INSTITUTE OF ENGINEERING & MANAGEMENT

(School of University of Engineering and Management, Kolkata)

DEPARTMENT OF ELECTRICAL ENGINEERING

SEMESTER WISE CURRICULAM

2nd YEAR- 3rdSEMESTER

Syllabus for B. Tech Admission Batch 2024

University of Engineering & Management

Institute of Engineering & Management, Salt Lake Campus

University of Engineering & Management, Jaipur

Syllabus for B.Tech Admission Batch 2024

Index

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	Humanities and social sciences including Management	MC301	Indian Constitution	2	0	0	0	2	0.5
6	Humanities and social sciences including Management	ESP301	Essential Studies for Professionals III	2	0	0	0	2	0.5
7	Professional Core Courses	PCCEE391	Electrical Circuit Analysis Laboratory	0	0	3	0	3	1
8	Professional Core Courses	PCCEE392	Analog Electronics Lab	0	0	3	0	3	1
9	Professional Core Courses	PCCEE393	Data Structure and Algorithm Lab	0	1	3	0	4	3
10	Humanities and social sciences including Management	SDP381	Skill Development for Professionals III				2	2	0.5
11	Project. Seminar and Industrial Training	PWEE381	Mini Project I				1	1	1
12	Massive Open Online Courses (MOOCs)	MOOCs	Massive Open Online Courses (MOOCs)						
13	Industry and Foreign Certification (IFC)	IFC	Industry and Foreign Certification (IFC)						
14	Mandatory Additional Requirements (MAR)	MAR381	Mandatory Additional Requirements (MAR)						
Total Credit Points of Semester				**14**	**5**	**9**	**3**	**31**	**20.5**

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Subject Name: Mathematics-III **Credit: 3** **Lecture Hours: 42**

Subject Code: BSM301

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

Relevant Links: Study material NPTEL Coursera

Course Objectives:

1. The syllabus will prepare the learners for Engineering Exit Examinations, ESE and campus placements.
2. The Transform techniques will enable the students to construct new circuits for the communication industry.
3. After completion of the course, the students will be able to process data in Electronic Industry and constructing circuits.
4. The 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:

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

CO1. 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.

CO2. Find the inter-relation between two or more phenomena with the help of curve fitting.

CO3.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.

CO4.Apply the statistical tools in business, economical and commercial areas for analyzing problems and to make better decisions for future in their fields.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Random Variables & Probability Distributions**	Discrete Random Variable; 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. Continuous Random Variable; Continuous Probability Distributions, Expectation and Variance of random variables, Exponential, Normal and Gamma Distributions; Mean, Variance and Moment Generating Functions of the corresponding variates. Tchebycheff's Inequality and Weak Law of Large Numbers (Statement only)	***International Academia:***https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.orgisites/default/files/Model Curriculum/UG-1/ug-voll.pdf ***Industry Mapping: N/A***	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.	**International Standards** : https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/ ***AICTE-prescribed syllabus:***	4	"stata": statistical software for data science

			https://www.aicte-india.orgisites/default/files/Model Curriculum/UG-1/ug-voll.pdf ***Industry Mapping: N/A***		
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.	***International Standards***: https://www.cl.cam.ac.uk/teaching/2021/IntroProb/materials.html ***AICTE-prescribed syllabus:*** https://www.aicte-india.orgisites/default/files/Model Curriculum/UG-1/ug-voll.pdf ***Industry Mapping: N/A***	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.	***International Standards:***https://ocw.mit.edu/courses/1-010-uncertainty-in-engineering-fall-2008/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.orgisites/default/files/Model Curriculum/UG-1/ug-voll.pdf ***Industry Mapping: N/A***	6	"R" software for statistical computing
5	**Testing of Hypothesis**	Large Sample Test: Statistical Hypotheses, Test Statistic, Best Critical Region, Test for single mean, difference of means, single proportion, difference of proportions, and difference of standard deviations. Small Sample Test: 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.	***International Standards:*** https://ocw.mit.edu/courses/6-041-probabilistic-systems-analysis-and-applied-probability-fall-2010/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.orgisites/default/files/Model Curriculum/UG-1/ug-voll.pdf ***Industry Mapping: N/A***	12	"R" software for statistical computing

Suggested Learning Resources:

Text Book:

Name of the Text Book	Author Name	Edition	Publisher Name	Chapter No.	Module No. and Name of the proposed Syllabus
A Course on Probability & Statistics	Saktipada Nanda and Sibashis Nanda	2nd Edition (2024)	Mind pro books Academic Series	2,3	Module-1: Random Variables and Probability Distributions
				9	Module-2: Method of Least Squares and Curve Fitting
				12	Module-4: Estimation of Parameters
				13	Module-5: Testing of Hypothesis
Statistical Methods	N.G.Das	Combined Edition Vol. 1 &2 (2017)	McGraw Hill Education	12	Module-1: Random Variables and Probability Distributions
				8	Module-2: Method of Least Squares and Curve Fitting
				13	Module-3: Module-2: Method of Least Squares and Curve Fitting
				14	Module-4: Estimation of Parameters
				14	Module-5: Testing of Hypothesis

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.

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Subject Name: Electrical Circuit Analysis **Credit:3** **Lecture Hours: 40**

Subject Code: PCCEE301

Pre-requisite: Basic Electrical Engineering

Relevant Links:

Study material	NPTEL	Coursera	LinkedIn Learning	LESSON PLAN_PCCEE301

Course Objectives:

The purpose of learning this course is-

1. To solve D.C. networks by different circuit analysis methods.
2. To understand the transient and steady-state response of electrical circuits.
3. To analyze circuits in the sinusoidal steady-state (single-phase and three-phase).
4. To analyze two port circuit behavior.

Course Outcomes:

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

CO1. 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.

CO2. Apply differential equations to analyze and solve series and parallel circuit and their sinusoidal steady state analysis

CO3. Apply powerful mathematical tools like Laplace transform to analyze and solve different circuit related problems.

CO4. Explain the concept of two port networks to formulate network equations and solving circuit related problems.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Network Theorems**	Superposition theorem, Thevenin theorem, Norton theorem, Maximum power transfer theorem, Reciprocity theorem, Compensation theorem. Analysis with dependent current and voltage sources. Node and Mesh Analysis. Concept of duality and dual networks.	***International Academia:*** https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.orgisites/default/files/Model Curriculum/UG-1/ug-voll.pdf ***Industry Mapping:*** MATLAB, PSPICE	10	1. Verification of Network theorems using software & hardware 2. Transient response of R-L and R-C network: simulation with software & hardware
2	**Solution of First and Second order networks**	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, steady state and transient state response.	***International Academia:*** https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.orgisites/default/files/Model Curriculum/UG-1/ug-voll.pdf ***Industry Mapping:*** MATLAB, PSPICE	8	Transient response of R-L-C series and parallel circuit: simulation with software & hardware

3.	**Sinusoidal steady state analysis**	Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complex power. Three-phase circuits. Mutual coupled circuits, Dot Convention in coupled circuits, Ideal Transformer.	***International Academia:*** https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.orgisites/default/files/Model Curriculum/UG-1/ug-voll.pdf ***Industry Mapping:*** MATLAB, PSPICE	8	1.Frequency response of LP and HP filters: simulation & hardware. 2.Frequency response of BP and BR filters: simulation & hardware. 3.Generation of Periodic, Exponential, Sinusoidal, Damped Sinusoidal, Step, Impulse, Ramp signal using MATLAB in both discrete and analog form.
4	**Electrical Circuit Analysis Using Laplace Transforms**	Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, inverse Laplace transform, transformed network with initial conditions. Transfer function representation. Poles and Zeros. Frequency response (magnitude and phase plots), series and parallel resonances.	***International Academia:*** https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.orgisites/default/files/Model Curriculum/UG-1/ug-voll.pdf ***Industry Mapping:*** MATLAB, PSPICE	8	1. Determination of Laplace transform and Inverse Laplace transform using MATLAB. 2. Amplitude and Phase spectrum analysis of different signals using MATLAB.
5	**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.	***International Academia:*** https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/ ***AICTE-prescribed syllabus:*** https://www.aicte-india.orgisites/default/files/M	6	Determination of Impedance (Z) and Admittance (Y) parameter of two-port network: simulation & hardware.

			odel Curriculum/UG-1/ug-voll.pdf ***Industry Mapping:*** MATLAB, PSPICE		

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
Circuit Theory Analysis and Synthesis	Abhijit Chakrabarti	7th	Dhanpat Rai & Co. (Pvt.) Ltd.	3,12	Module-1: Network Theorems
				8	Module-2: Solution of First and Second order networks
				4	Module-3: Sinusoidal steady state analysis
				9	Module-4: Electrical Circuit Analysis Using Laplace Transforms
				13	Module-5: Two Port Network and Network Functions

Reference books:

1. M. E. Van Valkenburg, “Network Analysis”, Prentice Hall, 2006.
2. D. Roy Choudhury, “Networks and Systems”, New Age International Publications, 1998.
3. C. K. Alexander and M. N. O. Sadiku, “Electric Circuits”, McGraw Hill Education, 2004.

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Subject Name: Analog Electronics **Credit:3** **Lecture Hours: 42**

Subject Code: PCCEE302

Pre-requisite: Physics, Basic Electronics

Relevant Links: Study material NPTEL Coursera LinkedIn Learning

LESSON PLAN_PCCEE302

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 number	**Topic**	**Sub-topics**	**Mapping with Industry and International Academia**	**Lecture Hours**	**Corresponding Lab Assignment**
1	**Diode**	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. 3. Study of Switched Mode Power Supply & construction of a linear voltage regulator using regulator IC chip
2	**BJT circuits**	Structure and I-V characteristics of a 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 it's gain & Bandwidth. 2. V-I Characteristics of BJT

			Industry Mapping: Hardware Chipset (CMOS, IGBT) Software: P-Spice		
3	**FET circuits**	MOSFET structure and I-V characteristics. 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 equivalent circuit.	***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	1. V-I Characteristics of JFET and MOSFET
4	**Operational amplifier**	Linear applications of op-amp: Idealized analysis of op-amp circuits. Inverting a n d 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. Nonlinear applications of op-	***International Standards:*** **(https://ocw.mit.edu/courses/6-002-circuits-and-electronics-spring-2007/video_galleries/video-lectures/)** ***AICTE prescribed syllabus:*** (https://www.aicte-	8	1. Realization of a V-to-I & I-to-V converter using Op-Amps. 2.

		amp Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector.	india.org/sites/default/files /Model_Curriculum/Final_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	3. 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, Berkhausen criterion, Colpit, 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. 2. Study of timer circuit using NE555 & configuration for monostable & astable and bistable multivibrator. 3. Realization of a Phase Locked Loop

			/Model_Curriculum/Final_ECE.pdf) ***Industry Mapping:*** Software: P-Spice		using Voltage Controlled Oscillator (VCO).

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.
Robert Boylestad Louis Nashelsky "Electronic Devices and Circuit Theory”, Pearson

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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	Coursera	**LESSON PLAN_PCCEE303**

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.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Review of Vector Calculus**	Vector algebra - addition, subtraction, components of vectors, scalar and vector multiplications, triple products, three orthogonal coordinate systems (rectangular, cylindrical and spherical). Vector calculus - differentiation, partial differentiation, integration, vector operator del, gradient, divergence and curl; integral theorems of vectors. Conversion of a vector from one coordinate system to another.	***International Academia:*** https://ocw.mit.edu/courses/8-07-electromagnetism-ii-fall-2012/ ***AICTE-prescribed syllabus:***https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf ***Industry Mapping:*** Software: MATLAB, ANSYS	6	No corresponding lab
2	**Static Electric Field**	Coulomb's law, Electric field intensity, Electrical field due to point charges. Line, Surface and Volume charge distributions. Gauss law and its applications. Absolute Electric potential, Potential difference, Calculation of potential differences for different configurations. Electric dipole, Electrostatic Energy and Energy density.	**International Standards**:https://ocw.mit.edu/courses/6-013-electromagnetics-and-applications-spring-2009/ ***AICTE prescribed syllabus:***https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf	6	No corresponding lab

3	**Conductors, Dielectrics and Capacitance**	Current and current density, Ohms Law in Point form, Continuity of current, Boundary conditions of perfect dielectric materials. Permittivity of dielectric materials, Capacitance, Capacitance of a two wire line, Poisson's equation, Laplace's equation, Solution of Laplace and Poisson's equation, Application of Laplace's and Poisson's equations.	***International Standards***: https://ocw.mit.edu/courses/6-013-electromagnetics-and-applications-spring-2009/ ***AICTE prescribed syllabus:***https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf ***Industry Mapping:*** Software: MATLAB, ANSYS	6	No corresponding lab
4	**Static Magnetic Fields**	Biot-Savart Law, Ampere Law, Magnetic flux and magnetic flux density, Scalar and Vector Magnetic potentials. Steady magnetic fields produced by current carrying conductors.	***International Standards:*** https://ocw.mit.edu/courses/6-641-electromagnetic-fields-forces-and-motion-spring-2005/ ***AICTE prescribedsyllabus:***https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf ***Industry Mapping:*** Software: MATLAB, ANSYS	6	No corresponding lab

5	**Magnetic Forces, Materials and Inductance**	Force on a moving charge, Force on a differential current element, Force between differential current elements, Nature of magnetic materials, Magnetization and permeability, Magnetic boundary conditions, Magnetic circuits, inductances and mutual inductances.	***International Standards:*** https://ocw.mit.edu/courses/6-641-electromagnetic-fields-forces-and-motion-spring-2005/ ***AICTE prescribedsyllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf ***Industry Mapping:*** Software: MATLAB, ANSYS	6	No corresponding lab
6	**Time Varying Fields and Maxwell's Equations**	Faraday's law for Electromagnetic induction, Displacement current, Point form of Maxwell's equation, Integral form of Maxwell's equations, Motional Electromotive forces. Boundary Conditions.	***International Standards:*** https://ocw.mit.edu/courses/8-07-electromagnetism-ii-fall-2012/ ***AICTE prescribedsyllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf ***Industry Mapping:*** Software: MATLAB, ANSYS	6	No corresponding lab
7	**Electromagnetic Waves**	Derivation of Wave Equation, Uniform Plane Waves, Maxwell's equation in Phasor form, Wave equation in Phasor form, Plane waves in free space and in a homogenous material. Wave equation for a conducting medium, Plane	***International Standards:*** https://ocw.mit.edu/courses/8-07-electromagnetism-ii-fall-2012/ ***AICTE prescribedsyllabus:*** https://www.aicte-india.org/sites/default/files/	6	No corresponding lab

		waves in lossy dielectrics, Propagation in good conductors, Skin effect. Poynting theorem.	Model_Curriculum/UG-1/ug-vol1.pdf ***Industry Mapping:*** Software: MATLAB, ANSYS		

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.

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Subject Name: Indian Constitution **Credit: 0.5** **Lecture Hours: 35**

Subject Code: MCEE301

Pre-requisite: School history

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.

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Indian Constitution**	Indian Constitution: Sources and constitutional history, Features: Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy	***International Academia:*** ***https://mnit.ac.in/dept_hss/downloads/Syllabus/UG/21HST808.pdf*** ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Vol.%20II%20%20AICTE%20UG%20%20Curriculum.pdf*** ***Industry Mapping:*** *https://byjus.com/ias/upsc-syllabus/*	5	Designing of a small set of rules and regulations (constitution) for an educational institution
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, LokSabha, RajyaSabha. State government and its administration: Governor: Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions,	***International Academia:*** 1. https://www.iitg.ac.in/hss/page_syllabus_details.php?slno=YzdtOS9VVGhiV25PNDZkMWh1ZkdXdz09 2. http://unipune.ac.in/university_files/Constitution/All%20PG%20Compulsory%20Paper%20Introduction%20to%20Constitution_13.012021.pdf ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Vol.%20II%20%20AICTE%20UG%20%20Curriculum.pdf***	10	Queries on the following – 1. Union Govt. 2. President of India 3. Role of PM 4. Centre-State Relationship 5. State Govt. 6. CMs of States 7. Council of Ministers 8. Latest Developments in States' Politics

			Industry Mapping: https://www.drishtiias.com/pdf/1593776909-uttar-pradesh-pcs-preliminary-mains-syllabus.pdf		
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 court, independence of the court, jurisdiction and power of supreme court. Subordinate courts: constitutional provision, structure and jurisdiction. National legal services authority, Lokadalats, family courts, gramnyayalays. Public interest litigation (PIL): meaning of PIL, features of PIL, scope of PIL, principle of PIL, guidelines for admitting PIL	***International Academia:*** 1. https://www.kuk.ac.in/lms/syllabus?did=NDE=&sid=NDUxNQ==&pn=TS5UZWNoLiBDb21wdXRlciBFbmdpbmVlcmluZyAoVUlFVCk= ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Vol.%20II%20%20AICTE%20UG%20%20Curriculum.pdf*** ***Industry Mapping:*** https://www.shiksha.com/exams/wbcs-exam-syllabus	10	Queries on Lok Adalats, Family courts and PIL

4	**Local Administration:**	District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Pachayati raj: Introduction, PRI: ZilaPachayat, Elected officials and their roles, CEO ZilaPachayat: Position and role, Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.	***International Academia:*** 1. https://www.amrita.edu/course/indian-constitution/ 2. https://www.kud.ac.in/file_upload/nep/3-4%20Sem%20NEP/Revised%20Syllabus%20of%20All%20UG%204th%20Semester%20for%20India%20&%20Indian%20Constitution%20Compulsory%20Subject%20under%20NEP.pdf ***AICTE-prescribed syllabus:*** ***https://www.aicte-india.org/sites/default/files/Vol.%20II%20%20AICTE%20UG%20%20Curriculum.pdf*** ***Industry Mapping:*** https://rpsc.rajasthan.gov.in/Static/Syllabus/5A186FF9-57DB-46D0-A1FA-126B4AA87639.pdf	10	Make a list of Local-District Administrators, Major Officials of District and Their role

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.

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

Syllabus for B.Tech Admission Batch 2024

Subject Name: Electrical Circuit Analysis Laboratory Credit:1 Lecture Hours: 27

Subject Code: PCCEE391

Pre-requisite: Basic Electrical Laboratory

Relevant Link: Workbook

Course Objectives:

The purpose of learning this course is-

1. To solve D.C. networks by different circuit analysis methods.
2. To understand the transient and steady-state response of electrical circuits.

Course Outcomes:

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

CO1.Determine transient response of different electrical circuit, parameters of two port network, frequency response of filters, Laplace transform and inverse Laplace transform

CO2. Generate different signals in both discrete and analog form. Analyze amplitude and phase spectrum of different signals.

CO3.Verify network theorems, construct circuits with appropriate instruments and safety precautions.

CO4. Simulate electrical circuit experiments using suitable software.

Laboratory Experiments

Module No	Description	No of period
1	**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
2	**Create and evaluate** the **transient response of R-L-C series and parallel circuits** through both software-based simulation and hardware experimentation.	3
3	**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
4	**Simulate and analyze** the **frequency response of Low Pass (LP) and High Pass (HP) filters**; **construct hardware circuits** to study their practical behavior and compare with simulated outcomes.	3
5	**Develop and evaluate** the **frequency response of Band Pass (BP) and Band Reject (BR) filters** using software tools and hardware realization.	3
6	**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
7	**Implement and verify** the **Laplace Transform and Inverse Laplace Transform** of given functions using **MATLAB**, with applications to system analysis.	3
8	**Analyze the amplitude and phase spectra** of different time-domain signals using **MATLAB** to understand their frequency-domain characteristics.	3
9	**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

Experiment Name	Web-Link/ Software Used
Transient response of R-L and R-C network: simulation with software & hardware	Hands on practical done on breadboard. Software : PSPICE/Multisim
Transient response of R-L-C series and parallel circuit: simulation with software & hardware	Hands on practical done on breadboard. Software : PSPICE/Multisim
Verification of Network theorems using software & hardware	Hands on practical done on breadboard. Software : PSPICE/Multisim.

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Syllabus for B.Tech Admission Batch 2024

Subject Name: Analog Electronics Laboratory **Credit:1** **Lecture Hours: 27**

Subject Code: PCCEE392

Pre-requisite: Basic Electronics Laboratory

Relevant Links: Analog Electronics Workbook

Course Objective(s):

The purpose of learning this course is to-

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

Course Outcomes:

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

CO1. Explain 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.

Laboratory Experiments

Expt. no	Description	No of period
1	Design an unregulated power supply using a full wave rectifier with and without a 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

Virtual Lab. Details

Experiment Name	Web-Link/ Software Used
Study of Ripple and Regulation Characteristics of Full Wave Rectifier with and without Capacitor Filter.	http://vlabs.iitkgp.ernet.in/be/exp6/index.html http://vlabs.iitkgp.ernet.in/be/exp7/index.html http://vlabs.iitkgp.ernet.in/be/exp8/index.html
Study of Zener Diode as Voltage Regulator.	http://vlabs.iitkgp.ernet.in/be/exp10/index.html#
Study of Characteristics Curves of B.J.T	http://vlabs.iitkgp.ernet.in/be/exp11/index.html http://vlabs.iitkgp.ernet.in/be/exp12/index.html http://vlabs.iitkgp.ernet.in/be/exp13/index.html
Study of Timer Circuit Using NE555 &Configuration For Mono-stable & Astable Multi-vibrator	http://he-coep.vlabs.ac.in/Experiment8/Aim.html?domain=ElectronicsandCommunications&lab=Hybrid%20Electronics%20Lab
Study of D.A.C & A.D.C.	http://he-coep.vlabs.ac.in/Experiment6/Aim.html?domain=ElectronicsandCommunications&lab=Hybrid%20Electronics%20Lab

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Syllabus for B.Tech Admission Batch 2024

Subject Name: Data Structure & Algorithm **Credit: 3** **Lecture Hours: 36**

Subject Code: PCCEE393

Pre-requisite: Basic Computation and Principles of C, Engineering Mathematics

Study Material Coursera NPTEL Infosys Springboard Linkedin learning

Course Objectives:

The purpose of learning this course is to-

1. Understand the fundamentals of data structures and algorithms.
2. Familiarize the students with basic data structures and their use in fundamental algorithms.
3. Understand and design efficient algorithms for sorting and searching.
4. Be able to solve problem statements using algorithms.
5. Apply the skills to store and interpret data using defined structures and perform various operations.

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Course Outcomes:

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

CO1: Students will be able to acquire and remember the knowledge of fundamental data structures

CO2: Students will be able to understand any data structure properly and to have knowledge on basics of computer hardware and number systems.

CO3: Students will be able to implement any problem by writing their own algorithms

CO4: Students will be able to analyze the algorithm for a given problem.

Following topics need to learn before performing Laboratory Experiments

Module number	Topic	Sub-topics	Mapping with Industry and International Academia	Lecture Hours	Corresponding Lab Assignment
1	**Introduction to Data Structures in C programming**	Arrays 1D array, 2D array, multi-dimensional arrays, Operations in array Algorithms Flowchart and pseudo-code Time and Space complexity	***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf ***International Academia:*** Lecture Notes | Advanced Data Structures | Electrical Engineering and Computer Science | MIT OpenCourseWare	4	Find largest/smallest element in an array. Add the elements of two 3x3 matrices into one 3x3 matrix.
2	**Linear Data Structures**	Linked Lists, Singly linked list Doubly linked list, Circular linked list, Stack, Queue	***AICTE-prescribed syllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf ***International Academia:*** Lecture Notes | Advanced Data	6	Declare a linked list and perform the various operations like searching and sorting on the stored elements. Implement Stack/Queue

			Structures | Electrical Engineering and Computer Science | MIT OpenCourseWare		using arrays to insert-delete/display the elements.
3	**Non-Linear Data Structures**	Trees, Binary tree, Binary tree – operations, Height and depth of B-Tree, Graphs, Definition and concepts, Types of graphs Graph traversals – BFS, DFS, Shortest path	***AICTE-prescribedsyllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf ***International Academia:*** Lecture Notes | Advanced Data Structures | Electrical Engineering and Computer Science | MIT OpenCourseWare	6	Implement a Binary Tree to perform traversal, insertion and deletion of values. Find the depth and height of a B-Tree.
4	**Searching and Sorting**	Hashing, Collision resolution techniques, Linear search, binary search, sequential search, Bubble sort, Insertion sort, Selection sort, Quick sort, Merge sort	***AICTE-prescribedsyllabus:*** https://www.aicte-india.org/sites/default/files/Model_Curriculum/UG-1/ug-vol1.pdf ***International Academia:*** Lecture Notes | Advanced Data Structures | Electrical Engineering and Computer Science | MIT OpenCourseWare	4	Implement collision resolution in hashing. Implement Bubble sort and Selection sort with user defined values. Compare their time-complexities.

Suggested Learning Resources:

Text Books

1. “Fundamentals of Data Structures of C” by Ellis Horowitz, SartajSahni, Susan Anderson-freed.

2. “Data Structures Using C” by ReemaThareja.

3. “Data Structures” by S. Lipschutz.

Reference Books

1. “Data Structures And Program Design In C”, 2/E by Robert L. Kruse, Bruce P Leung.

2. “Data Structure Through C in Depth” by S.K. Srivastava and Deepali Srivastava; published by BPB Publications.

3. “Introduction to Algorithms” by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein.

Laboratory Experiments

Experiment No.	Description	No of period
1.	Implementation of array operation in Stacks and Queues: adding, deleting elements.	3
2.	Implementation of array operation in Circular Queue: Adding & deleting elements.	3
3.	Implementation of array operation in Merging Problem: Evaluation of expressions operations on multiple Stacks & queues.	3
4.	Inserting, deleting, and inverting a linked list. Implementation of stacks & queues using linked lists.	3
5.	Polynomial addition, Polynomial multiplication, Sparse Matrices: Multiplication, addition.	3
6.	Recursive and Non recursive traversal of Trees, Threaded binary tree traversal, AVL tree implementation.	3
7.	BFS, DFS application over graph.	3
8.	Spanning tree by Prim’s & Krushkal’s algorithm application over graph	3
9.	Searching, inserting and deleting, searching & sorting techniques.	3