JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION TECHNOLOGY

COURSE STRUCTURE AND SYLLABUS

For UG – R20

B. TECH - ELECTRONICS AND COMMUNICATION TECHNOLOGY

(Applicable for batches admitted from 2020-2021)

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA

KAKINADA - 533 003, Andhra Pradesh, India

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION TECHNOLOGY

II Year – I Semester

S. No.	Course	Category	L	T	P	Credits
1	Mathematics-III	BS	3	0	0	3
2	Electronic Devices and Circuits	PC	3	0	0	3
3	Signals and Systems	PC	3	0	0	3
4	Random Variables and Stochastic Process	PC	3	0	0	3
5	Switching Theory and Logic Design	PC	3	0	0	3
6	Electronic Devices and Circuits Lab	PC Lab	0	0	3	1.5
7	Switching Theory and Logic Design Lab	PC Lab	0	0	3	1.5
8	Signals and Systems Lab	PC Lab	0	0	3	1.5
9	MATLAB Programming	SOC	1	0	2	2
10	Constitution of India	MC	2	0	0	0
	Total Credits					**21.5**

II Year – II Semester

S. No.	Course	Category	L	T	P	Credits
1	Computer Architecture and Organization	ES	3	0	0	3
2	Electronic Circuit Analysis	PC	3	0	0	3
3	Analog Communications	PC	3	0	0	3
4	Electromagnetic Waves and Transmission Lines	PC	3	0	0	3
5	Managerial Economics and Financial Analysis	HS	3	0	0	3
6	Electronic Circuit Analysis Lab	PC Lab	0	0	3	1.5
7	Analog Communications Lab	PC Lab	0	0	3	1.5
8	Computer Architecture and Organization Lab	ES Lab	0	0	3	1.5
9	PYTHON Programming	SOC	1	0	2	2
	Total Credits					**21.5**

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II Year - I Semester		L	T	P	C
		3	0	0	3
MATHEMATICS –III					

Course Objectives:

1. To familiarize the techniques in partial differential equations
2. To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

Unit – I: Vector calculus:
Vector Differentiation: Gradient – Directional derivative – Divergence – Curl – Scalar Potential
Vector Integration: Line integral – Work done – Area – Surface and volume integrals – Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof).

Unit –II: Laplace Transforms:
Laplace transforms of standard functions – Shifting theorems – Transforms of derivatives and integrals – Unit step function – Dirac's delta function – Inverse Laplace transforms – Convolution theorem (with out proof).
Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

Unit –III: Fourier series and Fourier Transforms:
Fourier series: Introduction – Periodic functions – Fourier series of periodic function – Dirichlet's conditions – Even and odd functions – Change of interval – Half-range sine and cosine series.
Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals – Sine and cosine transforms – Properties – inverse transforms – Finite Fourier transforms.

Unit –IV: PDE of first order:
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT V: Second order PDE and Applications:
Second order PDE: Solutions of linear partial differential equations with constant coefficients– RHS term of the type e^{ax+by}, $Sin\ (ax+by)$, $cos(ax+by)$, x^m , y^n Applications of PDE: Method of separation of Variables – Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.

Text Books:
1. **B. S. Grewal,** Higher Engineering Mathematics, 43rd Edition, KhannaPublishers.
2. **B. V. Ramana,** Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

Reference Books:
1. **Erwin Kreyszig,**Advanced Engineering Mathematics, 10th Edition,Wiley-India.
2. **Dean. G. Duffy,**Advanced Engineering Mathematics with MATLAB, 3rd Edition, CRC Press.
3. **Peter O' Neil,** Advanced Engineering Mathematics,Cengage.
4. **Srimantha Pal, S C Bhunia,** Engineering Mathematics, Oxford UniversityPress.

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Course Outcomes: At the end of the course, the student will be able to

1. Interpret the physical meaning of different operators such as gradient, curl and divergence.
2. Estimate the work done against a field, circulation and flux using vector calculus.
3. Apply the Laplace transform for solving differential equations.
4. Find or compute the Fourier series of periodic signals.
5. Know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms. And Identify solution methods for partial differential equations that model physical processes.

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II Year - I Semester		L	T	P	C
		3	0	0	3
ELECTRONIC DEVICES AND CIRCUITS					

Course Objectives:
The main objectives of this course are

1. To learn and understand the basic concepts of semiconductor physics.
2. Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes.
3. To learn and understand the application of diodes as rectifiers with their operation and characteristics with and without filters are discussed.
4. Acquire knowledge about the principle of working and operation of Bipolar Junction Transistor and Field Effect Transistor and their characteristics.
5. To learn and understand the purpose of transistor biasing and its significance.
6. Small signal equivalent circuit analysis of BJT and FET transistor amplifiers and compare different configurations.

UNIT-I: Review of Semi Conductor Physics: Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors
Junction Diode Characteristics : energy band diagram of PN junction Diode, Open circuited p- n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance.

UNIT-II: Special Semiconductor Devices: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, Varactor Diode, Photodiode, Tunnel Diode, UJT, PN-PN Diode, SCR. Construction, operation and V-I characteristics.
Rectifiers and Filters: Basic Rectifier setup**,** half wave rectifier, full wave rectifier, bridge rectifier,derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter(Series inductor), Capacitor filter(Stunt inductor), π-Filter,comparison of various filter circuits in terms of ripple factors.

UNIT- III: Transistor Characteristics:
BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor asan amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.
FET: FET types, construction, operation, characteristicsμ, g_m, $r_d$parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT- IV: Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis,BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in V_{BE}, I_c, and β, Stability factors, (S, S', S''), Bias compensation, Thermal runaway, Thermalstability.
FET Biasing- methods and stabilization.

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UNIT- V: Small Signal Low Frequency Transistor Amplifier Models:
BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters,generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.
FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FETamplifiers.

Text Books:
1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, SecondEdition,2007
2. Electronic Devices and Circuits-K. Lal Kishore, BS Publications, FourthEdition,2016.
3. Electronics devices & circuit theory- Robert L.Boylestad andLouiNashelsky, Pearson/Prentice hall, tenth edition,2009

References:
1. Integrated Electronics-J. Millman, C. Halkias,Tata Mc-Graw Hill, SecondEdition,2009
2. Electronic Devices and Integrated Circuits – B.P. Singh,Rekha , Pearson publications,
3. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, 4^{th}Edition,2008.

Course Outcomes:
At the end of this course the student will be able to
1. Apply the basic concepts of semiconductor physics.
2. Understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation.
3. Know the construction, working principle of rectifiers with and without filters with relevant expressions and necessary comparisons.
4. Understand the construction, principle of operation of transistors, BJT and FET with their V-I characteristics in different configurations.
5. Know the need of transistor biasing, various biasing techniques for BJT and FET and stabilization concepts with necessary expressions.And perform the analysis of small signal low frequency transistor amplifier circuits using BJT and FET in different configurations.

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II Year - I Semester		L	T	P	C
		3	0	0	3
SIGNALS and SYSTEMS					

Course Objectives:
The main objectives of this course are given below:

1. To study about signals and systems.
2. To analyze the spectral characteristics of signal using Fourier series and Fourier transforms.
3. To understand the characteristics of systems.
4. To introduce the concept of sampling process
5. To know various transform techniques to analyze the signals and systems.

UNIT- I: INTRODUCTION: Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions. Related Problems.

UNIT –II: FOURIER SERIES AND FOURIER TRANSFORM:
Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. 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. Introduction to Hilbert Transform.RelatedProblems.

UNIT-III: ANALYSIS OF LINEAR SYSTEMS: Introduction**,** Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system, Related problems. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT –IV:
CORRELATION: Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.
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, Introduction to Band Pass sampling, Related problems.

UNIT –V:

LAPLACE TRANSFORMS: Introduction**,** Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Inverse Laplace transform, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using wave form synthesis.

Z–TRANSFORMS: Concept of Z- Transform of a discrete sequence. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms. Distinction between Laplace, Fourier and Z transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications,2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI,2nd Edn,1997
3. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2ndEdition,2007

REFERENCE BOOKS:

1. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press,2015
2. Signals and Systems – T K Rawat , Oxford University press,2011

Course Outcomes: At the end of this course the student will able to:

1. Differentiate the various classifications of signals and systems.
2. Analyze the frequency domain representation of signals using Fourier concepts.
3. Classify the systems based on their properties and determine the response of LTI Systems.
4. Know the sampling process and various types of sampling techniques.
5. Apply Laplace and z-transforms to analyze signals and Systems (continuous &discrete).

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II Year - I Semester		L	T	P	C
		3	0	0	3
SIGNALS and SYSTEMS					

Course Objectives:
The main objectives of this course are given below:

6. To study about signals and systems.
7. To analyze the spectral characteristics of signal using Fourier series and Fourier transforms.
8. To understand the characteristics of systems.
9. To introduce the concept of sampling process
10. To know various transform techniques to analyze the signals and systems.

UNIT- I: INTRODUCTION: Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude-shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems. Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function. Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, closed or complete set of orthogonal functions, Orthogonality in complex functions. Related Problems.

UNIT –II: FOURIER SERIES AND FOURIER TRANSFORM:
Fourier series representation of continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. 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. Introduction to Hilbert Transform.RelatedProblems.

UNIT-III: ANALYSIS OF LINEAR SYSTEMS: Introduction**,** Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Transfer function of a LTI system, Related problems. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

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UNIT –IV:

CORRELATION: Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

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, Introduction to Band Pass sampling, Related problems.

UNIT –V:

LAPLACE TRANSFORMS: Introduction**,** Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Inverse Laplace transform, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using wave form synthesis.

Z–TRANSFORMS: Concept of Z- Transform of a discrete sequence. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms. Distinction between Laplace, Fourier and Z transforms.

TEXT BOOKS:

1. Signals, Systems & Communications - B.P. Lathi, BS Publications,2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI,2nd Edn,1997
3. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2ndEdition,2007

REFERENCE BOOKS:

1. Principles of Linear Systems and Signals – BP Lathi, Oxford University Press,2015
2. Signals and Systems – T K Rawat , Oxford University press,2011

Course Outcomes: At the end of this course the student will able to:

1. Differentiate the various classifications of signals and systems.
2. Analyze the frequency domain representation of signals using Fourier concepts.
3. Classify the systems based on their properties and determine the response of LTI Systems.
4. Know the sampling process and various types of sampling techniques.
5. Apply Laplace and z-transforms to analyze signals and Systems (continuous &discrete).

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II Year - I Semester		**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
RANDOM VARIABLES and STOCHASTIC PROCESSES					

Course Objectives:

1. To give students an introduction to elementary probability theory, in preparation
2. To learn the concepts of statistical analysis, random variables and stochastic processes.
3. To mathematically model the random phenomena with the help of probability theory Concepts.
4. To introduce the important concepts of random variables and stochastic processes.
5. To analyze the LTI systems with stationary random process as input.

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.

UNIT II

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, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable: Monotonic Transformations for a Continuous Random Variable, Non-monotonic Transformations of Continuous Random Variable.

UNIT III

MULTIPLE RANDOM VARIABLES: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem: Unequal Distribution, Equal Distributions.
OPERATIONS ON MULTIPLE RANDOM VARIABLES: Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variables case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV

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 Stationary, 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.

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UNIT V

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

LINEAR SYSTEMS WITH RANDOM INPUTS: Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, Autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross- Power Density Spectra of Input and Output, Band pass, Band-Limited and Narrowband Processes,Properties.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles,TMH, 4th Edition,2001.
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulisand S.Unnikrisha, PHI, 4th Edition,2002.
3. Probability and Random Processes with Applications to Signal Processing, HenryStark and John W. Woods, Pearson Education, 3rdEdition,2001.

REFERANCE BOOKS:

1. Schaum's Outline of Probability, Random Variables, and Random Processes,1997.
2. An Introduction to Random Signals and Communication Theory, B.P. Lathi, International Textbook,1968.
3. Probability Theory and Random Processes, P. Ramesh Babu, McGrawHill,2015.

Course Outcomes:

After completion of the course, the student will be able to

1. Mathematically model the random phenomena and solve simple probabilistic problems.
2. Identify different types of random variables and compute statistical averages of these random variables.
3. Characterize the random processes in the time and frequency domains.
4. Analyze random processes with temporal characteristics
5. Analyze the LTI systems with random inputs.

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II Year - I Semester		L	T	P	C
		3	0	0	3
SWITCHING THEORY AND LOGIC DESIGN					

Course Objectives:

1. To solve a typical number base conversion and analyze new error coding techniques.
2. Theorems and functions of Boolean algebra and behavior of logic gates.
3. To optimize logic gates for digital circuits using various techniques.
4. Boolean function simplification using Karnaugh maps and Quine-McCluskey methods.
5. To understand concepts of combinational circuits.
6. To develop advanced sequential circuits.

UNIT – I

REVIEW OF NUMBER SYSTEMS & CODES:

Representation of numbers of different radix, conversation from one radix to another radix, r -1's compliments and r's compliments of signed members.Gray code ,4 bit codes; BCD, Excess-3, 2421, 84-2-1 code etc. Error detection & correction codes: parity checking, even parity, odd parity, Hamming code.

BOOLEAN THEOREMS AND LOGIC OPERATIONS:

Boolean theorems, principle of complementation & duality, De-morgan theorems.Logic operations ; Basic logic operations -NOT, OR, AND, Universal Logic operations, EX-OR, EX- NOR operations.Standard SOP and POS Forms, NAND-NAND and NOR-NOR realizations, Realization of three level logic circuits. Study the pin diagram and obtain truth table for the following relevant ICs 7400,7402,7404,7408,7432,7486.

UNIT – II

MINIMIZATION TECHNIQUES:

Minimization and realization of switching functions usingBoolean theorems, K-Map (up to 6 variables)and tabular method(Quine-mccluskey method) with only four variables and single function.

COMBINATIONAL LOGIC CIRCUITS DESIGN:

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders; 4-bit adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit and carry look-a-head adder circuit, Design code converts using Karnaugh method and draw the complete circuit diagrams.

UNIT – III

COMBINATIONAL LOGIC CIRCUITS DESIGN USING MSI &LSI :

Design of encoder ,decoder, multiplexer and de-multiplexers, Implementation of higher order circuits using lower order circuits . Realization of Boolean functions using decoders and multiplexers.Design of Priority encoder, 4-bit digital comparator and seven segment decoder. . Study the relevant ICs pin diagrams and their functions 7442,7447,7485,74154. **INTRODUCTION OF PLD's :**

PLDs:PROM, PAL, PLA -Basics structures, realization of Boolean functions, Programming table.

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UNIT – IV
SEQUENTIAL CIRCUITS I:
Classification of sequential circuits (synchronous and asynchronous) , operation of NAND & NOR Latches and flip-flops; truth tables and excitation tables of RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals. Conversion from one flip-flop to another flip- flop. Design of 5ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift, register.
Study the following relevant ICs and their relevant functions 7474,7475,7476,7490,7493,74121.

UNIT – V
SEQUENTIAL CIRCUITS II :
Finite state machine; state diagrams, state tables, reduction of state tables. Analysis of clocked sequential circuits Mealy to Moore conversion and vice-versa.Realization of sequence generator, Design of Clocked Sequential Circuit to detect the given sequence (with overlapping or withoutoverlapping).

TEXT BOOKS:

1. Switching and finite automata theory Zvi.KOHAVI,Niraj.K.Jha 3rdEdition,Cambridge UniversityPress,2009.
2. Digital Design by M.MorrisMano,Michael D Ciletti,4th edition PHIpublication,2008.
3. Switching theory and logic design by Hill and Peterson**,**Mc-Graw Hill TMH edition, 2012.

REFERENCES:

1. Fundamentals of Logic Design by Charles H. Roth Jr, JaicoPublishers,2006
2. Digital electronics by R S Sedha.S.Chand & companylimited,2010
3. Switching Theory and Logic Design by A. Anand Kumar,PHI Learning pvtltd,2016.
4. Digital logic applications and design by John M Yarbough, Cengage learning,2006.
5. TTL 74-Series databook.

Course Outcomes: the student will able to

1. Classify different number systems and apply to generate various codes.
2. Use the concept of Boolean algebra in minimization of switching functions.
3. Design different types of combinational logic circuits.
4. Apply knowledge of flip-flops in designing of Registers and counters.
5. The operation and design methodology for synchronous sequential circuits and algorithmic state machines and Produce innovative designs by modifying the traditional design techniques.

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II Year - I Semester		L	T	P	C
		0	0	3	1.5
ELECTRONIC DEVICES AND CIRCUITS LAB					

Note: The students are required to perform the experiment to obtain the V-I characteristics and to determine the relevant parameters from the obtained graphs.

Electronic Workshop Practice:

1. Identification, Specifications, Testing of R, L, C Components (ColourCodes), Potentiometers, Coils, Gang Condensers, Relays, Breadboards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs,LEDs, LCDs, SCR,UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. P-N Junction DiodeCharacteristics

Part A: Germanium Diode (Forward bias& Reverse bias) Part B: Silicon Diode (Forward Bias only)

2. Zener DiodeCharacteristics

Part A: V-ICharacteristics Part B: Zener Diode as Voltage Regulator

3. Rectifiers (without and withc-filter)

Part A: Half-waveRectifier Part B: Full-wave Rectifier

4. BJT Characteristics(CEConfiguration)

Part A: InputCharacteristics Part B: Output Characteristics

5. FET Characteristics(CSConfiguration)

Part A: DrainCharacteristics Part B: Transfer Characteristics

6. SCRCharacteristics
7. UJTCharacteristics
8. TransistorBiasing
9. CRO Operation and itsMeasurements
10. BJT-CEAmplifier
11. Emitter Follower-CCAmplifier
12. FET-CSAmplifier

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Equipment required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. DigitalMulti-meters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION TECHNOLOGY

II Year - I Semester		**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**
SWITCHING THEORY and LOGIC DESIGN LAB					

Course Objectives:

i. To Verify the truth tables of logic gates
ii. To Design and verify the operation of combinational circuits.
iii. To Design and verify the operation of sequential circuits
iv. To Verify the operation of Johnson/ring counter and different types shift register
v. To Verify the operation of RAM and ALU

The students are required to design and draw the internal structure of the following Digital Integrated Circuits and to it is required to verify the logic with necessary hardware.

List of Experiments:

1. Realization of Logic Gates
2. 3 to 8 Decoder- 74138
3. 8*1 Multiplexer-74151 and 2*1 De-multiplexer-74155
4. 4-Bit Comparator-7485.
5. D Flip-Flop- 7474
6. Decade Counter- 7490
7. 4 Bit Counter-7493
8. Shift Register-7495
9. Universal shift register-74194/195
10. Ram (16*4)-74189 (read and write operations)
11. ALU

Equipments Required:

1. Power supply
2. Integrated Circuits
3. Trainer Kits

Course Outcomes:

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

i. Distinguish logic gates for design of digital circuits
ii. Design different types of Combinational logic circuits
iii. Analyze the operation of flip-flops
iv. Apply knowledge of flip-flops in designing of Registers and Counters
v. Analyze the operation of RAM and ALU

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II Year - I Semester		**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**
SIGNALS AND SYSTEMS LAB					

List of Experiments: (Minimum of Ten Experiments has to be performed)

1. Familiarization with MATLAB
   Matrix Operations & Plotting using MATLAB
   Relational Operators, Loops & Functions using MATLAB
2. To explore the commutation of even and odd symmetries in a signal with algebraic operations.
3. To explore the effect of transformation of signal parameters (amplitude-scaling, time-scaling and time-shifting).
4. To identify a given system as linear or non-linear.
5. To explore the time variance and time invariance property of a given system.
6. To explore causality and non-causality property of a system.
7. Generation of Signals & Signal Operations Synthesis of signals using Fourier Series
8. Convolution on Continuous Time Signals
9. To demonstrate the convolution and correlation of two discrete-time signals.
10. To demonstrate the sampling in frequency domain (Discrete Fourier Transform).
11. To demonstrate the time domain sampling of band limited signals (Nyquist theorem).
12. Study of Laplace Transforms using MATLAB
13. Study of Z Transforms using MATLAB

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II Year - I Semester		**L**	**T**	**P**	**C**
		1	**0**	**2**	**2**
Skill oriented course*-MATLAB Programming					

Introduction to MATLAB

1. Warm-up
2. Arithmetic Operations
3. Complex numbers
4. Array indexing
5. Allocating memory
6. Special characters and functions
7. Control flow
8. Plotting
9. Programming in MATLAB (M-files)
10. MATLAB sound
11. Loading and saving data
12. Programming and Problem solving

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION TECHNOLOGY

II Year-I Semester		**L**	**T**	**P**	**C**
		2	**0**	**0**	**0**
CONSTITUTION OF INDIA					

Course Objectives:

1. To enable the student to understand the importance of constitution.
2. To understand the structure of executive, legislature and judiciary.
3. To understand philosophy of fundamental rights and duties.
4. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
5. To understand the central and state relation financial and administrative.

UNIT-I

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning outcomes:

After completion of this unit student will

- Understand the concept of Indianconstitution
- Apply the knowledge on directive principle of statepolicy
- Analyze the History, features of Indianconstitution
- Evaluate Preamble Fundamental Rights andDuties

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, RajyaSabha, The Supreme Court and High Court: Powers andFunctions;

Learning outcomes:-After completion of this unit student will

- Understand the structure of Indiangovernment
- Differentiate between the state and centralgovernment
- Explain the role of President and PrimeMinister
- Know the Structure of supreme court and Highcourt

UNIT-III

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions

Learning outcomes:-After completion of this unit student will

- Understand the structure of stategovernment
- Analyze the role Governor and ChiefMinister
- Explain the role of stateSecretariat
- Differentiate between structure and functions of statesecretariat

UNIT-IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: ZilaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

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Learning outcomes:-After completion of this unit student will
- Understand the localAdministration
- Compare and contrast district administration role andimportance
- Analyze the role of Myer and elected representatives ofMunicipalities
- Evaluate Zillapanchayat block levelorganisation

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

Learning outcomes:-After completion of this unit student will
- Know the role of Election Commission applyknowledge
- Contrast and compare the role of Chief Election commissioner andCommissiononerate
- Analyze role of state electioncommission
- Evaluate various commissions of viz SC/ST/OBC andwomen

References:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi.
2. SubashKashyap, Indian Constitution, National BookTrust..
3. J.A. Siwach, Dynamics of Indian Government &Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication).
6. J.C. Johari, Indian Government andPoliticsHans.
7. J. Raj IndianGovernment andPolitics.
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. NewDelhi.
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press2012.

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Resources:
1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

Course Outcomes:
At the end of the semester/course, the student will be able to have a clear knowledge on the following:
1. Understand historical background of the constitution making and its importance for building a democratic India.
2. Understand the functioning of three wings of the government ie.,executive, legislative and judiciary.
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.
4. Analyze the decentralization of power between central, state and local self-government.
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
6. Know the sources, features and principles of Indian Constitution.
7. Learn about Union Government, State government and its administration.
8. Get acquainted with Local administration and PachayatiRaj.
9. Be aware of basic concepts and developments of Human Rights.
10. Gain knowledge on roles and functioning of Election Commission

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION TECHNOLOGY

II Year-II Semester		**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
COMPUTER ARCHITECTURE and ORGANIZATION					

Course objectives:

1. To understand the architecture of modern computer with its various processing units.
2. Also the Performance measurement of the computer system.
3. To understand the memory management system of computer.
4. To understand the various instructions, addressing modes.
5. To Understand the concept of I/O organization

UNIT -I:
Basic Structure Of Computers: Functional unit, Basic Operational concepts, Bus structures, System Software, Performance, The history of computer development.
Machine Instruction and Programs:
Instruction and Instruction Sequencing: Register Transfer Notation, Assembly Language Notation, Basic Instruction Types,

UNIT -II:
Addressing Modes, Basic Input/output Operations, The role of Stacks and Queues in computer programming equation. Component of Instructions: Logic Instructions, shift and Rotate Instructions
Type of Instructions: Arithmetic and Logic Instructions, Branch Instructions, Addressing Modes, Input/output Operations

UNIT -III:
INPUT/OUTPUT ORGANIZATION: Accessing I/O Devices, Interrupts: Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Direct Memory Access,
Buses: Synchronous Bus, Asynchronous Bus, Interface Circuits, Standard I/O Interface: Peripheral Component Interconnect (PCI) Bus, Universal Serial Bus (USB)

UNIT -IV:
The MEMORY SYSTEMS: Basic memory circuits, Memory System Consideration, Read- Only Memory: ROM, PROM, EPROM, EEPROM, Flash Memory, Cache Memories: Mapping Functions, INTERLEAVING
Secondary Storage: Magnetic Hard Disks, Optical Disks,

UNIT -V:
Processing Unit: Fundamental Concepts: Register Transfers, Performing an Arithmetic Or Logic Operation, Fetching A Word From Memory, Execution of Complete Instruction, Hardwired Control,
Micro programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

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TEXTBOOKS:

1. Computer Organization, Carl Hamacher, ZvonksVranesic, SafeaZaky, 5thEdition, McGrawHill,2011.
2. Computer Architecture and Organization, John P. Hayes ,3rdEdition, McGrawHill,2002.

REFERENCE BOOKS:

1. Computer Organization and Architecture – William Stallings SixthEdition,Pearson/PHI
2. Structured Computer Organization – Andrew S. Tanenbaum, 4th EditionPHI/Pearson, 2012.
3. Fundamentals or Computer Organization and Design, - SivaraamaDandamudiSpringer Int.Edition,2003.
4. "Computer Organization and Design: The Hardware/Software Interface" by DavidA. Patterson and John L.Hennessy, 1998.
5. J .P. Hayes, "Computer Architecture and Organization",McGraw-Hill,1998.

Course Outcomes:

1. Students can understand the architecture of modern computer.
2. They can analyze the Performance of a computer using performance equation.
3. Understanding of different instruction types.
4. Students can calculate the effective address of an operand by addressing modes.
5. They can understand how computer stores positive and negative numbers.
6. Understand the concepts of I/O Organization and Memory systems.

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION TECHNOLOGY

II Year-II Semester		L	T	P	C
		3	0	0	3
ELECTRONIC CIRCUIT ANALYSIS					

Course Objectives:
The main objectives of this course are:
1. To learn hybrid-pi parameters at high frequency and compare with low frequency parameters.
2. Learn and understand the purpose of cascading of single stage amplifiers and derive the overall voltage gain.
3. Analyze the effect of negative feedback on amplifier characteristics and derive the characteristics.
4. Learn and understand the basic principle of oscillator circuits and perform the analysis of different oscillator circuits.
5. Compare and analyze different Power amplifiers like Class A, Class B, Class C, Class AB and other types of amplifiers and Analyze different types of tuned amplifier circuits.

UNIT-I Small Signal High Frequency Transistor Amplifier models:
BJT: Transistor at high frequencies, Hybrid- π common emitter transistor model, Hybrid π conductance, Hybrid π capacitances, validity of hybrid π model, determination of high- frequency parameters in terms of low-frequency parameters , CE short circuit current gain, current gain with resistive load, cut-off frequencies, frequency response and gain bandwidth product.
FET: Analysis of common Source and common drain Amplifier circuits at high frequencies.

UNIT-II
Multistage Amplifiers: Classification of amplifiers, methods of coupling**,** **c**ascaded transistor amplifier and its analysis, analysis of two stage RC coupled amplifier, high input resistance transistor amplifier circuits and their analysis-Darlington pair amplifier, Cascode amplifier, Boot-strap emitter follower, Differential amplifier using BJT.

UNIT -III
Feedback Amplifiers : Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers, Generalized analysis of feedback amplifiers, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers.

Unit-IV
Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wien bridge oscillators with BJT and FET and their analysis, Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators using BJT, Frequency and amplitude stability of oscillators.

UNIT-V
Power Amplifiers: Classification of amplifiers(A to H), Class A power Amplifiers, Class B Push-pull amplifiers, Complementary symmetry push pull amplifier, Class AB power amplifier, Class-C power amplifier, Thermal stability and Heatsinks.
Tuned Amplifiers: Introduction, Q-Factor, small signal tuned amplifier, capacitance single tuned amplifier, double tuned amplifiers, , staggered tunedamplifiers

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION TECHNOLOGY

Text Books:

1. Integrated Electronics- J. Millman and C.C. Halkias, Tata McGraw-Hill,1972.
2. Electronic Devices and Circuits Theory – Robert L. Boylestad and LouisNashelsky, Pearson/Prentice Hall, Tenth Edition,2009.
3. Electronic Devices and Integrated Circuits – B.P. Singh,Rekha , Pearson publications, 2006

References:

1. Electronic Circuit Analysis and Design – Donald A. Neaman, McGrawHill,2010.
2. Microelectronic Circuits-Sedra A.S. and K.C. Smith, Oxford University Press,Sixth Edition,2011.
3. Electronic Circuit Analysis-B.V.Rao, K.R.Rajeswari, P.C.R.Pantulu,K.B.R.Murthy, Pearson Publications.

Course Outcomes:

At the end of this course the student can able to

1. Design and analysis of small signal high frequency transistor amplifier using BJT and FET.
2. Design and analysis of multi stage amplifiers using BJT and FET and Differential amplifier using BJT.
3. Design and analyse feedback amplifiers
4. Design different RC and LC oscillator circuitss with an understanding of their amplitude and frequency stability
5. Know the classification of the power and tuned amplifiers and their analysis with performance comparison.

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II Year-II Semester		L	T	P	C
		3	0	0	3
ANALOG COMMUNICATIONS					

Course Objectives:

Students undergoing this course are expected to

1. Familiarize with the fundamentals of analog communications viz., need for modulation, generation and detection of AM Waves, power and BW Calculations.
2. Familiarize with various supressed carrier modulation techniques, their generation and detection methods, power and BW Calculations.
3. Study the concepts of angle modulation, generation and detection of FM & PM Waves, BW and power calculations
4. Develop the ability to classify and understand various functional blocks of radio transmitters and receivers.
5. Distinguish the figure of merits of various analog modulation methods, study different pulse modulation schemes.

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, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

UNIT II

DSB & SSB MODULATION: Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop. Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, 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, Applications of different AM Systems, FDM.

UNIT III

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

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UNIT IV

TRANSMITTERS & RECEIVERS: Radio Transmitter - Classification of Transmitter, AM Transmitter, Effect of feedback on performance of 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, Super hetro dyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting. Communication Receivers, extensions of super heterodyne principle and additional circuits.

UNIT V

NOISE: Review of noise and noise sources, noise figure**,** Noise in Analog communication Systems, Noise in DSB& SSB System, Noise in AM System, Noise in Angle Modulation Systems, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis
PULSE MODULATION: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, Time Division Multiplexing, TDM Vs FDM

TEXT BOOKS:

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe,TMH, 3rd Edition,2007.
2. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Edition,2007.
3. Modern Digital and Analog Communication Systems –B.P.Lathi,Zhi Ding,Hari Mohan Gupta,Oxford University Press,4th Edition,2017

REFERENCES:

1. Electronics & Communication System – George Kennedy and Bernard Davis,TMH 2004.
2. Communication Systems– R.P. Singh, SP Sapre, Second Edition TMH,2007.
3. Electronic Communication systems – Tomasi, Pearson, fourth Edition,2007.

Course Outcomes:

After undergoing the course, students will be able to

1. Calculate BW and Power requirements of Full carrier AM waves
2. Analyse and Differentiate different supressed carrier AM Waves
3. Generate and detect Angle modulated waves with their Power and BW measurements
4. Analyze various functional blocks of radio transmitters and receivers
5. Analyze noise characteristics of various analog modulation methods & Design simple analog systems for various modulationtechniques.

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II Year-II Semester		L	T	P	C
		3	0	0	3

ELECTROMAGNETIC WAVES and TRANSMISSION LINES

Course objectives:
The main objectives of this course are to understand

1. Fundamentals of steady electric and magnetic fields using various laws
2. Apply the concept of static and time varying Maxwell equations and power flow using pointing theorem
3. Wave characteristics in different media for normal and oblique incidence
4. Implement various concepts of transmission lines and impedance measurements

SYLLABUS:
Prerequisites: Understanding of Cartesian co-ordinates, spherical & cylindrical systems

UNIT I:
Review of Co-ordinate Systems, **Electrostatics:**, Coulomb's Law, Electric Field Intensity, Electric Flux Density,Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density,Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial Capacitors, Illustrative Problems.

UNIT II:
Magneto Statics : Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density,Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to MagneticFields, Ampere's Force Law, Inductances and Magnetic Energy. IllustrativeProblems**.**
Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere'sLaw and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements.Conditions at a Boundary Surface.Illustrative Problems.

UNIT III:
EM Wave Characteristics : Wave Equations for Conducting and Perfect Dielectric Media, UniformPlane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossydielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types,Illustrative Problems.
Reflection and Refraction of Plane Waves – Normal and ObliqueIncidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total InternalReflection, Surface Impedance. Poynting Vector and Poynting Theorem.Illustrative Problems.

UNIT IV:
Transmission Lines - I : Types, Parameters, T&π Equivalent Circuits, Transmission Line Equations,Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and GroupVelocities, Infinite Line, Lossless lines, distortion less lines, Illustrative Problems.

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UNIT V:

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; ImpedanceTransformations,λ/8,λ/4 andλ /2 Lines –. Smith Chart – Construction and Applications, Quarter wave transformer,Single Stub Matching, Illustrative Problems.

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.

REFERENCE BOOKS:

1. Electromagnetic Field Theory and Transmission Lines –GSN Raju, Pearson Education2006
2. Engineering Electromagnetic – William H. Hayt Jr. and John A. Buck, TMH, 7th ed.,2006.
3. Electromagnetic Field Theory and Transmission Lines: G SasiBhushana Rao,WileyIndia 2013.
4. Networks,LinesandFieldsJohn D. Ryder,Second Edition, PearsonEducation,2015.

Course Outcomes:

At the end of this course the student can able to

1. Determine E and H using various laws and applications of electric & magnetic fields
2. Apply the Maxwell equations to analyze the time varying behaviour of EMwaves
3. Gain the knowledge in uniform plane wave concept and characteristics of uniformplane wave invariousmedia
4. Calculate Brewster angle, critical angle and total internal reflection
5. Derive andCalculate the expressions for input impedance of transmission lines, reflection coefficient, VSWR etc. using smith chart

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II Year - II Semester		L	T	P	C
		3	0	0	3
MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS					

Course Objectives:

1. The Learning objectives of this paper are to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting..
2. To familiarize about the Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
3. To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
4. To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation.
5. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

Unit-I

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

Unit – II:

Theories of Production and Cost Analyses:

Theories of Production function- Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost –Volume- Profit analysis-Determination of Breakeven point(problems)-Managerial significance and limitations of Breakeven point.

Unit – III:

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles : Meaning and Features– PhasesofaBusinessCycle.FeaturesandEvaluationofSoleTrader,Partnership,JointStockCompany – State/Public Enterprises and their forms.

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Unit – IV:
Introduction to Accounting & Financing Analysis:
Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis (Problems)

Unit – V:
Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

TEXT BOOKS:
1. A R Aryasri, Managerial Economics and Financial Analysis, The McGraw – Hill companies.

REFERENCES:
1. Varshney R.L, K.L Maheswari, Managerial Economics, S. Chand & CompanyLtd,
2. JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New editionedition
3. N.P Srinivasn and M. SakthivelMurugan, Accounting for Management, S. Chand & CompanyLtd,
4. MaheswariS.N,AnIntroduction to Accountancy, Vikas Publishing House PvtLtd

Course Outcomes:
1. The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for aproduct.
2. The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination ofinputs.
3. The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different BusinessUnits.
4. The Learner is able to prepare Financial Statements and the usage of various Accounting tools forAnalysis.
5. The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decisionmaking.

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II Year-II Semester		L	T	P	C
		0	0	3	1.5
ELECTRONIC CIRCUIT ANALYSIS LAB					

Note: The students are required to design the circuit and perform the simulation using Multisim/ Equivalent Industrial Standard Licensed simulation software tool**.** Further they are required to verify the result using necessary hardware equipment.

List of Experiments :(Minimum of Ten Experiments has to be performed)

1. Determination of f_T of a given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley/ Colpitt's Oscillator
6. Two Stage RC Coupled Amplifier
7. Darlington Pair Amplifier
8. Bootstrapped Emitter Follower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A Power Amplifier
11. Class B Push-Pull Power Amplifier
12. Complementary Symmetry Class B Push-Pull Power Amplifier
13. Single Tuned Voltage Amplifier
14. Double Tuned Voltage Amplifier

Equipment required:

Software:

i. Multisim/ Equivalent Industrial Standard Licensed simulation software tool.
ii. Computer Systems with required specifications

Hardware Required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY KAKINADA
KAKINADA – 533 003, Andhra Pradesh, India

DEPARTMENT OF ELECTRONICS AND COMMUNICATION TECHNOLOGY

II Year-II Semester		L	T	P	C
		0	0	3	1.5
ANALOG COMMUNICATIONS LAB					

List of Experiments:

(Twelve experiments to be done- **The students have to calculate the relevant parameters**)– (a. Hardware, b.MATLAB Simulink,c. MATLAB Communication toolbox)

A. Amplitude Modulation - Modulation &Demodulation
B. AM - DSB SC - Modulation &Demodulation
C. Spectrum Analysis of Modulated signal using Spectrum Analyzer
D. Diode Detector
E. Pre-emphasis & De-emphasis
F. Frequency Modulation – Modulation & Demodulation
G. AGC Circuits
H. Verification of Sampling Theorem
I. Pulse Amplitude Modulation & Demodulation
J. PWM, PPM –Modulation & Demodulation
K. PLL IC-565 as FM demodulator
L. Radio receiver characteristics
M. Radio Receiver/TV Receiver Demo kits or Trainees.

Note: All the above experiments are to be executed/completed using hardware boards and also to be simulated on Mat lab.

Equipment& Software required: Software :

i) Computer Systems withlatestspecifications
ii) Connected inLAN(Optional)
iii) Operating system(Windows/Linuxsoftware)
iv) Simulations software (Simulink&MATLAB)

Equipment:

1. RPS - 0 – 30V
2. CRO - 0 – 20 M Hz.
3. FunctionGenerators - 0 – 1 MHz
4. Components andBreadboards
5. Multimeters and othermeters
6. SpectrumAnalyzer

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II Year-II Semester		L	T	P	C
		0	0	3	1.5
COMPUTER ARCHITECTURE AND ORGANIZATION LAB					

List of Experiments: (Minimum of Twelve Experiments has to be performed)

1. Design a simple combinational circuit with four variables and obtain minimal SOP Expression and verify the truth table using Digital Trainer Kit.
2. Four variable logic function verification using 8 to 1multiplexer by Digital Trainer Kit.
3. Design full adder circuit and verify its functional table by Digital Trainer Kit.
4. Design a four bit ring counter using D Flip – Flops / JK Flip Flop and verify output by Digital Trainer Kit.
5. Design a four bit Johnson's counter using D Flip-Flops / JK Flip Flops and verify output by Digital Trainer Kit.
6. Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it by Digital Trainer Kit.
7. Design BCD Adder Circuit and Test the Same using Relevant IC by Digital Trainer Kit.
8. Design Excess-3 to BCD convertor and test it by Digital Trainer Kit.
9. To study ALU (74181).
10. Perform hexadecimal addition and multiplication, test it by using Digital Trainer Kit.
11. Perform binary multiplication and verify using Digital Trainer Kit
12. Verify Hamming code generation, detection and correction by Digital Trainer Kit.
13. Design Booth's multiplier and verify using Digital Trainer Kit.

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II Year-II Semester		L	T	P	C
		1	0	2	2
Skill oriented course*-PYTHON Programming					

Course Objectives:

The aim of Python Programming Lab is

1. To acquire programming skills in core Python.
2. To acquire Object Oriented Skills in Python
3. To develop the skill of designing Graphical user Interfaces in Python
4. To develop the ability to write database applications in Python

List of Experiments:

1. Write a program that asks the user for a weight in kilograms and converts it to pounds. There are 2.2 pounds in a kilogram.
2. Write a program that asks the user to enter three numbers (use three separate input statements). Create variables called total and average that hold the sum and average of the three numbers and print out the values of total and average.
3. Write a program that uses a *for* loop to print the numbers 8, 11, 14, 17, 20, . . . , 83, 86, 89.
4. Write a program that asks the user for their name and how many times to print it. The program should print out the user's name the specified number of times.
5. Use a *for* loop to print a triangle like the one below. Allow the user to specify how high the triangle should be.

   *
   **
   ***
   ****
6. Generate a random number between 1 and 10. Ask the user to guess the number and print a message based on whether they get it right or not.
7. Write a program that asks the user for two numbers and prints *Close* if the numbers are within .001 of each other and Not close otherwise.
8. Write a program that asks the user to enter a word and prints out whether that word contains any vowels.
9. Write a program that asks the user to enter two strings of the same length. The program should then check to see if the strings are of the same length. If they are not, the program should print an appropriate message and exit. If they are of the same length, the program should alternate the characters of the two strings. For example, if the user enters *abcde* and *ABCDE* the program should print out *AaBbCcDdEe*

Course Outcomes:

By the end of this lab, the student is able to

1. Write, Test and Debug Python Programs
2. Use Conditionals and Loops for Python Programs
3. Use functions and represent Compound data using Lists, Tuples and Dictionaries
4. Use various applications using python