NRI INSTITUTE OF TECHNOLOGY

(An Autonomous Institution Permanently Affiliated to JNTUK, Kakinada)
(Accredited by NAAC with "A" Grade and ISO 9001:2015 Certified Institution)
POTHAVARAPPADU (V), (VIA) NUNNA, AGIRIPALLI (M), PIN – 521 212

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE STRUCTURE FOR SECOND YEAR B.TECH PROGRAMME

II YEAR I SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P	Total	CIA	SEA	Total	
1	18A2100202	Complex Variables and Transform Techniques	3	-	-	3	40	60	100	3
2	18A2104201	Digital Electronics and Logic Design	3	-	-	3	40	60	100	3
3	18A2102302	Network Analysis and Transmission Lines	3	-	-	3	40	60	100	3
4	18A2104401	Signals and Systems	3	-	-	3	40	60	100	3
5	18A2105601	**Open Elective -I**	3	-	-	3	40	60	100	3
6	18A2100101	Managerial Economics and Financial Analysis	3	-	-	3	40	60	100	3
7	18A2102392	Network Analysis Lab	-	-	2	2	40	60	100	1
8	18A2104392	Basic Simulation lab	-	-	2	2	40	60	100	1
9	18A2104491	Electronic Devices and Circuits Lab	-	-	2	2	40	60	100	1
Total			**18**	**-**	**6**	**24**	**360**	**540**	**900**	**21**

II YEAR II SEMESTER

Sl. No	Course Code	Title of the Course	Scheme of Instruction (Periods Per Week)				Scheme of Examination (Maximum Marks)			No. of Credits
			L	T	P	Total	CIA	SEA	Total	
1	18A2200202	Probability Theory and Stochastic Process	3	-	-	3	40	60	100	3
2	18A2204301	Electro Magnetic Theory	3	-	-	3	40	60	100	3
	18A2204302	Control Systems	3	-	-	3	40	60	100	3
4	18A2204401	Analog and Pulse Circuits	3	-	-	3	40	60	100	3
5	18A2204402	Analog Communications	3	-	-	3	40	60	100	3
6		**Open Elective –II**	3	-	-	3	40	60	100	3
7	18A2200801	Professional Ethics and Human Values	2	-	-	2	40	60	100	0
8	18A2204491	Analog Communications Lab	-	-	2	2	40	60	100	1
9	18A2204492	Analog and Pulse Circuits lab	-	-	2	2	40	60	100	1
10	18A2204493	Digital Electronics and Logic Design Lab	-	-	2	2	40	60	100	1
Total			**18**	-	**6**	**24**	**360**	**540**	**900**	**21**

L - LECTURE T – TUTORIAL P - PRACTICAL
CIA – Continuous Internal Assessment SEA – Semester End Assessment

B.TECH (ECE)
II-YEAR II-SEMESTER

18A2100202: COMPLEX VARIABLES & TRANSFORM TECHNIQUES

Lecturer-Tutoral : 3 Hours **Internal :40**
Credirt: 3 **External :60**

Prerequisites:
1.Knowledge of complex numbers, Trigonometric relations, Differentiation**,** Integration and co-ordinate Geometry
2. Convergence of series

Course Objectives:

1. To familiarize the techniques in complex variables
2. To familiarize the techniques in fourier series.
3. To familiarize the techniques in fourier transforms
4. To familiarize the techniques in Z-transforms

To equip the students to solve application problems in their disciplines

Course Outcomes:	
Upon successful completion of the course, the student will be able to:	
CO1	Student will be able to ➢ **write** an analytic function if either real part or imaginary part is known and by **using** Cauchy-Riemann equations or **apply** Milne-Thompson method**(L3)**
CO2	Student will be able to ➢ **evaluate** the integral of complex function over the region bounded by the closed curves by **apply** either Cauchy-Goursat theorem or Cauchy's integral formula or Cauchy's Residue theorem**(L5)**
CO3	Students will be able to ➢ **write** the infinite series expansion of complex function by **apply** Taylor's/Maclaurin's/Laurent's series**(L3)**
CO4	Students will be able to ➢ **write** a Fourier series expansion of a periodic function by **using** Euler's formulae **(L3)**
CO5	Student will be able to ➢ **understand** the concept of Fourier transform and its properties **(L2)**
CO6	Student will be able to ➢ **solve** the difference equations using Z-transforms and Inverse Z-transforms**(L3)**

Contribution of Course Outcomes towards achievement of Program Outcomes : (1 – Low, 2- Medium, 3 – High)

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**
CO1	3	**3**	2	**2**	-	-	-	-	-	-	-	-
CO2	3	**3**	2	**2**	-	-	-	-	-	-	-	-
CO3	3	**3**	2	**2**	-	-	-	-	-	-	-	-
CO4	3	**3**	2	**2**	-	-	-	-	-	-	-	-
CO5	3	**3**	2	**2**	-	-	-	-	-	-	-	-
CO6	3	**3**	2	**2**	-	-	-	-	-	-	-	-

Syllabus:

Unit-1: Complex Variable – Differentiation & Integration

Complex function , Real and Imaginary parts of Complex function, Limit**,** Continuity and Derivative of complex function, Cauchy-Riemann equations, Analytic function, entire function, singular point, conjugate function**,** Harmonic functions, Milne-Thomson method**.**

Line integral of a complex function, Cauchy's theorem(only statement) , Cauchy's Integral Formula.

Unit-2: Complex Variable- Series expansion, Residue Theorem & Evaluation of Real Integrals

Absolutely convergent and uniformly convergent of series of complex terms, Radius of convergence**,** Taylor's series, Maclaurin's series expansion, Laurent's series.

Zeros of an analytic function, Singularity, Isolated singularity, Removable singularity, Essential singularity, pole of order m, simple pole, Residues, Residue theorem, Calculation of residues, Residue at a pole of order m**,**

Evaluation of real definite integrals: Integration around the unit circle**,** Integration around semi circle.

Unit-3: Fourier Series and Transforms

Introduction, Eulers formula, conditions for Fourier expansion**,** Functions having points of discontinuity, change of interval, Odd and Even function-expansions, Half-range series**.**

Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties, Inverse transforms – Finite Fourier transforms.

Unit-4: Z-Transforms .

Definition of Z-transform, elementary properties, linearity property, damping rule, shifting u_n to the right and left, multiplication by n, initial value theorem, final value theorem,

Inverse Z-transform, convolution theorem, formation of difference equations, solution of difference equations using Z-transforms.

TEXT BOOKS:

1.B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43/e, 2010.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.

REFERENCE BOOKS:

1. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7/e, Mc-Graw Hill, 2004.
2.N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008.

E-RESOURCES:

1.www.nptelvideos.com/mathematics/ (Math Lectures from MIT,Stanford,IIT'S)

2.nptel.ac.in/courses/122104017

3.nptel.ac.in/courses/111105035

18A2102301: NETWORK ANALYSIS AND TRANSMISSION LINES

Lecturer-Tutoral : 3 Hours **Internal :40**
Credirt: 3 **External :60**

Pre-Requisites for the Course:

Students are assumed to have back ground knowledge on the following topics:

1. Properties of conductors and Dielectrics.

Course Objectives:

Students will be able To

1. To know the behaviour of the steady state and transient states in RLC circuits
2. To understand the resonance and two port network parameters
3. Wave characteristics in different media for normal and oblique incidence.
4. Various concepts of transmission lines and impedance measurements

Course Outcomes:

Course Name: NATL	
Upon successful completion of this course, students should be able to	
C222.1	Gain the knowledge on basic RLC circuits behavior.
C222.2	Analyze the steady state and transient states of RLC circuits.
C222.3	Analyze the two port network parameters.
C222.4	Demonstrate the reflection and Refraction of EM waves at boundaries
C222.5	Analyse basic transmission line parameters.
C222.6	Analysis and Design of a transmission lines.

Course Outcomes vs. Program Outcomes

(CO-PO) Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	3							3		2
CO2	3	3	3							3		2
CO3	3	3	2							3		2
CO4	3	3	2							3		2

CO5	3	3	2							3		2
CO6	3	3	2							3		2
Total	18	18	14							18		10
Avg.	3	3	2.33							3		1.6

Course Content (Syllabus):

UNIT I

Network Theorems

Super position theorem, Thevenin's theorem, Norton's theorem, and Maximum Power Transfer theorem.

Two Port Network

Relationship of two port variables, Short circuit admittance parameters, Open circuit impedance parameters, Transmission parameters, Hybrid parameters, Relation between parameter sets.

UNIT II

Transient and Steady state analysis of RC, RL and RLC Circuits

Response to sinusoidal excitation—series RL, RC and RLC Circuits, parallel RC, RL and RLC.

Resonance

Introduction, Definition of Q series resonance, Bandwidth of series resonance, parallel resonance, Condition for maximum impedance, current in anti resonance, Bandwidth of parallel resonance.

UNIT III

Transmission Lines - I

Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Equivalent Circuit, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts

Part II

Lossless / Low Loss Characterization, Types of Distortion, Condition for Distortion less line, Minimum Attenuation, Loading - Types of Loading.

UNIT IV

Transmission Lines – II

Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. Low loss radio frequency lines and UHF Transmission lines, UHF Lines as Circuit Elements

Part II

$\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations, Smith Chart – Configuration and Applications, Single Stub Matching.

Text Books:

1.network Analysis –Van Valkenburg ,3rd Ed.,Pearson ,2016.
2.Networks,Lines and Fields –JD Ryder , PHI,2nd Edition ,1999.

Reference Books:

1.Electric Circuits- J.Edministerand M.Nahvi –Schaum's Outlines,Mc Graw Hills Education ,1999.
2.Engineering Circuit Analysis –William Hayt and Jack E Kemmerly,MGH,8th Edition ,1993
3.Electromagnetics with Applications-JD.Karus,5th Ed.,TMH
4.Transmission Lines and Networks –Umesh Sinha, Satya Prakashn,2001,(Tech.India Publications),Newdelhi

18A2104201: DIGITAL ELECTRONICS AND LOGIC DESIGN

Lecturer-Tutoral : 3 Hours **Internal :40**
Credirt: 3 **External :60**

Course Objectives: Students will be able to:

1. To study the basic philosophy underlying the various number systems, negative number representation, binary arithmetic, binary codes and error detecting and correcting binary code.
2. To study the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques.
3. To study the combinational logic design of various logic and switching devices and their realization.
4. To study some of the programmable logic devices and their use in realization of switching functions.
5. To study the sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices, their minimization techniques and their realizations.
6. To implement synchronous state machines using flip flops.

Course Outcomes:

At the end of the course, the students will develop ability to:

1. Understand the numeric information in different forms and interpret different logic gates.
2. Minimize the given Switching functions in SoP and PoS forms using K-Map and Tabular Method.
3. Analyze and Design various combinational circuits like Encoders, Decoders, Multiplexers, De-multiplexers, and Arithmetic Circuits.
4. Design combinational logic circuits using different types of Programmable Logic Designs.
5. Design and Implement various sequential circuits like flip flops, registers.
6. Design the state diagrams with the knowledge of Mealy and Moore conversions, state machines using various flip flops.

Pre-Requisites for the Course: Students are expected to have knowledge on the following topics:

S. No	Topic

1 Set theory (Mathematics)

2 Basic logic operations like bit wise operations, Shift operations, flow charts, ASCII codes, etc. (Computer Programming)

3 Number systems, Digital logic design, Concepts of state machines using flip flops.

Course Outcomes vs. Program Outcomes (CO-PO) Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	3	2	1	-	-	-	-	-	-	2	-	3
CO4	2	-	-	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	2	-	3
CO6	2	2	3	-	-	-	-	-	-	-	-	-
Total	16	12	6	-	-	-	-	-	-	4	-	6
Avg.	**2.67**	**2.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.67**	**0.00**	**1.00**

Course Content (Syllabus):

UNIT- I

Number Systems and Binary Codes

Philosophy of number systems, complement representation of negative numbers, binary arithmetic, binary codes, error detecting & error correcting codes – Hamming codes.

Boolean algebra

Fundamental postulates of Boolean algebra, Basic theorems and properties. Digital logic gates, Representation of Boolean Functions using Canonical and Standard forms, , Multilevel NAND/NOR realizations.

UNIT- II

Minimization of Switching Functions

Minimization of switching functions using K-Map up to 5-variables, Tabulation Method.

Combinational Circuits

Design of Adders, Subtractors, Parallel Binary Adder, BCD adder, Encoder, Decoder, Multiplexer (MUX), Demultiplexer, Parity generator, Magnitude Comparator, Code converters.

UNIT- III

Programmable Logic Devices

Basic Structures of PROM, PLA, PAL, Realization of switching functions using PROM, PLA and PAL.

Sequential Logic Circuits-I

Classification of sequential circuits, Basic flip-flops (Truth tables and excitation tables), MS JK flip-flop, Race Around Condition, Conversion from one flip-flop to another flip-flop.

UNIT- IV

Sequential Logic Circuits II

Design of ripple counters, Design of synchronous counters, Registers, Shift register, Bidirectional Shift register, Universal shift register.

Synchronous Sequential Machines

State reduction and State assignment, Partitioning method, Mealy and Moore models, Design procedures, Design and realization of circuits using various Flip-flops.

Text Books:

1. Switching Theory & Logic Design by A. Anand Kumar,PHI,3rd Edition.
2. Digital Design, Morris Mano, PHI, 3rd Edition, 2001.
3. Switching and Finite Automata theory, Zvi Kohavi and Niraj k Jha, Cambridge University Press, 3rd edition, 2010.

References:

1. Fundamentals of Logic Design, Charles H. Roth, Thomson Publications, 5th Edition,2009.
2. Modern Digital Electronics by R.P. Jain, Mcgraw Hill, 3rd edition.

18A2104401:SIGNALS AND SYSTEMS

Lecturer-Tutoral : 3 Hours **Internal :40**
Credirt: 3 **External :60**

Course objectives:

Students will be able to:

1. To introduce the terminology of signals and systems and Fourier tools through the analogy between vectors and signals
2. To introduce Fourier transform to convert signal from time domain to frequency domain and understand the concept of sampling and reconstruction of signals
3. To analyze the linear systems in time and frequency domains and understand importance of convolution, correlation.
4. To study Laplace-transform as mathematical tool to convert signals from time domain to complex frequency domain, and also study Z-transform as mathematical tool to analyze discrete-time signals and systems.

Course outcomes: At the end of the course, the students will develop ability to:

1. Learn the basic concepts of signals and systems and represent signal in terms of Exponential and Trigonometric Fourier Series.
2. Transform the time domain signal into frequency domain by applying Fourier Transform.
3. Perform sampling and reconstruction of signals with the help of Nyquist criterion.
4. Analyze Linear systems in time and frequency domain and understand the properties of convolution and correlation.
5. Transform continuous time signals into complex frequency domain by applying Laplace Transforms.
6. Transform discrete time signals into complex frequency domain by applying Z – Transforms.

Pre-Requisites for the Course:

Students are expected to have knowledge on the following topics:

S. No	**Topic**
1	Engineering Mathematics –I

Course Outcomes vs. Program Outcomes (CO-PO) Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	2	2					2		1	
CO2	3	2	2	1	3						2	
CO3	3	3	2	2	2	1					2	
CO4	3	3		2	3					2		2
CO5	3	3		2	3					2		2
CO6	18	16	6	10	11	1	-	-	2	4	6	5
Total	3	2.66	2	1.66	2.75	1	-	-	2	2.66	1.5	1.66
Avg.	3	3	2	2					2		1	

Course Content (Syllabus):

UNIT I

Introduction To Signals And Systems: Continuous and discrete time signals, Exponential and sinusoidal signals, Concepts of Impulse function, Unit step function and Signum function. Continuous and discrete time systems, Basic system properties. Orthogonal signal space and Signal approximation using orthogonal functions.

Fourier Series: Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum.

UNIT II

Fourier Transforms

Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function.

Sampling: Sampling theorem, Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling, Aliasing.

UNIT III

Linear System Analysis: Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics.

Convolution and Correlation of Signals: Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation.

UNIT IV

Laplace Transforms: Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.Ts, Relation between L.T and F.T. of a signal.

Z-Transforms: Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

Text Books:

1. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn
2. Signals & Systems- A.Anand Kumar –2nd Edition, PHI, 2012.
3. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.

References:

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Signals and Systems - K R RajeswariB.VisvesvaraRao, “Signals & Systems” – 1st Edition, PHI, 2009.
3. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
4. Charles L.Phillips, John M. Parr, Eve A. Riskin, “Signals, Systems, and Transforms”, Pearson Publications, 4th Edition.

18A2105601: DATA STRUCTURES
(Open Elective-I)

Lecturer-Tutoral : 3 Hours **Internal :40**
Credirt: 3 **External :60**

Course Objectives:

Students will be able to:

1. To impart basic knowledge of data structures.
2. Be familiar with basic techniques of algorithm analysis
3. Be familiar with writing recursive methods
4. To understand concepts about searching and sorting techniques
5. To understand concepts about searching and sorting techniques
6. To design and implementation of various basic and advanced data

structures like stacks, queues, lists, trees and graphs.
7. To design and implementation of various basic and advanced data structures like stacks, queues, lists, trees and graphs.
8. To introduce various techniques for representation of the data in the real world.
9. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures

Course Outcomes:

At the end of the course, the students will develop ability to:

1. Ability to analyze algorithms, and to understand the concept of recursive function
2. Ability to summarize searching and sorting techniques.
3. Ability to describe linked list operations
4. Ability to describe stack, queue and linked list operation
5. Ability to have knowledge of Trees, able to use trees to solve real time problems
6. to apply concepts of graphs to solve real time problems

Pre-Requisites for the Course: C Programming

Students are expected to have knowledge on the following topics:

S.No	Topic
1	Data Structures, Recursion, Searching and Sorting.
2	Linked Lists, Stacks, and Queues.
3	Trees.
4	Graphs

Course Outcomes vs. Program Outcomes (CO-PO) Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	2	2								2
CO2	3	2	3	2								2
CO3	3	2	3	2								2
CO4	3	2	3	2								2
CO5	3	2	3	2								2
CO6	3	2	3	2								2
Total	18	13	17	12								12
Avg.	3	2.7	3	2								2

Course Content (Syllabus):

UNIT I

Data Structures, Recursion, Searching and Sorting

Data Structures: Definition, Types of Data Structures, Arrays, structures, self-referential structures, Operations, Algorithm analysis Time Complexity and Space Complexity.

Recursion: Definition, Linear and Binary recursions, Iteration vs. Recursion.
Searching: Linear Search, Binary Search.
Sorting: Basic concepts, Divide-and-Conquer approach, Insertion Sort, Merge Sort, Quick Sort, and Heap Sort.

UNIT II
Linked Lists, Stacks, and Queues.

Linked Lists: Introduction, types of Linked Lists, operations, inserting a node in Single Linked List, deleting a node in Single Linked List, searching a node in Single Linked List, inserting, deleting, and searching a node in Double Linked List.
Stacks: Introduction, operations, applications, Stacks implementation using Arrays, Stacks implementation using Linked List, Expression Conversion: Infix to Postfix, Infix to Prefix.
Queues: Introduction, operations, applications, Queues implementation using Arrays, Queues implementation using Linked Lists, Circular Queue. Priority Queues

UNIT III
Trees

Basic Tree Concepts, Terminology, operations, Tree traversals, **Binary Trees:** definition, properties, Binary Tree representations, operations, **Binary Search Tree:** definition, properties, applications, Inserting, Deleting, and Searching element in Binary Search Tree,
Threaded Binary Tree: definition, properties, Inserting a Node into a Threaded Binary Tree, **Heaps:** Definition of a Max Heap, properties.

UNIT IV
Graphs

Introduction, Terminology, Representation of graphs, types of graphs, applications, operations, Graph transversal techniques: Breadth First Search (BFS), Depth First Search (DFS), implementations. **Minimum Spanning Tree (MST):** definition, Prim's algorithm, Kruskal's algorithm, **Shortest paths:** Basic Concepts, Dijsktra's algorithm.

Text books:

1 Data Structures using C,ReemaThareja, Oxford
2 Fundamentals of DATA STRUCTURES in C, Horowitz,SartajSahani, Susan Anderson – Freed, University Press

Reference Books:

1 Data Structures using C, 2nd Edition,by A. K. Sharma, Pearson India
2. Classic Data Structures, 2/e, Debasis, Samanta, PHI,2009
3 Data Structures and Algorithms, 2008, G.A.V.Pai, TMH
4 Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage
5 DATA STRUCTURE USING C,Udit Agarwal,KATSON Books

E-Resources:

1. https://en.wikipedia.org/wiki/Data_structure
2.https://www.tutorialspoint.com/data_structures_algorithms/data_structures_basics
3. http://nptel.ac.in/courses/106103069/

18A2100101: MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTS

Lecturer-Tutorial : 3 Hours **Internal :40**
Credits: 3 **External :60**

Course Objectives:

Students will be able to:

1. To enhance the knowledge of the students regarding importance of management and Managerial problems with optimum solutions and Demand Forecasting-methods.
2. To develop the concepts viz., Consumer Behavior and demand concept.
3. To provide the knowledge regarding production and cost and Break-Even Analysis.
4. To share the concepts like market structures and Business Organization.
5. To provide awareness regarding Capital Budgeting decisions & give an idea of practicing technique of Ratio Analysis.
6. To introduce the concepts- Financial Accounting.

Course Outcomes:

At the end of the course, the students will develop ability to:

1 Use the theory of managerial Economics ,demand ,Production analysis and fore casting theories.
2 Analyze of production markets and pricing strategies .Functions and Cost-price functions to manage markets & Break-Even point.
3 Develop an ability to identify, formulate and solve Engineering problem by applying the knowledge of Managerial Economics.
4 Theorize about characteristics features and types of Industrial organization, concept of changing business environment in Post-Liberalization scenario.
5 Enhance their capabilities in the interpretation of b/s that are followed in industries, organizations and institutes.
6 Apply financial analysis ,capital budgeting techniques in Evaluating various investment opportunities

Pre-Requisites for the Course:

Nil

Course Outcomes vs. Program Outcomes (CO-PO) MAPPING:

CO	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	1											
CO2		1										
CO3	2	2	1									
CO4			1				1					
CO5	1		1			2						
CO6	1				1						1	
Total	6	3	3		1	2	1				1	
Avg.	1.5	1.5	1		1	2	1				1	

COURSE CONTENT (Syllabus):

UNIT I

Introduction to Managerial Economics and Demand Analysis

Nature & Scope of Managerial Economics & its relationship with other subjects Concept of Demand, Determinants of Demand-law of demand & its limitations Elasticity of demand Types and measurements –Demand forecasting and methods.

UNIT II

Cost Analysis & Introduction to Markets

Different cost concepts :opportunity costs, Explicit & Implicit costs, Fixed & Variable costs Average & Marginal ,Short run & Long run costs Break Even Analysis(Simple problems). market-nature and types-monopolistic competition and oligopoly.

UNIT III

Types of Business Organisation & Business cycles

Features and Evaluation of sole Trader,Partnership ,Joint stock company & co-operative Societies.

Business Cycles: Meaning & features of Business cycles –Phases & control of Business cycles-concept of money and money supply, Functions of Commercial banks and RBI credit control methods of RBI.

UNIT IV

Introduction to Accounting and Financial Analysis

Introduction to Double entry system ,Journal, Ledger ,Trial balance & Final accounts.

Financial Analysis

Ratio Analysis-Need & significance(simple problems)Capital Budgeting Meaning & importance – Methods of Capital Budgeting :Payback period ,ARR(Accounting Rate Of Return),NPV(Net Present Value)(simple problems).

Text Books:

1. Dr.A.R.Aryasri-Managerial Economics and Financial Analysis TMH 2011.
2.Dr.N.Appa Rao, Dr.p.vijay kumar :Managerial Economics and Financial Analysis carigage publications ,New Delhi-2011.
3.Prof.J.V.Prabhakara Rao,Prof.P.Venkata Rao.Managerial Economics and Financial Analysis-Ravindra publications.

Reference Books:

1.V.Maheswari Managerial Economics Sultan Chand.2014.
2.Dr.B.Kuberudu and Dr.T.v.Ramana:managerial economics and Financial Analysis,Himalaya publishing House,2014.
3.Suma Damodaran:Managerial Economics,Oxford,2011.
4.Maheswari:Financial Accounting ,Vikas Publications.
5.Shailaja,Gajjala and Usha Munipalle,Universities press,2015
6. Banking Law and Practise , Gordan and Mithani, Himalaya publications

E-Resources:

1. https://www.tutorialspoint.com/managerialeconomic
2. https://lecturenotes.in/subject/566/managerial-economics-and-financial-anlysis-mefa

18A2102392--NETWORK ANALYSIS LABORATORY

Practical : 2 Hours **Internal :40**
Credits: : 1 **External :60**

Preamble:

The objective of the Network Analysis lab is to expose the students to the of electrical circuits and give them experimental skill. The purpose of lab experiment is to continue to build circuit construction skills using different circuit element. It also aims to introduce MATLAB a circuit simulation software tool. It enables the students to gain sufficient knowledge on the programming and simulation of Electrical circuits.

Course Outcomes: Upon the completion of Network Analysis practical course, the student will be able to attain the following:

- Familiarity with DC and AC circuit analysis techniques.
- Analyze complicated circuits using different network theorems.
- Acquire skills of using MATLAB software for electrical circuit studies.
- Acquire skills of two port network parameters (Z, Y, ABCD, h & g).
- Determine the self and mutual inductance of coupled coils.

S.No	List of Experiments
1	Verification of Kirchhoff's current law and voltage law using hard ware and digital simulation.
2	Verification of mesh analysis using hard ware and digital simulation.
3	Verification of nodal analysis using hard ware and digital simulation.
4	Verification of super position theorem using hard ware and digitalsimulation.
5	Verification of reciprocity theorem using hardware and digital simulation.
6	Verification of maximum power transfer theorem using hardware anddigital simulation.
7	Verification of Thevenin's theorem using hard ware and digital simulation.
8	Verification of Norton's theorem using hard ware and digital simulation.
9	Verification of compensation theorem using hard ware and digitalsimulation.
10	Verification of series resonance using hard ware and digital simulation.
11	Verification of parallel resonance using hard ware and digital simulation.
12	Verification of Two Port Network Parameters Z & Y Parameters using hard ware
13	Verification of Two Port Network Parameters ABCD & HYBRID Parameters using hard ware.
14	Verification of self inductance and mutual inductance by using hard ware.

18A2104392-BASIC SIMULATION LABORATORY

Practical : 2 Hours **Internal :40**
Credits: : 1 **External :60**

List of Experiments

- All the experiments are to be simulated using MATLAB or equivalent software.
- Minimum of 10 experiments are to be completed.

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic And Aperiodic), Such as Unit Impulse, Unit Step, Square, Saw Tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals And Sequences Such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy And Average Power.
4. Finding the Even and Odd Parts of Signal/ Sequence and Real and Imaginary Parts of Signal.
5. Convolution between Signals and Sequences.
6. Autocorrelation and Cross Correlation between Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of Unit Sample, Unit Step And Sinusoidal Responses Of The Given LTI System And Verifying Its Physical Realizability and Stability Properties.
9. Finding the Fourier Transform of a Given Signal and Plotting Its Magnitude and Phase Spectrum.
10. Waveform Synthesis Using Laplace Transforms.
11. Locating the Zeros and Poles And Plotting the Pole-Zero Maps in S Plane and Z-Plane For the given Transfer Function.
12. Sampling Theorem Verification.

18A2104491-ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Practical : 2 Hours **Internal :40**
Credits: : 1 **External :60**

LIST OF EXPERIMENTS

PART-I

1. Resistors: Colour Codes, Variable Resistors and LDR
2. Capacitors and their Colour codes
3. Coils and Inductors
4. Relays and switches
5. Breadboards
6. Diodes
7. Transistors BJT, UJT, FET
8. Silicon Controlled Rectifiers SCR
9. Soldering Guide
10. Multimeters, CRO
11. Function Generator, Regulated Power Supply

PART-II

1. PN Junction Diode Characteristics
   a. Silicon Diode Characteristics
   b. Germanium Diode Characteristics
2. Zener diode characteristics and
   Zener as Voltage Regulator
3. Rectifiers
   Half Wave Rectifier with and without filters
4. Rectifiers
   Full Wave Rectifier with and without filters
5. Transistor CE Characteristics
   a. Input Characteristics
   b. Output Characteristics
6. Transistor CB Characteristics
   a. Input Characteristics
   b. Output Characteristics
7. FET Characteristics
   a. Drain Characteristics
   b. Transfer characteristics
8. CRO Operation and its measurements
9. UJT Characteristics
10. UJT Relaxation Oscillator
11. SCR Characteristics
12. Transistor Biasing
13. LED Characteristics

B.TECH (ECE)
II-YEAR II-SEMESTER

18A2200202- PROBABILITY THEORY & STOCHASTIC PROCESS

Lecturer-Tutoral : 3 Hours **Internal :40**
Credirt: 3 **External :60**

Course Objectives:

Students will be able to:

1. To give students an introduction to elementary probability theory, in preparation for courses on statistical analysis, random variables and stochastic processes.
2. To mathematically model the random phenomena with the help of probability theory concepts.
3. To introduce the important concepts of random variables and stochastic processes.
4. To introduce the types of noise and modeling noise sources.

Course Outcomes:

At the end of the course, the students will develop ability to:

1. Understand the axiomatic formulation of modern Probability Theory, Characterize probability models and random variables, function of random variables and formulate fundamental probability distribution and density functions.
2. Explain the concepts of expectation and conditional expectation, Evaluate and apply moments & characteristic functions, transformation of a random variable.
3. Understand the joint distribution function, joint density function, concept of inequalities, and operations on two random variables and multiple random variables.
4. Understand the concept of random processes and determine covariance, Analyze continuous and discrete- time random processes, Explain the concepts of stationary and wide sense stationary process, autocorrelation, cross correlation functions.
5. Understand the concept of random processes, spectral density of stationary random processes and cross power density spectrum, apply the above knowledge to solve basic problems.
6. Apply the theory of stochastic processes to analyze linear systems with random inputs and the systems in the presence of different types of noise sources.

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2								
CO2	3	1	2	1								
CO3	3	2	3	1								
CO4	2	1	3	1								
CO5	2	1	-	2								
CO6	2	1	2	3								
Total	15	9	12	10								
Avg.	2.5	1.5	2	1.66								

Pre-Requisites for the Course:

Students are expected to have knowledge on the following topics:

S. No	Topic
1.	Calculus skills.
2.	Solution of ordinary differential equations.
3.	Fourier transform
4.	Linear Systems

Course Content (Syllabus):

UNIT I

THE RANDOM VARIABLE : Introduction, Review of Probability Theory, Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variables, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Conditional Density, Properties.

OPERATION ON ONE RANDOM VARIABLE – EXPECTATIONS : Introduction, Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Characteristic Function, Moment Generating Function.

UNIT II

MULTIPLE RANDOM VARIABLES: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence.

OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case.

UNIT III

RANDOM PROCESSES – TEMPORAL CHARACTERISTICS: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Concept of Stationary and Statistical Independence.First-Order Stationary Processes, Second-order and Wide-Sense Stationarity, N^{th}-order and Strict-Sense Stationarity.

Time Averages and Ergodicity, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

UNIT IV

RANDOM PROCESSES – SPECTRAL CHARACTERISTICS: The Power Density Spectrum: Properties, Relationship between Power Density Spectrum and Autocorrelation Function, Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Density Spectrum and Cross-Correlation Function.

Modeling of Noise Sources: Resistive (Thermal) Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Average Noise Figure, Average Noise Figure of cascaded networks.

Text Books:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, TMH, 4^{th} Edition, 2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis and S.Unnikrisha, PHI, 4^{th} Edition, 2002.

References:

1. Probability Theory and Stochastic Processes – B. Prabhakara Rao, BS Publications.
2. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, Pearson Education, 3^{rd} Edition.
3. Schaum's Outline of Probability, Random Variables, and Random Pocesses.
4. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook, 1968.
5. Random Process – Ludeman , John Wiley
6. Probability Theory and Random Processes, P. Ramesh Babu, McGrawHill, 2015.

18A2204301- ELECTRO MAGNETIC FIELD THEORY

Lecturer-Tutoral : 3 Hours **Internal :40**

Credirt: 3 **External :60**

Course Objectives:

Students will be able to:

1. To study the basic philosophy underlying the various number systems, negative number representation, binary arithmetic, binary codes and error detecting and correcting binary code.
2. To study the theory of Boolean algebra and to study representation of switching functions using Boolean expressions and their minimization techniques.
3. To study the combinational logic design of various logic and switching devices and their realization.
4. To study some of the programmable logic devices and their use in realization of switching functions.
5. To study the sequential logic circuits design both in synchronous and Asynchronous modes for various complex logic and switching devices, their minimization techniques and their realizations.
6. To implement synchronous state machines using flip flops.

Course Outcomes:

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

C224.1	Interpret and Apply the static electrostatic fields with respect to coordinate systems.
C224.2	Analyze and Demonstrate the static magnetic fields in real time applications.
C224.3	Formulate the Maxwell's Equations in different forms.
C224.4	Associate the fundamental theory of electromagnetic waves in free space and their practical applications.
C224.5	Evaluate and Relate wave propagation characteristics in different conducting media.
C224.6	Demonstrate the reflection and Refraction of EM waves in normal and oblique incidences

CO-PO Mapping:

Course Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
C224.1	**3**		**2**									
C224.2		**3**										
C224.3			**3**									**3**
C224.4	**3**				**2**							
C224.5		**3**										
C224.6		**2**										
AVG	**3**	**2.67**	**2.5**		**2**							**3**

Pre-Requisites for The Course:

Students are expected to have knowledge on the following topics:

S. No	
1.	Engineering Mathematics
2.	Engineering Physics

Course Content (syllabus):

UNIT I

Electrostatics : Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Illustrative Problems.

Fields in Materials :Convection, Conduction and Displacement Current Densities, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations..Illustrative Problems.

UNIT II

Magneto Statics : Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials. Illustrative Problems**.**

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer emf, Inconsistency of Ampere's Law, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface: Dielectric-Dielectric and Dielectric-Conductor Interfaces. Illustrative Problems.

UNIT III

EM Wave Characteristics - I: Characterization of conductor and dielectric media**,** Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H,

EM Wave Characteristics - I:

Sinusoidal Variations, Wave Propagation Characteristics in dielectric and conductor media, Wave Propagation Characteristics in good dielectric and good conductor media, skin depth..Illustrative Problems.

UNIT IV

EM Wave Characteristics – II: Polarization & Types, Brewster Angle, Critical Angle ,Total Internal Reflection, Surface Impedance. Poynting Vector and Poynting Theorem – Applications Illustrative Problems.

EM Wave Characteristics – II: Reflections and Refractions of uniform plane waves by a perfect dielectric at normal & Oblique incidence, Reflections and Refractions of uniform plane waves by a perfect conductor at normal & Oblique incidence.

Text Books:

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.
3. Transmission Lines and Networks–Umesh Sinha,Satya Prakashan (Tech. India Publications), New Delhi, 2001.

Reference Books:

1. Electromagnetics- J***.D. Kraus***, "***Electromagnetics***", 4th Edition, Mc Graw-Hill. Inc, 1992.
2. Engineering Electromagnetics:Nathan Ida, Springer(India)Pvt.Ltd., New Delhi, 2nd ed., 2005.
3. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
4. Electromagnetic Field Theory and Transmission Lines: G Sasi Bhushana Rao,Wiley India 2013.

18A2204302-CONTROL SYSTEMS

Lecturer-Tutoral : 3 Hours **Internal :40**
Credirt: 3 **External :60**

Course objectives:

Students will be able to:

1. To learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function
2. To study the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers
3. To study the stability of closed loop systems using Routh's stability criterion and the analysis by root locus method.
4. To present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.
5. To learn basic aspects of design of linear control systems using Bode plots.
6. To study state models & analyze the systems and to present the concepts of Controllability & Observability

Course Outcomes:

At the end of the course, the students will develop ability to:

1.	Understand Closed/Open Loop Control Systems, derive the transfer function of physical systems and determine overall transfer function using block diagram algebra & signal flow graph reduction techniques
2.	Study different types of standard test signals, find the output response of first and second order systems, determine time response specifications of second order systems and determine steady state error along with error constants
3.	Acquire the skill to analyze absolute and relative stability of LTI systems using Routh-Hurwitz stability criterion and the Root Locus Plot
4.	Analyze the stability of LTI systems using frequency response methods using Bode plots & Polar Plots.
5.	Analyze the stability of LTI systems using frequency response methods using Nyquist Plots
6.	Represent physical systems by State Transition Matrices based state space modeling and determine the output response by understanding the concepts of controllability and observability

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	2	-	-	-	-	-	-	-	-
CO5	3	2	2	2	-	-	-	-	-	-	-	-
CO6	2	-	-	3	-	-	-	-	-	-	-	-

Total	16	13	2	7	-	-	-	-	-	-	-	-
Avg.	2.67	2.6	2	2.33	-	-	-	-	-	-	-	-

Pre-Requisites for the Course: Students are expected to have knowledge on the following topics:

S. No	Topic
1	Laplace Transforms, Matrix Algebra & Differential Equations **[Mathematics]**
2	Kirchoff's Laws, Mesh & Nodal Analysis **[Electrical Circuit Analysis]**
3	DC & AC Motor working principles **[Electrical Machines]**

Course Content (Syllabus):

UNIT I
Introduction to Control Systems Components: Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer function.Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering -Block diagram algebra – Representation by Signal flow graph - Reduction is using Mason's gain formula.
UNIT II
Time Response Analysis: Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, Introduction to P, PI, PD and PID controllers.
UNIT III
Stability Analysis in S-Domain: The concept of stability – Routh's stability , limitations ,Routh-Hurwitz criterion – qualitative stability and conditional stability. **Root Locus Technique:** The root locus concept - construction of root loci –effects of adding poles and zeros to G(s) H(s) on the root loci.
UNIT IV
Frequency Response Analysis: Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram- Phase margin and Gain margin-Stability Analysis from Bode Plots. Polar Plots- Nyquist Plots- Stability Analysis. **State Space Analysis of Continuous Systems:**Concept of state, state variables and state model, derivation of state models from physical systems (Electrical), solving the Time invariant state Equations- State Transition Matrix and its Properties – Concepts of Controllability and Observability.
TEXT BOOKS:
1. Control Systems principles and design, M.Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India, 2nd Edition.
REFERENCE BOOKS:
1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India. 2. Control Systems, Manik Dhanesh N, Cengage publications. 3. Control Systems Engineering, I.J. Nagarath and M. Gopal, New Age International Publications, 5th Edition. Control Systems Engineering, S.Palani, Tata McGraw Hill Publications.
E-RESOURCES:

1. http://nptel.ac.in/courses.php 2. http://jntuk-coeerd.in/ 3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/

18A2204401-ANALOG AND PULSE CIRCUITS

Lecturer-Tutoral : 3 Hours **Internal :40**

Credirt: 3 **External :60**

Course Objectives:

Students will be able to:

1.To demonstrate BJT amplifier using h parameters
2. To explain feedback amplifiers and oscillators
1. To know the classification of the power amplifiers and their analysis
2. To study and design the concepts of linear and non linear wave shaping circuits
3. To analyze different types of Multi vibrators and their design procedures
4. To understand the basic principles of Sampling gates

Course Outcomes:

At the end of the course, the students will develop ability to:

1. To explain BJT amplifier using h parameter model
2. To analyze and design electronic subsystems such as feedback amplifiers and oscillators
3. To analyze power amplifiers such as Class A and Class B and compare their performance
4. To design linear and non linear wave shaping circuits with different inputs
1. To deign and analyze various multi vibrators using transistors
2. To remember and analyze unidirectional and bidirectional sampling gates

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3											
CO2	2	3			2							
CO3			3		2							
CO4	3		3									
CO5	3		3									
CO6			3									
Total	11	3	12	---	4	---	---	---	---	---	---	---
Avg.	2.75	3	3	0	2	0	0	0	0	0	0	0

Pre-Requisites for the Course:

Students are expected to have knowledge on the following topics:

S. No	Topic
1	Engineering Mathematics
2	Network Analysis
3	Electronic devices and circuits

Course Content (Syllabus):

UNIT I

AMPLIFIERS: Classification of amplifiers, Two port network, Determination of h parameters, Transistor hybrid model, Generalized analysis of transistor amplifier in CB, CE and CC configurations using h-parameters, Comparison of transistor amplifiers.

FEEDBACK AMPLIFIERS:

Feedback principle and concept, types of feedback, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Illustrative Problems

UNIT II

OSCILLATORS: Oscillator principle, condition for oscillations, RC-phase shift and Wein bridge oscillators and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators, Illustrative Problems

POWER AMPLIFIERS: Overview of power amplifiers, Class A power Amplifiers and their analysis, Class B Push-pull amplifiers and their analysis, Illustrative Problems

UNIT III

LINEAR WAVE SHAPING: High pass, Low pass RC circuits, their response expressions for sinusoidal, step, pulse, square, ramp and exponential inputs (Qualitative Treatment Only)

NON LINEAR WAVE SHAPING:

Diode clippers, Transistor clippers, clipping at two independent levels, Emitter coupled clipper; Clamping operation, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage (Qualitative Treatment Only)

UNIT IV

MULTIVIBRATORS:Bistable Multi Vibrator – Analysis and Design of Fixed Bias Bistable Multi Vibrator, Schmitt trigger, **Monostable Multi Vibrator –** Analysis and Design of Collector Coupled Monostable Multi Vibrator, **Astable Multi Vibrator –** Analysis and Design of Collector Coupled Astable Multi vibrator (Qualitative Treatment Only)

SAMPLING GATES: Basic operating principles of sampling gates, unidirectional sampling gate, unidirectional sampling gates to accommodate more than one input signal, bidirectional sampling gates using transistors, reduction of pedestal in a gate circuit, bidirectional sampling gates, four diode sampling gate, six diode sampling gates, applications of sampling gates

TEXT BOOKS

- Electronic Devices and Circuits- Salivahanan, N.Suressh Kumar, A. Vallavaraj, TATA McGraw Hill, Second Edition. **(UNITS I, II)**
- Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005 **(UNIT III,IV)**
- Integrated Electronics- J. Millman and C.C. Halkias, Tata Mc Graw-Hill, 1972

REFERENCES

- Electronic Circuit Analysis and Design – Donald A. Neaman, Mc Graw Hill.
- Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition.
- Electronic Circuit Analysis – A.P.Godse, Technical Publications
- Pulse and Digital Circuits – B.Yoganarsimhan

- Pulse & Digital Circuits by Venkata Rao,K,Ramasudha K, Manmadha Rao,G., Pearson,2010
- Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill, 1991

18A2204402-ANALOG COMMUNICATIONS

Lecturer-Tutoral : 3 Hours **Internal :40**
Credirt: 3 **External :60**

Course objectives:
Students will be able to:

1. The fundamentals of basic communication system Need of modulation, modulation processes and different amplitude modulation schemes.
2. Different angle modulation schemes with generation and detection methods.
3. Understand types of Noises & Generation and detection of pulse modulation techniques and multiplexing
4. Remember various radio receivers with their parameters.

Course outcomes:
At the end of the course, the students will develop ability to:

1. Understand different blocks in communication system & Design of various modulation and demodulation techniques.
2. Analyze generation and detection of FM signal & comparison between amplitude and angle modulation schemes.
3. Understand the types of noise affecting communication system and noise parameters. & Design generation & detection of Pulse Modulation techniques.
4. Identify different types of transmitters and receivers circuits and role of AGC

CO-PO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO1	3	2			1							2
CO2	3	2			1							2
CO3	3	2			1							2
CO4	3	2										2
Total	12	8			3							8
Avg.	3	2			0.75							2

Pre-requisites for the course:
Students are expected to have knowledge on the following topics:

S. No	Topic
1	Signals & Systems

Course Content (Syllabus):

UNIT I

AMPLITUDE MODULATION : Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, Detection of AM Waves

DSB & SSB MODULATION: Generation of DSBSC Waves, Coherent detection of DSB-SC Modulated waves, COSTAS Loop. Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves.

UNIT II

VESTIGIAL SIDE BAND MODULATION: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques.

ANGLE MODULATION: Basic concepts, Frequency Modulation,Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM.

UNIT III

NOISE: Noise in Analog communication System, Noise in DSB & SSB System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.

PULSE MODULATION: Time Division Multiplexing, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, TDM Vs FDM.

UNIT IV

TRANSMITTERS & RECEIVERS:

Radio Transmitter – Classification of Transmitter, AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter.

Radio Receiver -Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

TEXT BOOKS:

1. Principles of Communication Systems - Simon Haykin, John Wiley,2nd Ed.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.

REFERENCES:

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 2007 3rd Edition.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.

3. Communication Systems– R.P. Singh, SP Sapre, Second Edition TMH, 2007.
4. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.

OOPS THROUGH JAVA (OPEN ELECTIVE)

Lecturer-Tutoral : 3 Hours **Internal :40**
Credirt: 3 **External :60**

Course Objectives:

Students will be able to:

1. To **introduce** the object oriented programming concepts.
2. To **understand** object oriented programming concepts, and apply them in solving Problems.
3. To **introduce** the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes
4. To **introduce** the implementation of packages and interfaces
5. To **introduce** the concepts of exception handling and multithreading.
6. To **introduce** the design of Graphical User Interface using applets.

Course Outcomes:

At the end of the course, the students will develop ability to:

1. Able to **solve** real world problems using OOP techniques.
2. Able to **understand** the use of abstract classes and Packages in java.
3. Able to **develop** and **understand** exception handling and Interfaces in java
4. Able to understand multithreaded applications with synchronization and **design** GUI based applications and **develop** applets for web applications

Courses Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C125.1	3	3	-	-	-	-	-	-	-	-	-	3
C125.2	3	3	3	-	-	-	-	-	-	-	-	3
C125.3	3	3	3	2	-	-	-	-	2	-	-	3
C125.4	3	3	3	2	-	-	-	-	2	-	-	3
Total	12	12	9	4	-	-	-	-	4	-	-	12
Average	3	3	2	0.67	-	-	-	-	0.67	-	-	3

Pre-Requisites for the Course:

Students are expected to have knowledge on the following topics:

S. No	Topic
1	Basic Knowledge on computer usage
2	Basic knowledge on C

Course Content (syllabus):

UNIT I

Introduction to OOP, Procedural Programming Language and Object Oriented Language, Principles of OOP, Applications of OOP, History of Java, Java features, Java Virtual Machine (JVM), Java Program Structure, Variables, Primitive data types, Identifiers, Literals – Examples, Operators, expressions – Examples, Precedence Rules and Associativity, Primitive Type Conversion and Casting, Flow of Control, Classes and objects, Class Declaration, Creating Objects, Methods, Method Overloading

UNIT II

Constructors – Examples, Constructor Overloading, Garbage collector, Importance of static overriding, keyword and examples, this keyword – Examples, Arrays, command line arguments, Nested Classes., Inheritance, types of inheritance, Forms of Inheritance, super keyword, final keyword, Polymorphism an its and implementation, Method Creating the packages, using packages, importance of CLASSPATH, Access Protection, importing packages.

UNIT III

Interfaces, implementing interfaces, Nested Interfaces, Variables in interfaces, Multiple inheritance of interfaces, Differences between abstract class & interfaces, Exception handling, importance of try, catch, throw, throws and finally block, user-defined exceptions, Assertions.

UNIT IV

Multithreading: Introduction, differences, Thread life cycle, Creation of threads, Thread priorities, Thread Synchronization, Communication between Threads. Reading data from files and writing data to files, Files & random access file, Applet class, Applet structure, Applet life cycle, sample Applet programs,

Text Books:

1. The Complete Reference Java, 8th edition, Herbert Schildt, TMH.
2. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.

Reference Books:

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, Universities Press.
4. Programming in Java, S. Malhotra, S. Chudhary, 2nd edition, Oxford Univ. Press.
5. Java Programming and Object oriented Application Development, R. A. Johnson, Cengage Learning.

E-Resources:

1. http://www.javatpoint.com/

2. java.sun.com/docs/books/tutorial/java/TOC.html
3. http://www.learnjavaonline.org/
4. http://www.tutorialspoint.com/java/

18A2200801-PROFESSIONAL ETHICS AND HUMAN VALUES

(Common to all branches)

Lecture – Tutorial:	0-2	**CIA:**	40
Credits:	0	**SEA:**	60

Prerequisites:

Course Objectives:

- To create awareness on engineering ethics and human values.
- To understand social responsibility of an engineer.
- To instill moral and social values and loyalty.

Course Outcomes:

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

CO1	Grooms themselves as ethical, responsible and societal beings.
CO2	Discuss ethics in society and apply the ethical issues related to engineering.
CO3	Exhibit the understanding of ethical theories in professional environment.
CO4	Recognize their role as social experimenters (engineers) and comprehend codes of ethics.
CO5	Identify the risks likely to come across in the professional world, analyzing them and find solutions.
CO6	Realize the responsibilities and rights of engineers in the society.

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2- Medium, 3 – High)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO 1						1	1	2				1
CO 2						1	1	2				1
CO 3						1	1	2				1
CO 4						1	1	2				1
CO 5						1	1	2				1
CO 6						1	1	2				1

UNIT I

Human Values: Objectives, Morals, Values, Ethics, Integrity,

Work ethics, Service learning , Virtues, Respect for others, Living peacefully, Caring, Sharing, Honesty, Courage, Valuing time,Cooperation, Commitment, Empathy, Self-confidence, Challenges in the work place.

UNIT II

Engineering ethics

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles – Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

UNIT III

Engineering as Social Experimentation: Engineering as experimentation, Engineers as responsible experimenters, Codes of ethics, Industrial standards, A balanced outlook on law, Case study: The challenger.

UNIT IV

Safety, Responsibilities and Rights: Safety and risk, types of risks, Assessment of safety and risk, Safe exit, Risk-benefit analysis, safety lessons from 'the challenger' , Case study: Power plants, Collegiality and loyalty, Collective bargaining, Confidentiality, Conflict of interests, Occupational crime, whistle blowing, Intellectual property rights, professional rights.

Text Books:

- A Text book on Professional Ethics and Human Values by R.S Naagarazan- New Age International Publishers.
- " Engineering Ethics includes Human Values" by M. Govindarajan, S. Natarajan and V. S. Senthil Kumar- PHI Learning Pvt. Ltd-2009

Reference Books:

"Professional Ethics and Human Values" by A. Alavudeen, R. Kalil Rahman and M. Jayakumaran- Laxmi Publications.

E-Resources:

- www.onlineethics.org
- www.nspe.org
- www.globalethics.org
- www.ethics.org

18A2204491-ANALOG COMMUNICATIONS LABORATORY

Practical : 2 Hours **Internal :40**
Credits: : 1 **External :60**

LIST OF EXPERIMENTS

All the Following Experiments must be conducted

1. Amplitude Modulation & Demodulation
2. Diode detector characteristics
3. DSB SC - Modulation & Demodulation.
4. Frequency Modulation & Demodulation
5. Pre-emphasis & De-emphasis
6. AGC Circuits characteristics
7. Verification of Sampling Theorem
8. Pulse Amplitude Modulation & Demodulation.
9. PWM, PPM Modulation & Demodulation
10. Radio receiver characteristics

Equipment required:

1. RPS - (0 – 30) V
2. CRO - (0 – 20) M Hz.
3. Function Generators - (0 – 1) M Hz
4. Trainer kits

18A2204492-ANALOG AND PULSE CIRCUITS LABORATORY

Practical : 2 Hours **Internal :40**
Credits: : 1 **External :60**

Note: The students are required to design the circuit and verify the result using necessary hardware equipment

All the following Experiments should be conducted in laboratory

List of Experiments :

1. CE Amplifier
2. Current Shunt Feedback Amplifier
3. RC Phase Shift Oscillator
4. Colpitt's Oscillator
5. Class A Series fed Power Amplifier
6. Linear Waveshaping Circuits
7. Non Linear Waveshaping Circuits – Clippers
8. Non Linear Waveshaping Circuits – Clampers
9. Monostable Multivibrator
10. Astable Multivibrator

Equipment required for Laboratory:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Decade Inductance Boxes
8. Active & Passive Electronic Components

Content beyond syllabus:

Multisim/ Equivalent Industrial Standard Licensed simulation software tool

18A2204493- DIGITAL ELECTRONICS & LOGIC DESIGN LABORATORY

Practical : 2 Hours **Internal :40**
Credits: : 1 **External :60**

LIST OF EXPERIMENTS

All the following Experiments should be conducted in laboratory

1. Verification of basic logic gates
2. Verification of universal logic gates
3. Design & verify the circuit for given canonical expression.
4. Design & verify 4X1 Multiplexer.
5. Design & verify 1X4 De-Multiplexer.
6. Construct half adder & Full adder using half adder & verify truth tables.
7. Construct half subtractor & Full subtractor using half subtractor & verify truth tables.
8. Verify the truth tables of various Flip – Flops.
9. Design & verification of Decade counter.
10. Design & verification of 4 – bit ring counter using D Flip – flop.