECTIVES:

1. The syllabus will prepare the learners for Engineering Exit Examinations, ESE and campus placements.
2. Students will apply concepts of various probability distributions to find probabilities.
3. Students will make estimations for a mean, variance, standard deviation and proportions for big data.
4. Students will be eligible to work in the Data domain which is the emerging technology of the future and create more opportunities for creative work.
5. Students will be able to describe and quantify the uncertainty inherent in predictions made by machine learning models.

COURSE OUTCOMES:

CO	Course Outcomes
CO 1	Illustrate the ideas of probability and random variables, various discrete and continuous probability distributions with their properties and their applications in physical and engineering environment that will make a bridge between elementary statistical tools and probability theory.
CO 2	Find the inter-relation between two or more phenomena with the help of curve fitting.
CO 3	Understand the basic components of sampling and have the knowledge on exact sampling distributions which are essential for estimating and testing hypothetical statements. Know the various sampling methodologies and their efficiencies in theoretical and practical aspects.
CO 4	Estimate and test the parameters associated with the relevant areas for forecasting and verification of economic theory
CO 5	Apply the statistical tools in business, economical and commercial areas for analyzing problems and to make better decisions for future in their fields.

Detailed Syllabus:

Module No.	Topic	Sub-topics	Mapping with Chapters of the Text Book	Mapping with Industry & International Academia	Lecture Hour	Corresponding Lab Assignment
1	Random Variables and Probability Distributions	<i>Discrete Random Variable:</i> Discrete Probability Distribution, Expectation and Variance of random variables; Binomial and Poisson Distributions; Mean, Variance and Moment Generating Functions of Binomial and Poisson Variates; Convergence of Binomial to Poisson Variate. <i>Continuous Random Variable;</i> Continuous Probability Distributions, Expectation and Variance of random variables, Exponential, Normal Distributions; Mean, Variance and Moment Generating Functions of the corresponding variates.	Chapters 2 and 3/Text Book 1 Chapter 12 /Text Book 2	https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/	12	"R" software for statistical computing
2	Method of Least Squares and Curve Fitting	Principle of Least Squares, Curve fitting by the method of Least Squares - fitting of straight lines, second degree parabolas and exponential curves.	Chapter 9/Text Book 1 Chapter 8 /Text Book 2	https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/	4	"stata": statistical software for data science

3	Sampling and Sampling Distributions	Population and Sample, Sampling With and Without Replacement (SRSWR and SRSWOR); Random Samples, Population Parameters, Sample Statistics, Sampling Distributions, Standard Error and Probable Error; Sample Mean, Sampling Distribution of Means; Sample Proportion, Sampling Distribution of Proportions, Sample Variances, Sampling Distribution of Variances; Case where Population Variance is unknown; Central Limit Theorem (Statement only); Degrees of freedom, Chi-square distribution, Mean & Variance of Chi-square variate.	Chapter 11 /Text Book 1 Chapter 13/Text Book 2	https://www.cl.cam.ac.uk/teaching/2021/IntroProb/materials.html	8	"stata": statistical software for data science
4	Estimation of Parameters	Point and Interval estimations, Biased and Unbiased estimators, Minimum Variance Unbiased Estimator (MVUE), Consistent Estimator, Maximum Likelihood Estimation of Parameters, Applications in populations following theoretical distributions (Binomial, Poisson and Normal), Calculation of confidence limits for population mean and population proportions.	Chapter 12 /Text Book 1 Chapters 14/ Text Book 2	https://ocw.mit.edu/courses/1-010-uncertainty-in-engineering-fall-2008/	6	"R" software for statistical computing

5	Testing of Hypothesis	<i>Large Sample Test:</i> Statistical Hypotheses, Test Statistic, Best Critical Region, Test for single mean, difference of means, single proportion, difference of proportions, and difference of standard deviations. <i>Small Sample Test:</i> Test for single mean, difference of means and correlation coefficients, Test for ratio of variances, Chi-square test for goodness of fit and independence of attributes.	Chapter 13/ Text Book 1 Chapter 14?Text Book 2	https://ocw.mit.edu/courses/6-041-probabilistic-systems-analysis-and-applied-probability-fall-2010/	12	"R" software for statistical computing
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TEXT BOOK:

1. **Saktipada Nanda and Sibashis Nanda** , "A Course on Probability & Statistics", 2nd Edition (2024), Mindprobooks Academic Series
[Available in [flipkart.com/amazon.in](https://www.flipkart.com/amazon.in)]
2. **N.G.Das**, "Statistical Methods", Combined Edition Vol. 1 &2 (2017) McGraw Hill Education

REFERENCE BOOKS:

1. Sheldon M. Ross, "Introduction to Probability and Statistics for Engineers and Scientists", 6th Edition (2020), Academic
2. Douglas C. Montgomery and George C. Runger, Applied Statistics and Probability for Engineers, 7th edition (2018), John Wiley & Sons.
3. Murray R. Spiegel, John J. Schiller and R. Alu Srinivasan, "Schaum's Outline of Probability & Statistics" , 4th Edition (2012), McGraw Hill Education.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C01	3	3	3	2	2	1	1	1	1	2	1
C02	3	3	3	3	2	1	1	1	1	2	1
C03	3	3	3	3	2	1	1	1	1	2	1
C04	3	3	3	3	2	1	1	1	1	2	1
C05	3	3	3	2	2	2	2	2	2	3	2



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Syllabus for B.Tech Admission Batch 2025-29

Subject Name: Electrical Circuit Analysis

Credit: 3

Lecture Hours: 40

Subject Code: PCCEE301

List of Faculty Members handling the Subject –

1. Dr. Sourav Das, Dr. Subhajit Kar

Pre-requisite: Basic Electrical Engineering

Course Objective:

- To develop an understanding of electrical network fundamentals, signal types, and network response analysis.
- To introduce two-port network concepts and enable formulation and solution of network equations.
- To apply network theorems, coupled circuit analysis, and simplification techniques for solving complex engineering circuits.
- To utilize Laplace transform and other mathematical tools for analyzing and solving electrical circuit problems.

Course Outcomes:

CO No.	COURSE OUTCOME
CO1	Understand the concept of different types of networks and the application of different types of signals into such networks and analyzing resulting responses.
CO2	Explain the concept of two port networks to formulate network equations and solving circuit related problems.
CO3	Apply the concept of network theorems and other network analysis methods to solve problems related with coupled circuits to develop simpler circuits for complex engineering problems.

CO4	Apply powerful mathematical tools like Laplace transform to analyze and solve different circuit related problems.
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Relevant Links:

[Study Material](#)

[Coursera](#)

[Nptel](#)

[LinkedIn Learning:](#)

[Lesson Plan](#)

Detailed Syllabus:

Module	Topic	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab/ Assignment	Text Book & Mapped Chapter
1.	Network Theorems: Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Bisection Theorem, Compensation theorem. Analysis with dependent current and voltage sources. Node and Mesh Analysis. Concept of duality and dual networks,	International Academia: Circuits and Electronics Electrical Engineering and Computer Science MIT OpenCourseWare AICTE prescribed syllabus: ELECTRIC AL Engg Final.pdf Industry Mapping: Top 15 MATLAB Simulink Projects for Electrical Engineering AI mapping: Circuit Analysis with AI Teaching Resources IDEEAS Lab	10	Design and perform software-based simulations and construct hardware circuits to verify classical network theorems , such as Thevenin's, Norton's, Superposition, and Maximum Power Transfer theorems. HARDWARE EXPERIMENT: introduction and implementation to design pcb based circuits using KICAD.	A. Chakrabarti, circuit theory 2, 3

2.	Solution of First and Second order networks under transient and steady state response Solution of first and second order differential equations for Series and parallel R- L, R-C, R-L-C circuits, initial and final conditions in network elements, forced and free response, time constants, pole zero cancellation methods. Introduction to Steady State Analysis of series and parallel A.C Circuits, sinusoidal steady state response of RL, RC and RLC Circuits.	International Academia: Circuits and Electronics Electrical Engineering and Computer Science MIT OpenCourseWare AICTE prescribed syllabus: ELECTRICAL Engg Final.pdf Industry Mapping: Top 15 MATLAB Simulink Projects for Electrical Engineering AI mapping: Circuit Analysis with AI Teaching Resources IDEEAS Lab	8 1. Design and implement the transient response of R-L-C series circuits through AI DIGITAL TWIN MODEL through MATLAB interfacing. 2. Design and simulate the transient response of R-L and R-C circuits using circuit simulation software; develop and test the hardware setup to observe transient behavior practically. 3. Create and evaluate the transient response of R-L-C series and parallel circuits through both software-based simulation and hardware experimentation. 4. Analyze the amplitude and phase spectra of different time-domain signals using MATLAB to understand their frequency-domain characteristics. 5. Generate and visualize various signal types—Periodic, Exponential, Sinusoidal, Damped Sinusoidal, Step, Impulse, and Ramp signals—in both discrete and continuous time using MATLAB.	4,8,9
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3.	Network graphs and their applications Concept of Tree, Branch, Tree link, Incidence matrix, Tie-set matrix and loop currents, Cut set matrix and node pair potentials. Solution of Problems	International Academia: Circuits and Electronics Electrical Engineering and Computer Science MIT OpenCourseWare AICTE prescribed syllabus: ELECTRIC AL Engg Final.pdf Industry Mapping: Top 15 MATLAB Simulink Projects for Electrical Engineering AI mapping: Circuit Analysis with AI Teaching Resources IDEEAS Lab	6	Implementing Dijkstra's Algorithm for finding the shortest path in network using MATLAB.	16
4.	Two Port Network and Network Functions Two Port Networks, terminal pairs, relationship of two port variables, impedance parameters, admittance parameters, transmission parameters and hybrid parameters, interconnections of two port networks, scattering matrix for transmission line, Introduction to Active filter	International Academia: Circuits and Electronics Electrical Engineering and Computer Science MIT OpenCourseWare AICTE prescribed syllabus: ELECTRIC AL Engg Final.pdf Industry Mapping:	8	Design experiments to determine the Impedance (Z) and Admittance (Y) parameters of a two-port network using simulation tools; implement the setup in hardware to validate results.	13

		Top 15 MATLAB Simulink Projects for Electrical Engineering AI mapping: Circuit Analysis with AI Teaching Resources IDEEAS Lab			
5	Network Synthesis Network analysis vs. network synthesis, Concept of immittance (impedance + admittance), Hurwitz Polynomial, Positive Real Functions (PRF) / Brune's PRF, Even and odd parts of a network function, Removal of poles at infinity, origin, conjugate imaginary axis, and constant, LC Network Synthesis (one-port, lossless), RC Network Synthesis, RL Network Synthesis, Introduction to time varying network	International Academia: Circuits and Electronics Electrical Engineering and Computer Science MIT OpenCourseWare AICTE prescribed syllabus: ELECTRICAL Engg Final.pdf Industry Mapping: Top 15 MATLAB Simulink Projects for Electrical Engineering AI mapping: Circuit Analysis with AI Teaching Resources IDEEAS Lab	8	1. Hurwitz Realization for system identification and analysis using MATLAB. 2. Identification of Hurwitz Polynomial for Electrical System using MATLAB.	21

Lesson Plan:

Class No.	Chapter Name	Topic / Content	CO Mapping
1	Chapter 1: Network Fundamentals and Signals	Introduction to Network Theory and Course Overview	CO1
2	Chapter 1	Basic Network Elements and Circuit Variables	CO1
3	Chapter 1	Types of Networks: Linear, Nonlinear, Active, Passive	CO1
4	Chapter 1	Network Topology: Nodes, Branches, Loops and Meshes	CO1
5	Chapter 1	Kirchhoff's Current Law (KCL)	CO1
6	Chapter 1	Kirchhoff's Voltage Law (KVL)	CO1
7	Chapter 1	Network Equations and Circuit Analysis Techniques	CO1
8	Chapter 1	Classification of Signals and Systems	CO1
9	Chapter 1	Standard Signals: Unit Step, Ramp and Impulse	CO1
10	Chapter 1	Response of RL Circuits	CO1
11	Chapter 1	Response of RC Circuits	CO1
12	Chapter 1	Response of RLC Circuits	CO1
13	Chapter 1	Tutorial and Numerical Problems	CO1
14	Chapter 2: Two-Port Networks	Introduction to Two-Port Networks	CO2
15	Chapter 2	Open Circuit Impedance (Z) Parameters	CO2
16	Chapter 2	Short Circuit Admittance (Y) Parameters	CO2
17	Chapter 2	Hybrid (h) Parameters	CO2
18	Chapter 2	Transmission (ABCD) Parameters	CO2
19	Chapter 2	Relationship and Conversion Between Parameters	CO2
20	Chapter 2	Series, Parallel and Cascade Interconnections	CO2
21	Chapter 2	Numerical Problems on Two-Port Networks	CO2
22	Chapter 3: Network Theorems and Coupled Circuits	Superposition Theorem	CO3
23	Chapter 3	Thevenin's Theorem	CO3

24	Chapter 3	Norton's Theorem	CO3
25	Chapter 3	Maximum Power Transfer Theorem	CO3
26	Chapter 3	Reciprocity Theorem	CO3
27	Chapter 3	Millman's and Compensation Theorems	CO3
28	Chapter 3	Introduction to Coupled Circuits and Mutual Inductance	CO3
29	Chapter 3	Dot Convention and Analysis of Coupled Circuits	CO3
30	Chapter 3	Simplification of Complex Networks	CO3
31	Chapter 3	Tutorial and Numerical Problems	CO3
32	Chapter 4: Laplace Transform and Network Analysis	Introduction to Laplace Transform	CO4
33	Chapter 4	Properties and Theorems of Laplace Transform	CO4
34	Chapter 4	Inverse Laplace Transform Methods	CO4
35	Chapter 4	Laplace Transform of Circuit Elements	CO4
36	Chapter 4	Network Analysis in s-Domain	CO4
37	Chapter 4	Transient Analysis of RL Circuits Using Laplace Transform	CO4
38	Chapter 4	Transient Analysis of RC Circuits Using Laplace Transform	CO4
39	Chapter 4	Transient Analysis of RLC Circuits Using Laplace Transform	CO4
40	Chapter 4	Revision, CO Assessment and Course Wrap-Up	CO1–CO4

CO-PO MAPPING

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	–	–	–	–	–	–	–	–
CO2	3	3	2	1	1	–	–	–	–	–	–

CO3	3	3	3	2	1	–	–	–	–	–	–
CO4	3	3	2	2	2	–	–	–	–	–	–

Text Books

1. A. Chakraborty, “Circuit Theory”, Dhanpat Rai Publications, 2018.
2. D. Roy Choudhury, “Networks and Systems”, New Age International Publications, 1998.

Reference Books

1. M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006.
2. C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education, 2004.



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Syllabus for B.Tech Admission Batch 2025-29

Subject Name: Analog Electronics

Credit:3

Lecture Hours: 42

Subject Code: PCCEE302

Pre-requisite: Physics (10+2)

Relevant Links:

[Study material](#)

[NPTEL](#)

[Coursera](#)

[LinkedIn Learning](#)

Course Objectives:

The purpose of learning this course is-

1. The capability to know Diode circuits, BJT circuits, MOSFET circuits,
2. The ability to know the Differential, multi-stage and operational amplifiers
3. The ability to know the linear applications of op-amp.
4. The ability to know the nonlinear applications of op-amp.
5. The ability to know the Feedback amplifier & Oscillators.

Course Outcomes:

- CO1. To appreciate the functioning of OP-AMP, oscillator and the characteristics of BJT and MOSFF.
- CO2. Design of sinusoidal and non-sinusoidal oscillators using OP-AMP, design of single stage amplifier using BJT and MOSFET.
- CO3. Analyze various rectifier and amplifier circuits based on diode, OP-AMP, BJT and MOSFET.
- CO4. To design and construct requirement based multi-stage amplifier using BJT and MOSFET circuits.

Module	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	Review of basic concepts of Diode	Electronic system, basic concept of signal, noise. Zener diodes, clamping and clipping circuits. Review of half wave and full wave rectifier,	International Standards: (https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/video_galleries/video-lectures/) AICTE prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf Industry Mapping: Hardware Chipset (SCR) Software: Labview, P-Spice	2	1. Study of ripple and regulation characteristics of full wave rectifier with and without capacitor filter. 2. Study of Zener diode as voltage regulator. Study of Switched Mode 3. Power Supply & construction of a linear voltage regulator using regulator IC chip
2	BJT circuits	Structure and I-V characteristics of a BJT; Fabrication steps of BJT , BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common-collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits.	International Standards: (https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/video_galleries/video-lectures/) AICTE prescribed syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf	8	1. Construction of a two-stage R-C coupled amplifier & study of its gain & Bandwidth. V-I Characteristics of BJT

			Industry Mapping: Hardware Chipset (CMOS, IGBT) Software: P-Spice		
3	FET circuits Current mirrors	MOSFET structure and I-V characteristics, Fabrication steps of MOSFET, MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits - gain, input and output impedances, trans-conductance, high frequency transistor models, Miller's theorem, frequency response of single stage amplifier. Basic topology and its variants, V-I characteristics, Output resistance and minimum sustainable voltage (VON), maximum useable load, generation of current source.	International Standards: (https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/video_galleries/video-lectures/) AICTE prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) Industry Mapping: Hardware Chipset (CMOS, IGBT) Software: P-Spice	8	V-I Characteristics of JFET and MOSFET
4	Operational amplifier	Linear applications of op-amp: Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, +instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, Feedback amplifiers and Oscillators design (Wien bridge and phase shift). Analog to Digital Conversion.	International Standards: (https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/video_galleries/video-lectures/) AICTE prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf)	8	Realization of a V-to-I & I-to-V converter using Op-Amps.

		Nonlinear applications of op-amp Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector.	ECE.pdf Industry Mapping: Hardware Chipset (SCR) Software: Labview, P-Spice		
5	Application of Operational Amplifier	Differential, multi-stage and operational amplifiers: Differential amplifier; power amplifier; direct coupled multi-stage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product), Frequency Response of the amplifier.	International Standards: (https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/video_galleries/video-lectures/) AICTE prescribed syllabus: (https://www.aicte-india.org/sites/default/files/Model_Curriculum/Final_ECE.pdf) Industry Mapping: Hardware Chipset (SCR) Software: Labview, P-Spice	12	1. Instrumentation Amplifier using Op-Amp. 2. Construction of a simple function generator using IC
6	Feedback amplifier & Oscillators	Feedback amplifier & Oscillators: Concept of feedback, Negative & Positive feedback, Voltage/Current, Series/Shunt feedback, Barkhausen criterion, Colpitts, Hartley's, Phase shift, Wien bridge, & Crystal oscillators	International Standards: (https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/video_galleries/video-lectures/) AICTE prescribed syllabus: (https://www.aicte-india.org/sites/default/files	6	1. Study of class A, C & Push-Pull amplifiers. Study of timer circuit using NE555 & configuration for monostable & astable and bistable multivibrator. 2. Realization of a Phase Locked Loop using Voltage Controlled Oscillator (VCO).

			/Model Curriculum/Final ECE.pdf) Industry Mapping: Software: P-Spice		
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CO-PO mapping

CO	PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1		3	3	3	2	2	2	1	1	1	1	3
2		3	3	3	2	2	2	1	1	1	1	3
3		3	3	3	2	2	2	1	1	1	1	3
4		3	3	3	2	2	2	1	1	1	1	3

Suggested Learning Resources:

Text Books

Name of the Text Book	Author Name	Edition	Publisher Name	Chapter No.	Module No. and Name of the proposed Syllabus
MICROELECTRONIC CIRCUITS	Sedra & Smith	5th	Oxford University Publication	5	Module-2:BJT circuits
				4	Module-3:FET circuits
				3	Module 1: Diode Circuit
				2 & 7	Module 4 and Module 5: OPAMP
				8	Module 6:Feedback amplifier & Oscillators

Reference Books

1. P.R. Gray, R.G. Meyer, and S. Lewis, “Analysis and Design of Analog Integrated Circuits”, John Wiley & Sons.
2. Robert Boylestad Louis Nashelsky "Electronic Devices and Circuit Theory", Pearson

Syllabus for B.Tech Admission Batch 2025-29

Subject Name: Electromagnetic Field Theory

Credit: 4

Lecture Hours: 42

Subject Code: PCCEE303

Pre-requisite: Basic Electrical Engineering, Mathematics, Physics

Relevant Links:

Study material	NPTEL: https://nptel.ac.in/courses/108104087	Coursera	LESSON PLAN_PCCEE303
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Course Objectives:

The purpose of learning this course is to-

1. To understand the basic mathematical tools to deal with Electromagnetic field Problem.
2. To understand properties and application of Electric and magnetic field.
3. To analyze electromagnetic wave propagation.
4. To solve problem related to Electromagnetic field

Course Outcomes:

At the end of this course, students will demonstrate the ability to

- CO1. To remember the basic laws of electromagnetism.
- CO2. To understand the static and time varying electromagnetic field
- CO3. To solve electric and magnetic field for different source distribution.
- CO4. To analyze electromagnetic wave propagation in different medium.

Detailed syllabus

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	Review of Maxwell's equations	Review of Maxwell's Equation, time-harmonic fields, scalar and vector potentials, boundary conditions, Uniform plane wave	International Academia: https://ocw.mit.edu/courses/8-07-electromagnetism-ii-fall-2012/download/ AICTE-prescribed syllabus: https://www.aicte.gov.in/downloads/msyllabus/UG/ELECTRICAL%20Engg%20Final.pdf	8	None
2	Plane waves at boundaries	Plane wave reflection and refraction at boundaries: Normal and oblique incidence, Brewster angle		4	None
3	Plane waves in dispersive media	Quarter wave matching, wave propagation in dispersive media		4	None
4	Transmission Lines theory & applications	Transmission line parameters and equations, Input impedance, standing wave ratio and power, Smith chart, Impedance matching, Applications of transmission lines, Transient on transmission lines		8	None
5	Guided wave & Waveguides	TE, TM and TEM waves, parallel-plate waveguide, rectangular and cylindrical waveguides, waveguide resonators, dielectric guides		8	None
6	Antennas & Wave propagation	Hertzian dipole, half-wave dipole and quarter-wave monopole antennas, small loop antenna, antenna characteristics and arrays, Ground wave propagation, ionospheric propagation		8	None

Lesson Plan:

Module Number	Lecture Number	Lecture Topic
Module 1: Review of Maxwell's equations (8 Hours)	1	Review of Maxwell's Equations in differential and integral forms
	2	Understanding time-harmonic fields and phasors
	3	Scalar and vector potentials in electromagnetics
	4	Derivation and application of boundary conditions
	5	Introduction to the Uniform plane wave (UPW)
	6	Wave equations and propagation in lossless media
	7	Plane wave propagation in lossy and conducting media
	8	Intrinsic impedance and wave polarization concepts
Module 2: Plane waves at boundaries (4 Hours)	9	Plane wave reflection at normal incidence
	10	Plane wave refraction at normal incidence
	11	Oblique incidence: TE and TM polarization analysis
	12	Analysis of the Brewster angle and total internal reflection
Module 3: Plane waves in dispersive media (4 Hours)	13	Wave propagation in dispersive media: Phase and group velocity
	14	Characteristics of wave packets and dispersion relations
	15	Introduction to Quarter wave matching techniques
	16	Practical applications of impedance matching in media
Module 4: Transmission Lines theory & applications (8 Hours)	17	Transmission line parameters (R, L, G, C) and Telegrapher's equations
	18	Propagation constant and characteristic impedance
	19	Calculation of Input impedance and reflection coefficients
	20	Standing Wave Ratio (SWR) and power flow on lines
	21	The Smith Chart: Graphical representation of impedance
	22	Impedance matching techniques using the Smith Chart
	23	Analysis of Transients on transmission lines
	24	Engineering applications of transmission lines
Module 5: Guided wave &	25	Fundamental modes: TE, TM, and TEM waves
	26	Analysis of parallel-plate waveguides
	27	Rectangular waveguides: Mode equations and cut-off frequencies

Waveguides (8 Hours)	28	Field distributions in rectangular waveguides
	29	Introduction to Cylindrical (circular) waveguides
	30	Principles of waveguide resonators
	31	Dielectric guides and their characteristics
	32	Power transmission and attenuation in waveguides
Module 6: Antennas & Wave propagation (8 Hours)	33	Radiation principles and the Hertzian dipole
	34	Analysis of the half-wave dipole antenna
	35	Characteristics of quarter-wave monopole antennas
	36	Radiation from small loop antennas
	37	Fundamental antenna characteristics: Gain, Directivity, and Patterns
	38	Introduction to antenna arrays and beamforming
	39	Mechanisms of Ground wave propagation
	40	Ionospheric (Sky wave) and Space wave propagation

CO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	0	0	1	0	0	0	0	0	0
CO2	3	2	1	0	1	0	0	0	0	0	0
CO3	3	3	1	1	2	0	0	0	0	0	0
CO4	3	3	1	1	1	0	0	0	0	0	0

Suggested Learning Resources:

Text Books

Name of the Text Book	Author Name	Edition	Publisher Name	Chapter No.	Module No. and Name of the proposed Syllabus
Principles of Electromagnetics	M. N. O. Sadiku and S.V. Kulkarni	6th	Oxford University Publication	Chapters 1 to 10	Modules 1 - 7

Reference Books

1. W. Hayt, "Engineering Electromagnetics", McGraw Hill Education, 2012.

2. Pramanik, “Electromagnetism - Theory and applications”, PHI Learning Pvt. Ltd, New Delhi, 2009.
3. Pramanik, “Electromagnetism-Problems with solution”, Prentice Hall India, 2012.
4. G.W. Carter, “The electromagnetic field in its engineering aspects”, Longmans, 1954.
5. W.J. Duffin, “Electricity and Magnetism”, McGraw Hill Publication, 1980.
6. W.J. Duffin, “Advanced Electricity and Magnetism”, McGraw Hill, 1968.
7. E.G. Cullwick, “The Fundamentals of Electromagnetism”, Cambridge University Press, 1966.
8. D. Popovic, “Introductory Engineering Electromagnetics”, Addison-Wesley Educational Publishers, International Edition, 1971.



University of Engineering & Management
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University of Engineering & Management, Jaipur



Syllabus for B.Tech Admission Batch 2025-29

Subject Name: Measurement and Instrumentation

Credit: 3

Lecture Hours: 40

Subject Code: PCCEE304

Pre-requisite: Engineering Physics, Basic Electronics, Basic Electrical

Relevant Links [Study Material](#) [Coursera](#) [NPTEL](#)

Course Objectives:

1. To understand the fundamental principles of measurement and instrumentation, including calibration methods, instrument characteristics, standards, and error analysis.
2. To develop knowledge of voltage, current, power, and energy measurement techniques, along with compensation methods, potentiometers, and instrument transformers.
3. To learn the principles and techniques of analog-to-digital conversion, including sampling, quantization, and ADC methods used in measurement systems.
4. To acquire an understanding of digital instrumentation, data acquisition systems, and their applications in modern engineering measurements and industrial processes.

Course Outcome:

1. Apply calibration procedures effectively to ensure accurate measurements using various instruments.
2. Identify and analyze measurement errors, implementing appropriate compensation techniques for improved accuracy.
3. Utilize principles of power and energy measurement to calibrate relevant instruments and accurately assess power consumption.
4. Demonstrate proficiency in analog- to-digital conversion techniques and effectively employ digital instrumentation for data acquisition and analysis

Module No	Description	Mapping with Industry and international academia	Lecture Hours	Corresponding Lab assignment	Text Book	Mapped Chapter
1	Basics of Measurement and Instrumentation, Instrument Examples: Generalized block diagram of Measurement System, Industrial Standards of measurement. Measurement of current & Voltage using PMMC, MI and Electrodynamometer type instruments. Extension of range of instruments- shunts & multipliers-Current transformers-Potential Transformers.	AICTE Syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf International Academia: https://online.stanford.edu/courses/xeiet100-clean-renewable-energy-storage-sustainable-future	4	No Lab	A.K.Sawhney, Electrical & Electronics Measurements and Instrumentation; Dhanpat Rai.	Chapter 2
2	Power, Energy and Power Factor Measurements and its Errors: Definition of power, types, Measurement of power with different methods, construction and working of Electrodynamometer type Wattmeter, Errors in power measurements, Types of errors, Limiting error with examples. Measurement of Energy using Induction type energy meter. Electrodynamometer type P.F. meter.	AICTE Syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf International Academia: https://online.stanford.edu/courses/xeiet100-clean-renewable-energy-storage-sustainable-future	6	Exp- 7	A.K.Sawhney, Electrical & Electronics Measurements and Instrumentation; Dhanpat Rai.	Chapter 9
3	DC and AC Bridges: Concept of Bridges, Measurement of low resistance by Kelvin Double Bridge Method, A.C. bridges - Maxwell's inductance bridge, Anderson bridge, D-Sauty Bridge, Schering Bridge, Wien	AICTE Syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf	7	Exp- 1, 2, 3	A.K.Sawhney, Electrical & Electronics Measurements and	Chapter 13

	bridge- Circuit diagram, phasor diagram, derivations of equations for unknown parameter, Q-factor, dissipation factor, advantages and disadvantages for all the bridges.	International Academia: https://online.stanford.edu/courses/xeiet100-clean-renewable-energy-storage-sustainable-future			Instrumentation; DhanpatRai.	
4	Analogue Digital Instruments and its conversion: Q- Meter circuit and its operation, errors in Q- Meter circuits. Analog-to-Digital Conversion (ADC), Staircase Ramp Compensation, Integrator-based ADC, Delta-Pulse-Modulation-based ADC. Introduction, Digital voltmeters, Digital Frequency Meter, Errors in frequency measurement – possible remedies, Time And Ratio measurement. Frequency Divider Generator, Signal Generator, Digital Multimeter.	AICTE Syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf International Academia: https://online.stanford.edu/courses/xeiet100-clean-renewable-energy-storage-sustainable-future	8	Exp- 1, 2, 3, 4, 5, 6, 10	A.K.Sawhney, Electrical & Electronics Measurements and Instrumentation; DhanpatRai.	Chapter 4
5	Potentiometer and Instrument Transformer: DC and AC potentiometer, C.T. and V.T. construction, theory, operation, characteristics.	AICTE Syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf International Academia: https://online.stanford.edu/courses/xeiet100-clean-renewable-energy-storage-sustainable-future	7	Exp- 8	A.K.Sawhney, Electrical & Electronics Measurements and Instrumentation; DhanpatRai.	Chapter 18

6	Introduction to Sensors: Definition, significance of measurement and instruments, General concepts and terminology of measurement systems Resistive transducers: Strain gauges, types, resistance measuring methods, strain gauge applications: Load and torque measurement. Inductive transducers: Transformer type, synchros, eddy current transducers, LVDT: Construction, material, input-output characteristics. Optical Sensors: LDR, Photo Diode, Stroboscope, IR Sensor. Thermal sensors: Resistance temperature detector (RTD): principle, materials and types; Thermistor: principle, materials and types; Thermocouple, Thermoelectric effects, laws of thermocouple,	AICTE Syllabus: https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf International Academia: https://online.stanford.edu/courses/xeiet100-clean-renewable-energy-storage-sustainable-future	8	No experiment	A.K.Sawhney, Electrical & Electronics Measurements and Instrumentation; DhanpatRai.	Chapter 18
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CO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3	2	3	0	0	0	0	0	1
CO2	3	2	3	3	3	0	0	0	0	0	1
CO3	3	2	2	3	2	0	0	0	0	0	1
CO4	3	3	3	3	3	1	0	0	0	0	1

Text Books:

1. A.K.Sawhney, Electrical & Electronics Measurements and Instrumentation; Dhanpat Rai.
2. E.W Golding, Electrical Measurement and Measuring Instruments; Wheeler Publication
3. Electronic Measurement & Instrumentation By H. Cooper – PHI.

Reference Books:

1. Electronics Instruments & Measurement by David A. Bell – PHI.
2. J.B.Gupta, Electrical & Electronics Measurements and Instrumentation; S.K. Kataria and Sons.



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Syllabus for B.Tech Admission Batch 2025-29

Subject Name: Indian Constitution

Credit: 0

Lecture Hours: 24

Subject Code: MCEE301

List of Faculty Members handling the Subject – Prof. Deboleena Chakraborty

Pre-requisite: School history

Suggested Learning Resources:

Relevant Links:

[Study Material](#)

[Coursera](#)

[NPTEL](#)

Course Objectives:

The purpose of learning this course is-

1. Understand different features of Indian constitution. Power and functioning of Union, state and local self-government.
2. Understand basics of PIL and guideline for admission of PIL.
3. Analyze of local administration starting from block to Municipal Corporation.
4. Study the identification of authority to redress a problem in the profession and in the society.

Course Outcomes:

At the end of this course, students will demonstrate the ability to:

- CO1. Recall the meaning and significance of the Indian Constitution as the fundamental law of the land.
- CO2. Understand the Indian political system, the powers and functions of the Union, State and Local Governments in detail.
- CO3. Exercise their fundamental rights in proper sense and analyze the outcomes of the Electoral Process, Emergency provisions, Amendment procedure and the basics of PIL and guideline for admission of PIL.
- CO4. Access the Functioning of local administration starting from block to Municipal Corporation.

CO-PO Mapping:

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

Detailed Syllabus

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours
1	Indian Constitution	Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy	International Academia: MNIT SYLLABUS AICTE-prescribed syllabus: AICTE SYLLABUS Industry Mapping: https://byjus.com/ias/upsc-syllabus/	5
2	Union government and its administration	Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha. State government and its administration: Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions,	Academia: IIT GUWAHATI SYLLABUS AICTE-prescribed syllabus: AICTE SYLLABUS Industry Mapping: https://www.drishtiias.com/pdf/1593776909-uttar-pradesh-pcs-preliminary-mains-syllabus.pdf	10
3	Supreme court	Organization of supreme court, procedure of the court, independence of the court, jurisdiction and power of supreme court. High court: Organization of high court, procedure of the	Academia: LINK	10

		court, independence of the court, jurisdiction and power of supreme court. Subordinate courts: constitutional provision, structure and jurisdiction. National legal services authority, Lok adalats, family courts, gram nyayalays. Public interest litigation (PIL): meaning of PIL, features of PIL, scope of PIL, principle of PIL, guidelines for admitting PIL	AICTE-prescribed syllabus: AICTE SYLLABUS Industry Mapping: https://www.shiksha.com/exams/wbcs-exam-syllabus	
4	Local Administration	District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Panchayati raj: Introduction, PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.	Academia: https://www.amrita.edu/course/indian-constitution/ LINK AICTE-prescribed syllabus: AICTE SYLLABUS Industry Mapping: https://rpsc.rajasthan.gov.in/Static/Syllabus/5A186FF9-57DB-46D0-A1FA-126B4AA87639.pdf	10

Lesson Plan:

1. Module 1: Indian Constitution (Prof. Deboleena Chakraborty)

Sl. No.	Day	Description	Recommended books for the topic
1	Lecture-1	Introduce the concept and importance of a constitution in democratic governance.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication Ltd, India
2	Lecture-2	Discuss the historical development of the Indian Constitution.	Constitution of India, DD Basu, 21st

		Explain the role of the Constituent Assembly and key architects like Dr. B.R. Ambedkar.	Edition, Lexis Nexis Books Publication ltd, India
3	Lecture-3	Highlight the major sources and influences from other countries.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
4	Lecture-4	Examine the salient features of the Indian Constitution (e.g., federal structure, parliamentary system, fundamental rights, secularism).	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India

2. Module 2: Union government and its administration (Prof. Deboleena Chakraborty)

Sl. No.	Day	Description	Recommended books for the topic
5	Lecture-5	Features of Indian federalism Division of powers: Union, State & Concurrent Lists	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
6	Lecture-6	Understand the constitutional structure and real-world dynamics of Indian federalism.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
7	Lecture-7	Learn how Union-level decisions are made and implemented. President: Election, powers, role,	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
8	Lecture-8	Understand state-level administration and Centre–State administrative parallels.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India

9	Lecture-9	PM & Council of Ministers: Functions and responsibilities, Cabinet & Central Secretariat structure.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
10	Lecture-10	Governor: Role and discretionary powers, CM & State Council of Ministers.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India

3. **Module 3: Supreme Court** (Prof. Deboleena Chakraborty)

Sl. No.	Day	Description	Recommended books for the topic
11	Lecture-11	Learners understand how the apex court is structured and how it functions independently as the guardian of the Constitution. Jurisdiction & Powers: Original, Appellate, Advisory, Writ, Review powers	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
12	Lecture-12	Explain the role of High Courts and their relationship with state legal systems. Appointment and service conditions of High Court judges.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
13	Lecture-13	Learners grasp the ground-level legal structure and alternative dispute resolution methods in India.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India

14	Lecture-14	Students understand how PIL democratizes access to justice and empowers civil society.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
15	Lecture-15	Features and scope (Fundamental Rights, social justice), Supreme Court guidelines for PIL admission	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
16	Lecture-16	Subordinate Courts: Structure (Civil, Criminal, District Courts), jurisdiction. Family Courts, Gram Nyayalayas.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India

4. **Module 4: Local Administration** (Prof. Deboleena Chakraborty)

Sl. No.	Day	Description	Recommended books for the topic
17	Lecture-17	Introduce the role and importance of the District Collector as the administrative head overseeing law and order, development, and revenue in the district.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
18	Lecture-18	Explain the structure, functions, and constitutional status of Municipal Corporations, Councils, and Nagar Panchayats as urban local bodies.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
19	Lecture-19	Describe the powers of the Mayor and the responsibilities of elected municipal councillors in urban governance.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
20	Lecture-20	Discuss the role of the Municipal Commissioner/CEO in executing policies and managing municipal services effectively.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
21	Lecture-21	Provide an overview of the Panchayati Raj System as a decentralized governance model promoting rural empowerment.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India

22	Lecture-22	Outline the three-tier structure of PRIs and the functions of elected representatives at each level, especially in the Zila Panchayat.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
23	Lecture-23	Explain the role of the CEO of Zila Panchayat in coordinating rural development programs and administrative functions.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India
24	Lecture-24	Describe the organizational setup at block and village levels, highlighting the role of elected and appointed officials in strengthening grassroots democracy.	Constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India

Suggested Learning Resources:

Text Books

1. Introduction to the constitution of India, DD Basu, 21st Edition, Lexis Nexis Books Publication ltd, India

Reference Books

1. Indian polity, M, Laxmikanth, MC Graw Hill education, 5th Edition.



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Syllabus for B.Tech Admission Batch 2025-29

Subject Name: Electrical Circuit Analysis Laboratory **Credit:1**

Lecture Hours: 33

Subject Code: PCCEE391

Pre-requisite: Basic Electrical Laboratory

Study Material	Coursera	Nptel	LinkedIn Learning	Workbook
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Course Outcomes:

1. To verify classical network theorems through software simulation and hardware implementation.
2. To analyze the transient and frequency-domain behaviour of R-L, R-C and R-L-C circuits using MATLAB and circuit simulation tools.
3. To design and validate two-port network parameters and PCB-based hardware circuits.

Course objectives:

The purpose of learning this course is to-

1. To verify classical network theorems through software simulation and hardware implementation.
2. To analyze the transient and frequency-domain behaviour of R-L, R-C and R-L-C circuits using MATLAB and circuit simulation tools.
3. To design and validate two-port network parameters and PCB-based hardware circuits.
4. To design and validate AI based networks.

Laboratory Experiments Detailed Syllabus

Expt. no	Description	No of period
1	Design and perform software-based simulations and construct hardware circuits to verify classical network theorems, such as Thevenin's, Norton's, Superposition, and Maximum Power Transfer theorems.	3
2	HARDWARE EXPERIMENT: Introduction and implementation to design PCB based circuits using KiCAD.	3
3	Design and implement the transient response of R-L-C series circuits through an AI Digital Twin Model through MATLAB interfacing.	3
4	Design and simulate the transient response of R-L and R-C circuits using circuit simulation software; develop and test the hardware setup to observe transient behaviour practically.	3
5	Create and evaluate the transient response of R-L-C series and parallel circuits through both software-based simulation and hardware experimentation.	3
6	Analyze the amplitude and phase spectra of different time-domain signals using MATLAB to understand their frequency-domain characteristics.	3
7	Generate and visualize various signal types—Periodic, Exponential, Sinusoidal, Damped Sinusoidal, Step, Impulse, and Ramp signals—in both discrete and continuous time using MATLAB.	3
8	Implementing Dijkstra's Algorithm for finding the shortest path in a network using MATLAB.	3
9	Design experiments to determine the Impedance (Z) and Admittance (Y) parameters of a two-port network using simulation tools; implement the setup in hardware to validate results.	3
10	Hurwitz Realization for system identification and analysis using MATLAB.	3
11	Identification of Hurwitz Polynomial for Electrical System using MATLAB.	3

CO PO Mapping:

Course Objectives	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	3	3	1	-	-	2	2	-
CO2	3	3	2	3	3	-	-	-	1	2	-
CO3	3	3	3	3	3	1	-	-	2	2	2
CO4	3	3	3	3	3	1	1	2	2	2	3



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Syllabus for B.Tech Admission Batch 2025-29

Subject Name: Analog Electronics Lab

Credit:1

Lecture Hours: 30

Subject Code: PCCEE392

Pre-requisite: Basic Electronics Engineering Laboratory

Course objectives:

The purpose of learning this course is to-

1. To identify appropriate equipment and instruments for the experiment.
2. To study the various characteristics of different electronic components.
3. To work effectively in a team.

Detailed Syllabus

Expt. no	Description	No of period
1	Design an unregulated power supply using a full wave rectifier with and without capacitor to find ripple factors and load regulation.	3
2	Design a voltage regulated circuit using Zener diode	3
3	Design a voltage regulated circuit using IC	3

4	Design a low-level current source and voltage source using op-amp	3
5	Design an amplifier and signal conditioner for weak voltage signals using an instrumentation amplifier.	3
6	Design a low voltage audio amplifier and computing its frequency response using R-C coupled amplifier.	3
7	Design voltage-controlled amplifiers using JFET and MOSFET and finding its characteristics.	3
8	Design current controlled in various types of configurations.	3
9	Design a multivibrator circuit in various modes.	3

Course outcomes:

At the end of this course, students will demonstrate the ability to:

CO1. Explain the principle of operation of analog electronic components, Filters, regulators and analog electronic circuits.

CO2. Compute parameters and operating points of analog electronic circuits.

CO3. Determine response of analog electronic circuits

CO4. To design and construct requirement based multi-stage amplifier using BJT and MOSFET circuits.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	1	0	0	0	0	0	0	0	1	0
CO2	3	2	0	1	2	0	0	0	0	1	0
CO3	3	3	1	2	2	0	0	0	0	1	0
CO4	3	3	2	2	2	0	0	0	0	1	1



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Syllabus for B.Tech Admission Batch 2025-29

Subject Name: Data Structure & Algorithm Laboratory

Lecture Hours: 30

Pre-Requisite(s): C programming, Engineering Mathematics

Credit: 3

Subject Code: PCCEE393

Course Objective(s):

The purpose of learning this course is

1. To understand the basics of abstract data types.
2. To understand the principles of linear and nonlinear data structures.
3. To build an application using sorting and searching

Detailed Syllabus

Module No.	Description	No of period
1	Introduction: Basic Terminologies: Elementary Data Organizations, Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm, Asymptotic Notations, Time-Space trade off. Corresponding Lab Assignments: Worst/ average case analysis for small pseudo- codes.	3
2	Searching: Linear Search and Binary Search Technique sand their complexity analysis. Corresponding Lab Assignments: Variations on binary search with applications, recursive and iterative implementation of binary search with applications to problems.	6

3	Stacks: ADT Stack and its operations: Algorithms and their complexity analysis, Applications of Stacks: Expression Conversion and evaluation – corresponding Algorithms and complexity analysis. Corresponding Lab Assignments: Implementation of stacks with application to a problem.	3
4	Queue: ADT queue, Types of Queue: Simple Queue, Circular Queue, Priority Queue; Operations on each types of Queues: Algorithms and their analysis Corresponding Lab Assignments: Implementation of queues with application to a problem.	3
5	Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis. Corresponding Lab Assignments: Singly Linked Lists, Traversing, Searching, Insertion, Deletion operation applications to problems.	6
6	Sorting: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods. Corresponding Lab Assignments: Applications of Sorting Algorithms, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Comparison Among Sorting Methods.	3
7	Tree: Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis. Corresponding Lab Assignments: Implementation of AVL trees with search, insert, delete Operations and application to a problem. Comparison with unbalanced Binary Search Trees. (ii)Implementation of 2-4 trees with search, insert, delete operations and application to a problem. (iii) Comparison of the two Implementations above.	6
8	Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis. Corresponding Lab Assignments: Graph Traversal Algorithms.	3
9	Hashing Corresponding Lab Assignments: (i) Implementation of hash tables with applications to a problem. (ii) Implementation on trees and applications to a problem.	3

10	Dynamic Algorithm Selection using AI: Given runtime characteristics like data size, distribution etc, choose the best algorithm for sorting of a given dataset. Use AI for Detecting errors in Code: Use LLMs or code-specific models to detect and correct errors of the code used in any given data structure algorithms. Use AI to generate Time Complexity Estimator: Train a neural network to predict the time complexity class from code samples.	6
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Course Outcomes:

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

- CO1.** Differentiate how the choices of data structure & algorithm methods impact the performance of program.
- CO2.** Solve problems based upon different data structure & also write programs based on different data structure
- CO3.** Identify appropriate data structure & algorithmic methods in solving problem
- CO4.** Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing, Compare the benefits of dynamic and static data structures implementations.

CO-PO Mapping:

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

Suggested Learning Resources:

Text Books: Data Structures in C, Aaron M. Tenenbaum. Pearson

Reference Books:

1. Data Structures and Program Design In C, 2/E by Robert L. Kruse, Bruce P. Leung. PHI
2. Data Structure & Algorithms Using C, R.S. Salaria, 5th Ed., Khanna Publishing House
3. Data Structure, S. Lipschutz.. Mc Graw Hill



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Syllabus for B.Tech Admission Batch 2025-29

Subject Name: Measurement and Instrumentation Lab
Lecture Hours: 30

Credit: 1
Subject Code: PCCEE394

Course Objective(s):

The purpose of learning this course is to:

1. Develop a clear understanding of various electrical and electronic measurement techniques and their practical applications.
2. Familiarize students with different types of transducers and their use in measuring physical quantities such as temperature, displacement, and speed.
3. Provide hands-on experience in designing, calibrating, and testing measuring instruments and bridges for accurate data acquisition.
4. Introduce compensating circuits and digital techniques used in measurement systems for enhancing precision and reliability.
5. Enable students to understand the construction, working, and assembly of conventional and digital measuring instruments.

Course outcome(s):

At the end of the course, the students will be able to-

CO1: Design and analyze compensating circuits and evaluate their role in improving measurement accuracy.

CO2: Develop and calibrate different transducer based measurement systems (e.g., thermocouple, LVDT, strain gauge, capacitive transducer) for physical parameter measurement.

CO3: Examine and interpret characteristics of electrical and electronic instruments through experimental setups involving instrument transformers and bridges.

CO4: Illustrate the functioning and internal construction of different types of measuring instruments.

Experiment No.	Description	Hours
1	Design a model short transmission system and determine its efficiency by applying Instrument Transformers.	3
2	Design and calibrate a power and energy measurement system using Digital energy meter.	3
3	Design an unknown temperature measurement system of a Furnace using Thermocouple.	3
4	Core displacement measurement using LVDT through Digital Storage Oscilloscope.	3
5	Measurement of unknown capacitance of a low pass filter circuit using De Sauty Bridge and its condition monitoring using Schering Bridge	3
6	Calibration of Strain Gauge.	3
7	Rotational speed measurement system using Photo Magnetic pick up.	3
8	Water level measurement system by using capacitive transducer.	3
9	Design of an Angular Displacement Measurement system using Capacitive transducer.	3
10	Dismantle and assemble different parts of PMMC, Dynamometer, Electro thermal and Rectifier type of instruments, Digital multimeter and various other instruments to get familiarized with their constructions.	3

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	3	2	2	0	0	0	1	0	2
CO2	3	2	3	3	2	0	0	0	1	0	2
CO3	3	3	2	3	2	0	0	0	1	0	2
CO4	2	2	2	2	1	0	0	0	1	0	1