Year 2022-23 onward

B. Tech. Programme Structure

Electronics and Communication Engineering [ECE]

NIST Institute of Science and Technology (Autonomous)
Institute Park, Pallur Hills, Berhampur, Odisha, INDIA. Pin: 761008.
Web: www.nist.edu

Third Semester					
Theory					
Sl. No.	**Category**	**Subject Code**	**Subject Name**	**L-T-P**	**Credit**
1	BSC	22CM3BS01T	Mathematics-III	3-0-0	3
2	HSMC	22CM3HS01T/ 22CM3HS02T	**Humanities-I** Organizational Behavior/ **Management-I** Engineering Economics and Costing	3-0-0	3
4	ESC	22CM3ES01T	Data Structure using C	3-0-0	3
3	ESC	22EC3ES02T	Analog Electronic Circuits	3-0-0	3
5	PCC1	22EC3PC01T	PCC-1: Signal and Systems	3-0-0	3
6	PCC2	22EC3PC02T	PCC-2:Network Theory	3-0-0	3
7	MC		**Mandatory Course:**	3-0-0	0
		22CM3MC01T	Environmental Science and Engineering		
Total Credit (Theory)					**18**
Practical					
1	ESC	22CM3ES01L	Data Structure using C Laboratory	0-0-2	1
2	ESC	22EC3ES02L	Analog Electronic Circuits Laboratory	0-0-2	1
3	PCC	22EC3PC01L	PCC Lab-1: Signal and Systems Laboratory	0-0-2	1
4	PCC	22EC3PC02L	PCC Lab-2: Network Theory laboratory	0-0-2	1
5	PSI	22CM3PS01L	Summer Internship / Summer Training / MOOC Certification	0-0-2	1
Total Credit (Practical)					**5**
Total Semester Credit					**23**

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Mathematics-III (Probability and Statistics)**	
Course Type	Theory	
Course Code	**22CM3BS01T**	
Category	BSC (Basic Science course)	
Credit Point	3	
Time Commitment	Lecture	36 Hours
	Tutorial	08 Hours
	Practice	Nil
	Total	44 Hours
Recommended Background Knowledge		
Subject Description		
Objectives and Outcomes	**Objectives:** The course should enable the students to: 1. Enrich the knowledge of probability on single random variables and probability distributions. 2. Understand the foundations for classical inference involving confidence intervals and hypothesis testing.	

	3. Analyse the given data for appropriate test of hypothesis. 4. Apply the concept of correlation and regression.	
	Outcomes: On completion of this course, students are able to: 1. Use the basic probability rules, discrete and continuous probability distributions, including requirements of mean and variance. 2. Identify the characteristics of different discrete and continuous distributions. Identify the type of statistical situation to which different distributions can be applied. 3. Use of continuous distribution and various hypothesis of testing. 4. Employee the principles of linear regression and correlation and significance of the correlation coefficient.	
Assessment/ Evaluation	Mid-Term Examination	30 %
	Quiz Test-1	2.5 %
	Quiz-Test-2	2.5 %
	Surprise Test	5 %
	Assignment-1	2.5 %
	Assignment-2	2.5 %
	Attendance	5 %
	End-Term Examination	50 %
Prescribed Text Book(s)	1. R. E. Walpole, S. L. Myers, and K. Ye, Probability and statistics for engineers and scientists, 8th Edition, Pearson. [Chapter- 2(2.6-2.8), Chapter-3(3.1 – 3.4), Chapter- 4(4.1 – 4.3), Chapter-5(5.1-5.4, and 5.6), Chapter-6(6.1 – 6.6), Chapter-8(8.1, 8.2, 8.4 – 8.7), Chapter-9(9.1 – 9.6, and 9.12), 10(10.1 – 10.7, and 10.14)] 2. 2. S. C. Gupta, V. K. Kapoor, Fundamental of Mathematical Statistics, 10th revised edition, Sultan Chand & Sons. [Chapter- 10(10.1 – 10.8)]	

Reference Book(s)	1. J. E. Freund, Mathematical Statistics, 5th Edition, Prentice Hall of India pvt. Ltd., Eastern Economy Edition. 2. D. C. Montgomery and G. C. Runger, Applied Statistics and Probability for Engineers, 6th Edition, Wiley. 3. R. C. Johnson, Probability and Statistics for Engineers, 6th Edition, Prentice Hall of India pvt. Ltd., Eastern Economy Edition.
Digital Learning Resources	

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1	Use the basic probability rules, discrete and continuous probability distributions, including requirements of mean and variance.	
CO2	Identify the characteristics of different discrete and continuous distributions. Identify the type of statistical situation to which different distributions can be applied.	
CO3	Use of continuous distribution and various hypothesis of testing.	
CO4	Employee the principles of linear regression and correlation and significance of the correlation coefficient.	

DETAILED SYLLABUS:

Module No. 1	Probability	08 Hours
Conditional Probability, Multiplicative Rules, Baye's Rule, Random Variables and Probability Distributions: Concept of a Random Variable, Discrete Probability Distributions, Continuous		

Probability Distributions, Joint Probability Distributions. Mathematical Expectation: Mean of a Random Variable, Variance and Covariance of Random Variables, Means and Variances of Linear Combinations of Random Variables.

Module No. 2	**Probability Distributions**	**10 Hours**
Some Discrete Probability Distributions: Introduction and Motivation, Discrete Uniform Distribution, Binomial and Multinomial Distributions, Hypergeometric Distributions, Poisson Distribution and the Poisson Process. Some Continuous Probability Distributions: Continuous Uniform Distribution, Normal Distribution, Areas under the Normal Curve, Applications of the Normal Distribution, Normal Approximation to the Binomial, Exponential distribution.		

Module No. 3	**Fundamental Sampling and Estimations**	**10 Hours**
Fundamental Sampling Distributions and Data Descriptions: Random Sampling, Some Important Statistics, Sampling Distributions: Sampling Distribution of Means and Variances, t-distribution, One-Sample Estimation Problems: Introduction, Statistical Inference, Classical Methods of Estimation, Estimating the Mean (Single sample), Standard Error of Point Estimate, Prediction Intervals, Estimating the Variance (Single Sample).		

Module No. 4	**Tests of Hypotheses**	**06 Hours**
One-Sample Tests of Hypotheses: Statistical Hypotheses, Testing a Statistical Hypothesis, One and Two- Tailed Tests, Tests Concerning a Single Mean (Variance Known), Relationship to Confidence Interval Estimation, Tests on a Single Mean (Variance Unknown), Goodness -of -Fit Test.		

Module No. 5	**Correlation and Regression**	**06 Hours**
Bivariate Distribution, Correlation, Scatter Diagram, Karl Pearson Coefficient of Correlation, Calculation of the Correlation Coefficient for a Bivariate Frequency Distribution, Probable Error of Correlation Coefficient, Rank Correlation, Regression, Correlation Ratio.		

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Organizational Behavior**	
Course Type	Theory	
Course Code	**22CM3HS01T**	
Category	HSMC (Humanities, Social Science and Management Courses)	
Credit Point	3	
Time Commitment	Lecture	36 Hours
	Tutorial	08 Hours
	Practice	Nil
	Total	44 Hours
Recommended Background Knowledge		
Subject Description		
Objectives and Outcomes	1. Developing an understanding of the behaviour of individuals and groups inside organizations by enhancing the skills in appreciating individual, interpersonal, and group processes for increase. 2. Developing effectiveness both within and outside of organizations is the goal of any organization. 3. Through this course students will develop theoretical and practical insights.	

	4. The students will develop problem-solving capabilities for effectively managing the organizational processes.	
	Outcomes: Upon completion of this course, the student will be able to: 1. Students will understand the essential of maintaining the inter-personal relationships in organisations. 2. Personality factors will be effectively used to understand the communication among groups. 3. The reasons for conflict will be known and prescriptive methods can be devised to enhance higher productivity in organisations. 4. Being an employee in an organisation the importance of organisational change and culture can be known to all.	
Assessment/ Evaluation	Mid-Term Examination	30 %
	Quiz Test-1	2.5 %
	Quiz-Test-2	2.5 %
	Surprise Test	5 %
	Assignment-1	2.5 %
	Assignment-2	2.5 %
	Attendance	5 %
	End-Term Examination	50 %
Prescribed Text Book(s)	Organizational Behaviour, Robbins, Judge, Sanghi, Pearson.	
Reference Book(s)	Understanding Organizational Behaviour, Parek, Oxford 1. Organizational Behaviour, Hitt, Miller, Colella, Wiley 2. Organizational Behaviour, K. Awathappa, HPH. 3. Organizational Behaviour, VSP Rao, Excel 4. Understanding Organizational Behaviour, Parek, Oxford	

Digital Learning Resources	

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1	Students will understand the essential of maintaining the inter-personal relationships in organisations.	
CO2	Personality factors will be effectively used to understand the communication among groups.	
CO3	The reasons for conflict will be known and prescriptive methods can be devised to enhance higher productivity in organisations.	
CO4	Being an employee in an organisation the importance of organisational change and culture can be known to all.	

DETAILED SYLLABUS:

Module No. 1	**Fundamentals of OB:**	**06 Hours**
Introduction: Definition, nature and scope of OB (environmental and organizational context), Relationship between OB and the individual, Impact of IT, globalization and diversity on OB.		

Module No. 2	**Foundations of Individual Behavior:**	**10 Hours**
Personality: Meaning and definition, Determinants of personality, Personality traits, Personality and OB. Perception: Meaning and definition, Perceptual process, Importance of perception in OB. Motivation: Nature and importance, Herzberg's Two Factor Theory, Maslow's Need Hierarchy Theory, Alderfer's ERG Theory. Attitude: Definition, nature and dimensions, Attitude and OB. *Learning: Nature, learning and OB.*		

Module No. 3	**Group Dynamics of OB-I**	**08 Hours**
Communication: Types, interactive communication in organizations, barriers to communication, strategies to improve the follow of communication. Stress and Conflict: Meaning and types of stress, Meaning and types of conflict, Effect of stress on individuals, strategies to cope with stress and conflict.		

Module No. 4	**Group Dynamics of OB-II**	**06 Hours**
Power and Politics: Meaning and types of power empowerment. Groups Vs. Teams- Nature of groups, dynamics of informal groups, dysfunctions of groups and teams, teams in modern work place.		

Module No. 5	**Foundations of Organizational Behaviour**	**06 Hours**
Organizational Culture: Culture and organizational effectiveness. Organizational Change: Types of change, reasons to change, resistance to change. *Organisational Structure and Development: Concepts and process.*		

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Engineering Economics and Costing**	
Course Type	Theory	
Course Code	**22CM3HS02T**	
Category	HSMC (Humanities, Social Science and Management Courses)	
Credit Point	3	
Time Commitment	Lecture	36 Hours
	Tutorial	08 Hours
	Practice	Nil
	Total	44 Hours
Recommended Background Knowledge		
Subject Description		
Objectives and Outcomes	**Objectives:** At the end of the course the engineering students will be able: 1. To prepare engineering students to understand the basic concepts of Engineering economics and their application. 2. To carry out numerically the effects of changes in demand and supply on price determinations of products and services. 3. To justify or reject alternative projects in the light of changing domestic	

	and global scenario on the eve of technological innovations. 4. To analyse the macroeconomic environment and financial system of the country and its impact on business society and enterprise.	
	Outcomes: Upon completion of this course, the student will be able to: 1. Students will understand how to solve economic problems and the art of taking the right decision on scarce resources. 2. This will help to solve different microeconomic problems related to production, cost, and revenue maximization. 3. Students will be understood different market structures and levels of competition and determine the price. 4. This will help engineering students while evaluating and determining the cost of a project. This is also helpful in determining the value of money for future courses of action. 5. This will help to understand basic microeconomic concepts like inflation, national income, and money market.	
Assessment/ Evaluation	Mid-Term Examination	30 %
	Quiz Test-1	2.5 %
	Quiz-Test-2	2.5 %
	Surprise Test	5 %
	Assignment-1	2.5 %
	Assignment-2	2.5 %
	Attendance	5 %
	End-Term Examination	50 %
Prescribed Text Book(s)	Principles of Economics: Deviga Vengedasalam & Karun agaran Madhavan- Oxford Publication .	

Reference Book(s)	1. Engineering Economics and Costing: D.M.Methani & Suresh Chandra Das-Himalaya Publishing House 2. Engineering Economics and Costing: Sasmita Mishra-PH Learning Private Limited 3. R. Panneerselvam, 'Engineering Economics', PHI 4. Riggs, Bedworth and Randhwa, 'Engineering Economics', McGrow Hill Education India 5. Engineering Economics and Costing: Mahendra P. Agasty, Scitech Publications (INDIA) Pvt. Ltd.
Digital Learning Resources	

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1	Students will understand how to solve economic problems and the art of taking the right decision on scarce resources.	
CO2	This will help to solve different microeconomic problems related to production, cost, and revenue maximization.	
CO3	Students will be understood different market structures and levels of competition and determine the price.	
CO4	This will help engineering students while evaluating and determining the cost of a project. This is also helpful in determining the value of money for future courses of action.	
CO5	This will help to understand basic microeconomic concepts like inflation, national income, and money market.	

DETAILED SYLLABUS:

Module No. 1		**10 Hours**
Engineering Economics: Nature and Scope, Basic Problems of an Economy, Micro and Macro Economics; Demand: Meaning of demand, Determinants of demand, Demand function, Law of demand and its exceptions, Elasticity of demand and its measurement, (Simple numerical problems to be solved). Supply: Meaning of Supply, Determinants of Supply, Supply function, Law of Supply and its exception, Elasticity of Supply.		

Module No. 2		**07Hours**
Production: Factors of Production, Production Function; Laws of Returns: Law of Variable Proportions, Law of Returns to Scale, Cost and Revenue Concepts: Short Run Total Costs, Long Run Average Cost Curves, Total Revenue, Average Revenue and Marginal Revenue,		

Module No. 3		**06 Hours**
Market Structures: Basic understanding of different Market Structures; Determination of Equilibrium Price under Perfect Market Competition and Monopoly. Margin of safety and Break Even Analysis: Linear Approach (Simple numerical problems to be solved).		

Module No. 4		**10 Hours**
Time Value of Money: Interest- Simple and Compound, Nominal and Effective Rate of Interest, Cash flow diagrams, Principles of Economic Equivalence, Evaluation of Engineering Projects: Present, Future and Annual worth Method, Rate of Return Analysis; Cost-Benefit Analysis		

Module No. 5		**07 Hours**

Inflation: Meaning of Inflation, Types, Causes and Measures to Control Inflation. National Income: Definition, Concepts of National Income and its measurement, Banking: Commercial Bank, Functions of Commercial Bank, Central Bank, Functions of Central Bank.

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Data Structure using C**	
Course Type	Theory	
Course Code	**22CM3ES01T**	
Category	ESC(Engineering Science)	
Credit Point	3	
Time Commitment	Lecture	38 Hours
	Tutorial	06 Hours
	Practice	Nil
	Total	44 Hours
Recommended Background Knowledge		
Subject Description		
Objectives and Outcomes	**Objectives:** At the end of the course the engineering students will be able: 1. Implementation of different linear data structure. 2. Implementation of non-linear data structures like trees and graphs. 3. Applying different sorting and searching algorithms.	

<table>
<tr><td></td><td colspan="2">Outcomes:

Upon completion of this course, the student will be able to:

1. Apply the basic data structure like stack, queue, linked list, tree and graph on different problems.
2. Compare and differentiate different implementation of data structure.
3. Analyzing the time complexity and space complexity of different sorting and searching algorithms and data structures implementation.</td></tr>
<tr><td rowspan="8">Assessment/ Evaluation</td><td>Mid-Term Examination</td><td>30 %</td></tr>
<tr><td>Quiz Test-1</td><td>2.5 %</td></tr>
<tr><td>Quiz-Test-2</td><td>2.5 %</td></tr>
<tr><td>Surprise Test</td><td>5 %</td></tr>
<tr><td>Assignment-1</td><td>2.5 %</td></tr>
<tr><td>Assignment-2</td><td>2.5 %</td></tr>
<tr><td>Attendance</td><td>5 %</td></tr>
<tr><td>End-Term Examination</td><td>50 %</td></tr>
<tr><td>Prescribed Text Book(s)</td><td colspan="2">1. Data Structures: A Pseudocode Approach with C – Gilberg&Forouzan, 2nd Edition, Cengage, Indian Reprint 2016
2. Data Structures and Program Design in C – Kruse, Leung, 2nd Edition, Pearson,2008</td></tr>
<tr><td>Reference Book(s)</td><td colspan="2">1. Data Structures Using C - YedidyahLangsam& Moshe J. Augenstein Aaron M. Tanenbaum, 3rd Edition, Pearson, 2009
2. Algorithms and Data Structures: The basic toolbox, Kurt Mehlhorn and Peter Sanders, Springer, 2010
3. Programming and Data Structures (NPTEL) – (Vodeo lectures by Dr. Naveen Garg, IIT</td></tr>
<tr><td>Digital Learning Resources</td><td colspan="2"></td></tr>
</table>

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1	Apply the basic data structure like stack, queue, linked list, tree and graph on different problems.	
CO2	Compare and differentiate different implementation of data structure.	
CO3	Analyzing the time complexity and space complexity of different sorting and searching algorithms and data structures implementation.	

DETAILED SYLLABUS:

Module No. 1		**10 Hours**
Abstract Data Types – Definition and Representation, ADT of rational number, ADT of Stack, Data Structure and ADT. Stack and its usages: reversing string, matching parentheses, in fix to postfix, decimal to binary number. Queue: linear & circular queue, Deque & Applications. Matrix – sparse and dense. Representation of sparse matrix, Transpose & addition of sparse matrices.		

Module No. 2		**08 Hours**
Linked list and its representation: using array, using self referential structure. Singly, circular and double linked lists. Operations on linked list – Insertion, Deletion, Traversals. Usages of Linked list – insertion sort, Addition/multiplication of polynomials. Addition/Multiplication of large numbers.		

Module No. 3		**12 Hours**
Tree: Definition and Terminologies, child and parent nodes, Sub tree, root, leaf node, internal node, height of a tree. Binary, ternary, quad tree. Binary tree traversals. Reconstruction of binary tree from traversals. Binary search tree – inserting a new key, deleting a key, searching a key. AVL tree – inserting a new key into an AVL tree using rotations. B- tree: insertion and deletion using node splitting and merging.		

Module No. 4		**8 Hours**
Sorting and Searching: Bubble sort, selection sort quick sort and merge sort. Linear and binary search, Fibonacci search.		

Module No. 5		**06 Hours**
Basic Graph Algorithm: Graph representation – adjacency matrix and list – pros and cons. Graph traversals – Depth First Search and Breadth First Search.		

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Analog Electronic Circuits**	
Course Type	Theory	
Course Code	**22EC3ES02T**	
Category	ESC	
Credit Point	3	
Time Commitment	Lecture	36 Hours
	Tutorial	08 Hours
	Practice	Nil
	Total	44 Hours
Recommended Background Knowledge	Basic Electronics	
Subject Description		
Objectives and Outcomes	**Objectives:** The course should enable the students to: 1. Understand the basics of construction, operation and characteristics of different transistors and its biasing techniques 2. Develop small-signal model to analyze the performance of different amplifier both for low frequency and high frequency operation	

	3. Understanding the operational amplifiers and its applications 4. Analyze the performance parameters of large signal amplifiers and feedback topologies, extend the concept of feedback in different amplifier and oscillator circuits	
	Outcomes: Upon completion of this course, the student will be able to: 1. Analyze and understand the different biasing techniques to have excellent stabilization against internal and external parameter variation. 2. Develop small-signal model to analyze the performance of different amplifier both for low frequency and high frequency operation. 3. Apply the concept of different feedback and feedback topologies in designing various circuits used for amplification and frequency generation. 4. Analyze and design operational amplifier based amplifier and oscillator circuits by understanding its characteristics and configuration details.	
Assessment/ Evaluation	Mid-Term Examination	30 %
	Quiz Test-1	2.5 %
	Quiz-Test-2	2.5 %
	Surprise Test	5 %
	Assignment-1	2.5 %
	Assignment-2	2.5 %
	Attendance	5 %
	End-Term Examination	50 %
Prescribed Text Book(s)	1. Electronic Devices and Circuits theory, R.L. Boylestad and L. Nashelsky, 10th Edition, Pearson Education.	

Reference Book(s)	1. Microelectronics Circuits, A. Sedra and K.C Smith, Oxford University press. 2. Electronic Circuits: Analysis and Design (SIE), Donald Neamen, Mc-Graw Hills. 3. Milliman's Electronics Devices and Circuits, J. Milliman, C. Halkias, 2nd Edition, TMH.	
Digital Learning Resources	**Course Name**	Analog Electronic Circuits
	Course Link	https://nptel.ac.in/courses/108/102/108102112/
	Course Instructor	Dr. ShouribrataChatterjee, Department of Electrical Engineering, IIT Delhi
	Course Name	Analog Circuit
	Course Link	https://nptel.ac.in/courses/117/101/117101106/
	Course Instructor	Prof. A.N.Chandorkar, Department of Electrical Engineering, IIT Bombay
	Course Name	Analog Electronic Circuits by
	Course Link	https://nptel.ac.in/courses/108/105/108105158/
	Course Instructor	Prof. Pradip Mandal, Department of Electrical Engineering, IIT Kharagpur
	Course Name	Analog Electronic Circuits
	Course Link	https://nptel.ac.in/courses/108/102/108102095/
	Course Instructor	Prof. S.C. Dutta Roy, Department of Electrical Engineering, IIT Delhi

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1	Analyze and understand the different biasing techniques to have excellent stabilization against internal and external parameter variation.	
CO2	Develop small-signal model to analyze the performance of different amplifier both for low frequency and high frequency operation.	
CO3	Apply the concept of different feedback and feedback topologies in designing various circuits used for amplification and frequency generation.	
CO4	Analyze and design operational amplifier based amplifier and oscillator circuits by understanding its characteristics and configuration details.	

DETAILED SYLLABUS:

Module No. 1		**08 Hours**
Biasing of BJTs: Load lines (AC and DC); Operating Points; Different Biasing Techniques; Bias Stabilization; Bias design Examples. **Biasing of FETs and MOSFETs:** Operating point, Load line, Biasing techniques of FETs and design, Bias design: Graphical and analytical Method, Complimentary MOS (Principle of operation).		

Module No. 2		**08 Hours**
Small Signal Analysis of BJTs: Small-Signal Equivalent-Circuit Models; re model, Small Signal Analysis of CE, CC, CB amplifiers using re model, Hybrid equivalent Model, Graphical		

determination of hybrid parameter.

Small Signal Analysis of FETs: Small-Signal Equivalent-Circuit Model, Small Signal Analysis of CS, CD, CG Amplifiers.; Source Follower and Cascaded System.

Two port system approach: Effects of RS and RL on CE amplifier operation, Effects of R_{SIG} and R_L on CS Amplifier, Small signal analysis of Cascade and Cascode configurations, Darlington Connection and Current Mirror Circuits.

Module No. 3		**08 Hours**
Frequency Response of BJT and FET Amplifiers: General Frequency Considerations, Low and High Frequency Analysis of Single Stage Amplifiers, Square Wave Testing of amplifier.		

Module No. 4		**08 Hours**
Operational Amplifier: Ideal Op-Amp, Op-Amp Parameters, Open-loop and Closed-loop Gains, OP-AMP application as weighted summer, Differentiator and Integrator, Instrumentation amplifier.		

Module No. 5		**08 Hours**
Feedback amplifier and Oscillators: Concepts of negative and positive feedback, Four Basic Feedback Topologies, Advantage of Negative feedback, Principle of oscillation, OP-AMP based sinusoidal Oscillator Circuits: Wien Bridge oscillator and R-C Phase shift oscillator; Crystal Oscillators.		

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Signal and Systems**	
Course Type	Theory	
Course Code	**22EC3PC01T**	
Category	PCC1 (Professional Core Course)	
Credit Point	3	
Time Commitment	Lecture	36 Hours
	Tutorial	06
	Practice	Nil
	Total	42 Hours
Recommended Background Knowledge		
Subject Description		
Objectives and Outcomes	**Objectives:** The course should enable the students to: 1. Understand basics of signals and systems and convolution. 2. Explain spectral analysis of periodic and aperiodic signals using Fourier methods. 3. Develop the stability analysis using Laplace transform of continuous-	

<table>
<tr><td></td><td colspan="2">time and discrete-time signals.
4. To provide sufficient understanding of the properties and applications of Z- transform.</td></tr>
<tr><td></td><td colspan="2">Outcomes:
Upon completion of this course, the student will be able to:

1. Be able to describe continuous time signals and analyze the response of continuous time LTI system using different types of time domain analysis.

2. Be able to describe discrete time signals and analyze the response of discrete time LTI system using different types of time domain analysis.

3. Able to analyze continuous time signal in frequency domain by using different properties of Fourier series and Fourier transform.

4. Able to understand frequency domain analysis of Discrete time signal and system using various transform and its properties.</td></tr>
<tr><td rowspan="9">Assessment/ Evaluation</td><td>Mid-Term Examination</td><td>30 %</td></tr>
<tr><td>Quiz Test-1</td><td>2.5 %</td></tr>
<tr><td>Quiz-Test-2</td><td>2.5 %</td></tr>
<tr><td>Surprise Test</td><td>5 %</td></tr>
<tr><td>Assignment-1</td><td>2.5 %</td></tr>
<tr><td>Assignment-2</td><td>2.5 %</td></tr>
<tr><td>Attendance</td><td>5 %</td></tr>
<tr><td>End-Term Examination</td><td>50 %</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Prescribed Text Book(s)</td><td colspan="2">1. Tarun Kumar Rawat, Signals and Systems, 1st edition, Oxford University Press, 2010, India.
2. A. Nagoorkani, Signals and Systems, 2nd edition, Tata McGraw Hill Education Private Limited, 2010, New Delhi.</td></tr>
</table>

Reference Book(s)	**1.** I.J. Nagrath, S. N. Sharan, and R. Ranjan, S. Kumar, *Signals and Systems*, 2nd Edition, Tata McGraw Hill Education Private Limited, 2001, New Delhi. **2.** Ramesh Babu ,*Signals and Systems*, 4th edition, Scitech Publication, 2010, India.

Digital Learning Resources	Course Name	Signals and Systems
	Course Link	https://nptel.ac.in/courses/117/104/117104074/
	Course Instructor	Prof. K.S. Venkatesh, Department of Electrical Engineering, IIT Kanpur

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1	Be able to describe continuous time signals and analyze the response of continuous time LTI system using different types of time domain analysis.	
CO2	Be able to describe discrete time signals and analyze the response of discrete time LTI system using different types of time domain analysis.	
CO3	Able to analyze continuous time signal in frequency domain by using different properties of Fourier series and Fourier transform.	
CO4	Able to understand frequency domain analysis of Discrete time signal and system using various transform and its properties.	

DETAILED SYLLABUS:

Module No. 1	**Introduction to Signals: Continuous and Discrete Time Signals**	**08 Hours**
Continuous time and Discrete signal, Classification of CT and DT signals: energy, power, periodic, aperiodic, even, odd, random, causal, anti-causal, standard signals. Mathematical operations on CT and DT signals: amplitude scaling, time scaling, time shifting, folding, addition, multiplication.		

Module No. 2	**Introduction to Systems: Continuous and Discrete Time Systems**	**08 Hours**
Continuous and discrete-Time LTI Systems: linear, non-linear, time varying, time invariant, causal, non-causal, stable, unstable, static, dynamic; The Convolution Sum, Continuous-Time LTI Systems: The Convolution Integral, Properties of Linear Time-Invariant Systems, Convolution properties, correlation of energy and power signals, properties of correlation.		

Module No. 3	**Continuous Time Fourier Series and Fourier Transform**	**08 Hours**
Introduction, Fourier Series (FS) : Trigonometric, exponential , Gibb's phenomena, properties of Fourier series, Fourier Transform (FT) for CT signals: Introduction, FT of aperiodic signals, Convergence of FT, and Fourier Transform (FT) and its properties, FT of periodic signals, Analysis of CT systems using FT, energy spectral density and power spectral density.		

Module No. 4	**Laplace Transform**	**08 Hours**
Concept of complex frequency "S" Definition of Laplace transform and inverse Laplace transform, condition for existence, Laplace transform theorems, Differentiation and Integration, Concept of initial condition, Laplace transform of commonly used functions (sine, cos, unit step		

function etc.), Initial value theorem, Final value Theorem.

Module No. 5	**Z transform**	**08 Hours**
Z transform: Introduction, One sided and Two sided Z transform, Relationship with other transform, ROC, Properties, Inverse Z transform by long division , residue method and partial fraction method, Analysis of Linear Time Invariant (LTI) DT system using Z transform.		

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Network Theory**	
Course Type	Theory	
Course Code	**22EC3PC02T**	
Category	PCC2 (Professional Core Course)	
Credit Point	3	
Time Commitment	Lecture	34 Hours
	Tutorial	06 Hours
	Practice	Nil
	Total	40 Hours
Recommended Background Knowledge		
Subject Description		
Objectives and Outcomes	**Objectives:** The course should enable the students to: 1. To understand Coupled Circuits, Network Topology and Resonance. 2. To analyze transients in Electrical systems using Laplace transforms and harmonic analysis of electrical system by using Fourier series and Fourier Transforms.	

	3. To evaluate Network parameters of given Electrical network 4. To design basic filter configurations and Construction of electrical network using network synthesis.	
	Outcomes: Upon completion of this course, the student will be able to: 1. Apply network theorems for the analysis of electrical circuits. 2. Obtain the transient and steady-state response of electrical circuits. 3. Analyze two port circuit behavior and also analyze the harmonics with their amplitude and frequency spectrum of electrical system. 4. Design the filter circuit and construct the electrical systems by using synthesis methods.	
Assessment/ Evaluation	Mid-Term Examination	30 %
	Quiz Test-1	2.5 %
	Quiz-Test-2	2.5 %
	Surprise Test	5 %
	Assignment-1	2.5 %
	Assignment-2	2.5 %
	Attendance	5 %
	End-Term Examination	50 %
Prescribed Text Book(s)	1. Fundamentals of Electric Circuits – Alexander &Sadiku – Tata McGraw Hill, 5th Edition. 2. W. H. Hayt and J. E. Kemmerly, "Engineering Circuit Analysis", McGraw Hill Education, 2013. 3. M E Van Valkenburg, Network Analysis and Synthesis,3rd Edition, Pearson Education, 1980, India	
Reference Book(s)	1. S P Ghosh and A K Chakraborty, Network Analysis and Synthesis,1stEdition, Tata McGraw Hill, 2009, New Delhi. 2. Ravish R Singh, Network AnalysisAnd Synthesis, 2ndedition,,McGraw Hill Education,2013, New Delhi. 3. Joseph A. Edminister, MahmoodMaqvi, Theory and problem of electrical	

	circuits, Schaum's Outline Series, 6thEdition, Tata McGraw Hill, 2014,New Delhi. 4. Abhijit Chakrabarthi , Circuit Theory(Analysis and Synthesis), 7thRevised Edition, Dhanapata rai& Co. (P) LTD. Educational & Technical publishers, 2018, New Delhi.	
Digital Learning Resources	Course Name	Network Analysis
	Course Link	https://archive.nptel.ac.in/courses/108/105/108105159/
	Course Instructor	Prof. Tapas Kumar Bhattacharya, Department of Electrical and Electronics Engineering, IIT Kharagpur

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1	Apply network theorems for the analysis of electrical circuits.	
CO2	Obtain the transient and steady-state response of electrical circuits.	
CO3	Analyze two port circuit behavior and also analyze the harmonics with their amplitude and frequency spectrum of electrical system.	
CO4	Design the filter circuit and construct the electrical systems by using synthesis methods.	

DETAILED SYLLABUS:

Module No. 1	**Network Theorems and Network Topology:**	**08 Hours**
Network Theorems(AC Circuits only): Superposition theorem, Reciprocity Theorem, Thevenin's theorem, Norton's Theorem, and Maximum Power transfer theorem, Tellegen's theorem, Millman's theorem, Compensation theorem, concept of duality and dual networks. **Network Topology:** Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule.		

Module No. 2	**Solution of Electrical Networks, Frequency response and Magnetically Coupled Circuits.**	**10 Hours**
Solution of Electrical 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 response. **Magnetically Coupled Circuits:** Self inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits- problem solving.		

Module No. 3	**Electrical Circuit Analysis Using Laplace Transforms:**	**08 Hours**
Transient analysis of electrical circuits using Laplace Transforms: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non- homogenous, problem solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method.		

Module No. 4	Two Port Network and Network Functions:	10 Hours
Two Port Networks: Relationship of two port networks, Z-parameters, Y- parameters, Transmission line parameters, h-parameters, Inverse h- parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks, problem solving including dependent sources also. **Network Functions:** Significance of Poles and Zeros, Restriction on location of Poles and Zeros, Time domain behavior from Pole-Zero plots.		

Module No. 5		06 Hours
Network Synthesis: Realizability concept, Hurwitz property, positive realness, and properties of positive real functions. Synthesis of R-L, R-C and L-C driving point functions in Foster and Cauer forms.		

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Environmental Science and Engineering**	
Course Type	Theory	
Course Code	**22CM3MC01T**	
Category	MC (Mandatory Course)	
Credit Point	3	
Time Commitment	Lecture	36 Hours
	Tutorial	08 Hours
	Practice	Nil
	Total	44 Hours
Recommended Background Knowledge		
Subject Description		
Objectives and Outcomes	**Objectives:** The course should enable the students to: 1. To provide insight about impact of the humans activities on environment and impact of environment on the humans & its health. 2. To understand the basic problem of anthropogenic environmental pollution 3. To gain comprehensive knowledge about the social problem arising out of industrialization 4. To familiarize with the environmental ethics and act related to	

	environment	
	Outcomes: Upon completion of this course, the student will be able to: 1. Able to understand the concept of environmental pollution and its effect on society 2. Able to understand the root of the water pollution problem and adopted for its remedial. 3. Able to understand the other environmental pollution problem and adopted for its remedial. 4. Able to understand the problem of population growth and its effect on social issue and environment.	
Assessment/ Evaluation	Mid-Term Examination	30 %
	Quiz Test-1	2.5 %
	Quiz-Test-2	2.5 %
	Surprise Test	5 %
	Assignment-1	2.5 %
	Assignment-2	2.5 %
	Attendance	5 %
	End-Term Examination	50 %
Prescribed Text Book(s)	1. Gerard Kiely, Environmental Engineering, Tata McGraw Hill, Special Indian Ed, 2007 New Delhi. 2. B.K. Mohapatra, A Text Book of Environmental Engineering & Safety, Seven Seas Publication,4th Ed, 2010, Cuttack 3. L. M. Deshmukh, Industrial Safety Management, Tata McGraw Hill Publication, 1st Ed, 2010, New Delhi.	
Reference Book(s)	1. Arcadio P. Sincero & Gergoria A.Sincero, Environmental Engineering: A Design Approach, Prentice Hall, 1996, Geogia. 2. M. L. Davis and S. J. Masen, Principles of Environmental Engineering and Science, McGraw Hill International Edition, 4th Ed, 2019, United	

	Kingdom 3. Curringham & Saigo, Environmental Science, TMH, 2016, New Delhi 4. M.C. Dash & P.C. Mishra Man and Environment, Macmillan Publishers India Limited, 1st Ed, 2000, New Delhi 5. Gilbert M. Masters & Wendell P. Ela, An Introduction to Environmental Engineering and Science, Prentice Hall, 3rd Ed, 2008, United Kingdom.
Digital Learning Resources	Environmental Chemistry & Analysis, IIT Madras https://nptel.ac.in/courses/122/106/122106030/
	Environmental Engineering, IIT Roorkee https://nptel.ac.in/courses/103/107/103107084/#
	Environmental Air Pollution, IIT Delhi https://nptel.ac.in/courses/105/102/105102089/#
	Fundamentals of Environmental Pollution and Control, IIT Kharagpur https://nptel.ac.in/courses/123/105/123105001/#

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1	Able to understand the concept of environmental pollution and its effect on society.	
CO2	Able to understand the root of the water pollution problem and adopted for its remedial.	
CO3	Able to understand the other environmental pollution problem and adopted for its remedial.	
CO4	Able to understand the problem of population growth and its effect on social issue and environment.	

DETAILED SYLLABUS:

Module No. 1		**08 Hours**
Ecological Concepts and Natural Resources: Ecological perspective and value of environment. Ecosystem: Concept, structure& Function of ecosystem; Energy cycle, Food Chain, & Food Web; Ecological pyramid, types; Biodiversity; Ecological Succession: Type of ecosystem: Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystem. Geochemical Cycle: Water cycle, Carbon cycle, Oxygen cycle, Nitrogen cycle, etc., Environmental gradients, Tolerance levels of environment factor.		

Module No. 2		**08 Hours**
Water Pollution: Types, sources and consequences of water pollution; Ground water Contamination, Waste water treatment process: pretreatment, primary treatment, (Sedimentation, equalization and neutralization etc.), secondary treatment (Activated sludge technique and Trickling filter) tertiary treatment methods (Ion exchange, Electro-dialysis, Electrolytic recovery, reverse osmosis, etc.)		

Module No. 3		**10 Hours**
Air Pollution : Air pollution and pollutants, criteria pollutants& non-criteria pollutants, Acid deposition, Global climate change- Green House gases, Ozone Layer Depletion, Smog; Industrial Air Emission Control: Flue gas desulphurization, NOx removal,. Methods for control of particulate air pollutants (Mechanical device, Fabric Filtration, scrubber, Electrostatic precipitator), other removal methods like absorption, adsorption, precipitation, etc.		

Module No. 4		**08 Hours**
Solid Waste Management Source classification and composition of MSW: properties and separation, storage and transportation, MSW Management, Waste minimization of MSW, Reuse and recycling, Hazardous Waste Management, Hazardous waste and their generation, Transportation and treatment of hazardous waste: Incinerators, Inorganic waste treatment,		

handling of treatment plant residue. Waste minimization techniques.

Module No. 5		**06 Hours**
Noise Pollution: Types, sources and consequences of noise pollution, Physical Properties of sound: sound power, sound intensity and sound pressure levels;, Noise criteria, Noise Standards, Noise measurement, Noise control Methods.		

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Data Structure using C Laboratory**	
Course Type	Laboratory	
Course Code	**22CM3ES01L**	
Category	ESC (Engineering Science Courses)	
Credit Point	1	
Time Commitment	Lecture	05 Hours
	Tutorial	Nil
	Practice	20 Hours
	Total	25 Hours
Recommended Background Knowledge/Course Pre-requisites		
Subject Description		
Objectives and Outcomes	**Objectives:** The course should enable the students to:	
	Outcomes: Upon completion of this course, the student will be able to:	

Assessment/ Evaluation	Lab Experiments	20%
	Record Writing	10%
	Behavior/ Attitude	05%
	Quiz	10%
	Attendance	05%
	Final Lab Test	30%
	Final Viva/ Final Lab Quiz Test	20%
Prescribed Text Book(s)		
Digital Learning Resources		

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1		
CO2		
CO3		
CO4		

DETAILED SYLLABUS (EXPERIMENTS):

Sl. No.	Name of Experiments	Duration in Hrs
	Prerequisites Programs:	
1	Create a structure that stores a point in 2D. Accept 3 such points and find out the area of the triangle enclosed by these three points.	2
2	One array of numbers to be sorted. The no of element of the array is a user input. Create the array dynamically, accept its members and sort the array.	2
	Programs for Evaluation Lab:	
1	**(Integer stack simulation)** Write a structure for an integer stack, implement function push, pop, and pick, IsEmpty and IsFull function. Write a main function and call the functions based on an option entered.	2
2	**(Palindrome checking using stack)** Implement a stack of characters and create mystack.h. Write a program to check whether an entered string is a palindrome or not. One need to include mystack.h for calling the functions of character stack.	2
3	**(Simulating circular queue)** Defining structure of a circular queue (with a counter), write functions for inserting, deleting and counting no of elements present in the queue. Write functions IsFull and IsEmpty also. Write main function to call them.	2
4	**(Infix to Postfix)** Write a program to convert an infix expression into its corresponding postfix expression. The expression contains alphabets, operators and parentheses. During the conversion all possible checks for the correctness should be checked. [(a+b)/(c-d) would output ab+cd-/, ((a+b)^c-d would give error as “unmatched parenthesis]	2
5	**(Insertion sort)** A singly linked list gives a better way to implement insertion sort. A flat file contains someunknown number of integers. Implement insertion sort using a singly linked list that reads the next	2

	integer from the file and insert it into a linked list in its proper position. Write a function that prints the list after all elements is properly inserted into the linked list.	
6	**(Polynomial addition)** Represent a polynomial of a single variable using a singly linked list. Write functions create Polynomial that stores one polynomial in a singly linked list. Write a function to add two such linked lists.	2
7	**(BST simulation)** Declare a binary search tree where information at each node would be a single integer. Write functions for inserting a key, deleting a key from the tree. Write recursive traversal routines. After each insertion/deletion find all traversal results.	2
8	**(Bubble sort)** One array of numbers to be sorted. The no of element of the array is a user input. Create the array dynamically, accept its members and sort the array using bubblesort algorithm. Also count the total number of swaps.	
9	**(Quick sort)** Write a function to implement recursive quick sort algorithm and using this function sort an array of integers. Write another function to search for a key in this sorted array using binary search.	
10	**(Merge Sort)** Implement recursive merge sort using an array offixed size and hence sort an array of double numbers using this function **(Heap sort)** Implement heapify, build heap and heap sort routines. Apply heapsort to sort an array of numbers. Write a function to search for a given key in this sorted array using sequential search. **(BFS traversal)** Clearly declaring data structure of a graph, Write functions to read a directed graph from a flat file and to implement BFS routine in a directed graph. Show the result of BFS traversal in distance and previous arrays.	

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Analog Electronic Circuits Laboratory**	
Course Type	Laboratory	
Course Code	**22EC3ES02L**	
Category	ESC (Engineering Science Courses)	
Credit Point	1	
Time Commitment	Lecture	05 Hours
	Tutorial	Nil
	Practice	20 Hours
	Total	25 Hours
Recommended Background Knowledge/Course Pre-requisites		
Subject Description		
Objectives and Outcomes	**Objectives:** The course should enable the students to: 1. To illustrate the students different electronic circuit and their application in practice. 2. To impart knowledge on assessing performance of electronic circuit through monitoring of sensitive design and modeling parameters.	

	Course Outcomes: After completion of the course, the student will be able to 1. Test and experiment different types of BJT/JFET based electronic circuit and analyze their operation under different operating conditions. 2. Evaluate possible causes of discrepancy in experimental observations in comparison to theoretical outcome. 3. Practice different types of wiring and instruments connections keeping in mind technical, economical, safety issues. 4. Prepare professional quality textual and graphical presentations of laboratory data and computational results.	
Assessment/ Evaluation	Lab Experiments	20%
	Record Writing	10%
	Behavior/ Attitude	05%
	Quiz	10%
	Attendance	05%
	Final Lab Test	30%
	Final Viva/ Final Lab Quiz Test	20%
Prescribed Text Book(s)		

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1	Test and experiment different types of BJT/JFET based electronic circuit and analyze their operation under different operating conditions.	
CO2	Evaluate possible causes of discrepancy in experimental observations in comparison to theoretical outcome.	
CO3	Practice different types of wiring and instruments connections keeping in mind technical, economical, safety issues.	
CO4	Prepare professional quality textual and graphical presentations of laboratory data and computational results.	

DETAILED SYLLABUS (EXPERIMENTS):

Sl. No.	Name of Experiments	Duration in Hrs
(At least 10 out of 13 experiments should be done)		
1	Determination of cut- off and saturation voltage of a BJT and its application as a switch.	2
2	Assemble and test of BJT bias circuits: Fixed bias and feedback bias.	2
3	Design, assemble and test of BJT bias circuits: Voltage divider bias	2
4	Design, assemble and test of JEET bias circuits: fixed bias and self bias.	2

5	Design, assemble and test of BJT common-emitter circuit D.C and A.C performance: Voltage gain, input impedance and output impedance with bypassed and un-bypassed emitter resistor.	2
6	Design, assemble and test of BJT emitter-follower D.C and A.C performance: A.C. voltage gain, input impedance and output impedance.	2
7	Design, assemble and Test of JFET/MOSFET common-source amplifiers D.C and A.C performance: Voltage gain, input impedance and output impedance.	2
8	Determination of Bandwidth of a common-emitter amplifier from its frequency response.	2
9	Determination of Bandwidth of a BJT CE amplifier using Square wave testing.	2
10	Design and test of Differential amplifier circuits with its DC and AC performance.	2
11	Design and test of Darlington connection/ current mirror circuits.	2
12	Graphical determination of h-parameters of a CE amplifier.	2
13	Design Wien Bridge/R-C phase shift oscillator.	2

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Signal and Systems Laboratory**	
Course Type	Laboratory	
Course Code	**22EC3PC01L**	
Category	PCC	
Credit Point	1	
Time Commitment	Lecture	05 Hours
	Tutorial	Nil
	Practice	20 Hours
	Total	25 Hours
Recommended Background Knowledge/Course Pre-requisites		
Subject Description		
Objectives and Outcomes	**Objectives:** The course should enable the students to: The primary objective of this course is to provide a thorough understanding and analysis of signals in time and frequency domain using simulation software.	

	Outcomes: Upon completion of this course, the student will be able to: **1.** Understand basics of simulation software syntax, functions and programming. **2.** Generation of various continuous and discrete time signals and signal manipulations. **3.** Analyze CT and DT signals using various transforms. **4.** Analyze linear time-invariant (LTI) systems using various transforms.	
Assessment/ Evaluation	Lab Experiments	20%
	Record Writing	10%
	Behavior/ Attitude	05%
	Quiz	10%
	Attendance	05%
	Final Lab Test	30%
	Final Viva/ Final Lab Quiz Test	20%
Prescribed Text Book(s)		
Digital Learning Resources		

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1	Understand basics of simulation software syntax, functions and programming.	
CO2	Generation of various continuous and discrete time signals and signal manipulations.	
CO3	Analyze CT and DT signals using various transforms.	
CO4	Analyze linear time-invariant (LTI) systems using various transforms.	

DETAILED SYLLABUS (EXPERIMENTS):

Sl. No.	Name of Experiments	Duration in Hrs
1	Introduction to simulation software environment, constants, variables and expressions	2
2	Creation of arrays and matrices in simulator and their manipulation	2
3	Use of control structures and writing of programs and function	2
4	Generation and plotting of various continuous time signals	2
5	Generation and plotting of various discrete time signals	2
6	Linear Convolution of CT and DT signals	2
7	Linear Correlation of CT and DT signals.	2
8	Computation of trigonometric Fourier Series of CT periodic signals	2
9	Computation of exponential Fourier Series of CT periodic signals	2
10	Computation of Fourier Transform of CT aperiodic signals	2
11	Computation of Laplace transform and Inverse Laplace Transform of signals	2
12	Computation of Z transform and inverse.	2

COURSE DESCRIPTION:

Degree	B. Tech.	
Level	Undergraduate	
Branch	ECE (Electronics and Communication Engineering)	
Semester	3rd	
Subject Name	**Network Theory laboratory**	
Course Type	Laboratory	
Course Code	**22EC3PC02L**	
Category	PCC	
Credit Point	1	
Time Commitment	Lecture	05 Hours
	Tutorial	Nil
	Practice	20 Hours
	Total	25 Hours
Recommended Background Knowledge/Course Pre-requisites		
Subject Description		
Objectives and Outcomes	**Objectives:** The course should enable the students to: 1. To understand Resonance and coupled circuits. 2. To study the Steady state and Transient behavior of Electrical Circuits 3. To check the applicability of Network theorems for calculating the Electric circuit response. 4. To evaluate Network parameters of given Electrical network and also	

	understand the basic filter circuit response to design.	
	Outcomes: Upon completion of this course, the student will be able to: 1. Apply network theorems for the analysis of electrical circuits. 2. Obtain the Steady state and transient response of electrical circuits 3. Obtain frequency repose of the electrical circuits. 4. Analyze two port circuit behaviors, Filter circuits.	
Assessment/ Evaluation	Lab Experiments	20%
	Record Writing	10%
	Behavior/ Attitude	05%
	Quiz	10%
	Attendance	05%
	Final Lab Test	30%
	Final Viva/ Final Lab Quiz Test	20%
Prescribed Text Book(s)		
Digital Learning Resources		

CO's Mapping with PO's and PEO's

Course Outcomes	Course Outcome Statement	PO's / PEO's
CO1	Apply network theorems for the analysis of electrical circuits.	
CO2	Obtain the Steady state and transient response of electrical circuits	
CO3	Obtain frequency repose of the electrical circuits.	
CO4	Analyze two port circuit behaviors, Filter circuits.	

DETAILED SYLLABUS (EXPERIMENTS):

Sl. No.	Name of Experiments	Duration in Hrs
(At least 10 out of 13 experiments should be done)		
1	Verification of Network Theorems in DC circuits. (Norton's theorem, Reciprocity theorem, Maximum Power transfer theorem, Milliman's theorem & Compensation Theorem).	2
2	Verification of Network Theorems in AC circuits. (Superposition theorem, Reciprocity theorem, Maximum Power transfer theorem).	2
3	Study of DC and AC Transients for R-L, R-C & R-L-C circuits using storage oscilloscope.	2
4	Determination of two port network parameters.	2
5	Frequency response of Low pass and High Pass Filters.	2
6	Frequency response of Band pass and Band Elimination Filters.	2
7	Determination of self inductance, mutual inductance and coupling coefficient of a single phase two winding transformer representing a coupled circuit.	2
8	Study of resonance in R-L-C series and R-L-C Parallel circuit using oscilloscope.	2
9	Spectral analysis of a non-sinusoidal waveform.	2
10	Determination of Response of different DC circuits using MATLB Simulink/ PSpice.	2
11	Determine the frequency response of Series RLC and Parallel RLC circuit Using MATLAB Simulink.	2
12	Determination self inductance, Mutual inductance , of Coupled coils and their response using MATLB Simulink	2
13	Evaluation of Two – port Network parameters using MATLAB Simulink/PSpice.	2