VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD
B.TECH. II YEAR
ELECTRONICS AND COMMUNICATION ENGINEERING

III SEMESTER **R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22BS1MT204	Fourier and Complex Analysis	2	1	0	3	3
22PC1EC201	Electronic Circuit Analysis	3	0	0	3	3
22PC1EC202	Switching Theory and Logic Design	3	0	0	3	3
22PC1EC203	Signals and Systems	2	1	0	3	3
22PC1EC204	Probability Theory and Stochastic Processes	3	0	0	3	3
22PC2EC201	Electronic Circuit Analysis Laboratory	0	0	2	2	1
22PC2EC202	Logic Design Laboratory	0	0	2	2	1
22PC2EC203	Signals and Systems Simulation Laboratory	0	0	2	2	1
22PW4EC201	Design Thinking	1	0	2	3	2
22MN6HS103	Happiness and Wellbeing	2	0	0	2	0
Total		**16**	**2**	**8**	**26**	**20**

IV SEMESTER **R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22PC1EC205	Analog Circuits	3	1	0	4	4
22PC1EC206	Analog and Digital Communications	3	0	0	3	3
22PC1EC207	Electromagnetic Fields and Transmission Lines	3	0	0	3	3
22PC1EE205	Control Systems	3	0	0	3	3
22PC1EC208	Computer Organization and Design	3	0	0	3	3
22PC2EC205	Analog Circuits Laboratory	0	0	2	2	1
22PC2EC206	Analog and Digital Communications Laboratory	0	0	2	2	1
22SD5DS203	Python Programming and Practice	0	0	2	2	1
22SD5EC202	Field Project	0	0	2	2	1
22MN6HS201	Intellectual Property Rights	2	0	0	2	0
Total		**17**	**1**	**8**	**26**	**20**

L – Lecture T – Tutorial P – Practical D – Drawing CH – Contact Hours/Week
C – Credits SE – Sessional Examination CA – Class Assessment ELA – Experiential Learning Assessment
SEE – Semester End Examination D-D – Day to Day Evaluation LR – Lab Record
CP – Course Project PE – Practical Examination

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22BS1MT204) FOURIER AND COMPLEX ANALYSIS (FCA)

TEACHING SCHEME		
L	T/P	C
2	1	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Ordinary Differential Equations and Vector Calculus

COURSE OBJECTIVES:

- To learn the calculation of Fourier coefficients and Fourier transform of a function
- To lean analytic functions and their properties
- To learn concept of complex integration
- To learn classifications of Singular points and residues
- To learn the notion of conformal mapping

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Solve the problems using Fourier series and Fourier Transforms

CO-2: Apply Cauchy-Riemann equations to study analyticity of functions

CO-3: Evaluate contour integrals using Cauchy's integral theorems

CO-4: Evaluate contour integrals using residue theorem

CO-5: Analyze the image of the given curve under the given transformation

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	1	1	-	1	1	-	-	-	-	1	3	1	-
CO-2	3	2	1	-	-	1	1	-	-	-	-	1	2	1	-
CO-3	3	2	1	-	-	1	1	-	-	-	-	1	2	1	-
CO-4	3	2	1	-	-	1	1	-	-	-	-	1	2	1	-
CO-5	3	2	1	-	-	1	1	-	-	-	-	1	2	1	-

UNIT-I:

Fourier Series and Fourier Transforms: Euler's formulae, Fourier Series of periodic functions, Fourier series of even and odd functions, having arbitrary periods, half range Fourier series.

Fourier integral representation of a function, Fourier sine and cosine integral, Complex Fourier transform, Sine and Cosine transforms and their properties(without proofs), Finite Fourier Transform.

UNIT II:

Functions of Complex Variables: Functions of a complex variable, Continuity, Differentiability, Analyticity, Singular point, Cauchy-Riemann equations in Cartesian and polar coordinates (without proofs), Harmonic and conjugate harmonic functions, Milne – Thompson method. Analyticity of Exponential, trigonometric, hyperbolic functions and their properties.

UNIT-III:

Integration of Complex Function, Power Series: Line integral, evaluation along a path and by indefinite integration. Cauchy's integral theorem (without proof). Expansion of Taylor's series and Laurent series (without proofs).

UNIT-IV:

Residues and Real Integrals: Classifications of singular points: Isolated singular point, removable, pole of order m, essential singularity. Residues – Evaluation of residue by formulae, Residue theorem (without proofs), Evaluation of real integrals.

UNIT-V:

Conformal Mapping: Definition of Conformal mapping, transformation of e^z, log(z), z^2, Sin z, cos z, Basic Transformations-Translation, rotation, inversion. Bilinear transformation - fixed point, cross ratio, properties, determination of bilinear transformation mapping three given points to three assigned points.

TEXT BOOKS:

1. Higher Engineering Mathematics, B. S. Grewal, 36th Edition, Khanna Publishers, 2010
2. Higher Engineering Mathematics, B. V. Ramana, 11th Reprint, Tata McGraw-Hill, 2010
3. Complex Variables & Its Applications, Churchill and Brown, McGraw-Hill, 1996

REFERENCES:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley
2. Advanced Engineering Mathematics, Peter 'O' Neil, Cengage Learning

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1EC201) ELECTRONIC CIRCUIT ANALYSIS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Applied Physics

COURSE OBJECTIVES:

- To analyze low frequency BJT amplifiers
- To study the principle of multistage amplifiers and analysis of transistors at high frequency
- To know the concepts of negative feedback in amplifiers
- To understand the fundamentals and analyze oscillators
- To learn the basics of FET and MOSFET amplifiers

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Design single stage amplifiers using BJT

CO-2: Design multistage amplifiers and understand the concepts of high frequency analysis of BJT

CO-3: Apply the negative feedback to improve the stability of amplifiers

CO-4: Utilize the concept of positive feedback to generate sustained oscillations

CO-5: Design single stage FET and MOSFET amplifiers

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	3	2	2	-	-	-	-	-	-	1	2	-	2
CO-2	3	3	3	2	2	-	-	-	-	-	-	1	2	-	2
CO-3	3	3	3	2	2	-	-	-	-	-	-	1	2	-	2
CO-4	3	3	3	2	2	-	-	-	-	-	-	1	2	-	2
CO-5	3	3	3	2	2	-	-	-	-	-	-	1	3	-	3

UNIT-I:

Small Signal Low Frequency BJT Amplifiers: Transistor Hybrid model, Typical values of h- parameters in CE, CB and CC configurations, Analysis of CE, CC,CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

UNIT-II:

Multistage Amplifiers: Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascade RC Coupled amplifiers, Cascode amplifier, Darlington pair.

Transistor at High Frequency: Hybrid-π Common Emitter transistor model, CE short circuit gain, CE current gain with resistive load, Single stage CE transistor amplifier response at high frequencies.

UNIT-III:

Feedback Amplifiers: Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics –Voltage series (Transistor analysis), Voltage shunt, Current series and Current shunt Feedback configurations.

UNIT-IV:

Oscillators: Condition for Oscillations, RC type Oscillators-RC phase shift Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.

UNIT-V:

FET Amplifiers: Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOSFET Amplifiers, MOS Small signal model, Common source amplifier with resistive, Diode connected and Current source loads, Source follower, Common Gate Stage, Cascode and Folded Cascode Amplifier – frequency response.

TEXT BOOKS:

1. Integrated Electronics, Jacob Millman, Christos C Halkias, McGraw-Hill Education, 2009
2. Electronic Devices and Circuits Theory, Robert L. Boylestead, Louis Nashelsky, 11th Edition, Pearson, 2009

REFERENCES:

1. Electronic Devices and Circuits, David A. Bell, 5th Edition, Oxford, 2008
2. Electronic Circuit Analysis, S. Salivahanan, N. Suresh Kumar, 4th Edition, Tata McGraw-Hill, 2017
3. Microelectronic Circuits-Theory and Applications, Adel S. Sedra, Kenneth C. Smith, 7th Edition, Oxford, 2017

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1EC202) SWITCHING THEORY AND LOGIC DESIGN

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE OBJECTIVES:

- To analyze and explore number conversions for building digital circuits
- To explore logic functions for building digital logic circuits
- To explore the combinational logic circuits and PLD's
- To implement and examine the operation of sequential circuits
- To analysis of counters, registers and clocked sequential circuits

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Understand the knowledge on logic families and number systems
CO-2: Apply the concepts of Boolean algebra to minimize the digital systems
CO-3: Design combinational circuits for various digital applications
CO-4: Analyse and design sequential circuits for digital applications
CO-5: Acquire the knowledge on FSM to implement the digital systems

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	3	2	2	-	-	-	-	-	-	1	2	-	2
CO-2	3	3	3	2	2	-	-	-	-	-	-	1	2	-	2
CO-3	3	3	3	2	2	-	-	-	-	-	-	1	2	-	2
CO-4	3	3	3	2	2	-	-	-	-	-	-	1	2	-	2
CO-5	3	3	3	2	2	-	-	-	-	-	-	1	3	-	3

UNIT-I:

Digital Logic Families: Characteristics of logic families, TTL NAND gate, CMOS logic: Inverter, NAND, NOR gates, Tristate logic, Tristate TTL inverter.

Numbers Systems and Codes: Review of number systems, number base conversion, binary arithmetic, binary weighted and non-weighted codes, Complements, signed binary numbers, Fixed-point representation, Floating -Point Representation, Gray code and its applications.

UNIT-II:

Boolean Algebra and Gate Level Minimization: Binary Logic, Postulates and theorems, representation of switching functions, SOP and POS forms –Canonical forms, digital logic gates, Karnaugh Maps –minimization using two variable, three variable, four and

five variable K-Maps, Don't Care Conditions, NAND and NOR implementation, Exclusive-OR function, introduction to Tabulation method.

UNIT-III:

Design of Combinational Circuits: Combinational Circuits - Analysis and Design Procedure, Binary adders, Binary subtractors, Adder/Subtractor, carry look ahead adder, magnitude comparator, Decoders, Encoders, 4 to 2 priority encoders, Multiplexers, Implementation of Boolean functions using Multiplexers, Demultiplexers, Code Converters, Binary multiplier, BCD adder.

PLD's: Programmable Read Only Memory, Programmable Logic Array, Programmable Array Logic.

UNIT-IV:

Sequential Circuits-1: Combinational Vs Sequential Circuits, Latches, Flip Flops-RS flip flop, D flip flop, JK flip flop, T flip flop, Triggering of Flip-Flops, Master-Slave Flip flop, Flip Flops excitation functions, Conversion of one flip flop to another flip flop, Design of Synchronous counters, Asynchronous counters.

UNIT-V:

Sequential Circuits-2: Registers, Universal shift register, Synchronous Vs Asynchronous sequential circuits, Analysis of clocked sequential circuits, State Table, State Diagram, State Reduction and State Assignment, Sequence detector, Finite State Machine, Mealy and Moore Machines.

TEXT BOOKS:

1. Digital Design, M. Morris Mano, 3rd Edition, Pearson Education/PHI, 2003
2. Modern Digital Electronics, R. P. Jain, 5th Edition, McGraw-Hill Education, 2022
3. Logic Design Theory, Nripendra N. Biswas, Prentice Hall of India, 2001

REFERENCES:

1. Fundamentals of Logic Design, Roth, 5th Edition, Thomson, 2004
2. Switching and Finite Automata Theory, ZviKohavi, 2nd Edition, Tata McGraw-Hill, 1995
3. Switching and Logic Design, C. V. S. Rao, Pearson Education, 2005
4. Digital Principles and Design. Donald D. Givone, Tata McGraw-Hill, 2002

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1EC203) SIGNALS AND SYSTEMS

TEACHING SCHEME		
L	T/P	C
2	1	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Ordinary Differential Equations and Vector Calculus

COURSE OBJECTIVES:

- To understand various fundamental characteristics of signals and systems
- To study the importance of transform domain
- To analyze and design various systems
- To study the operations of convolution, correlation and the effects of sampling
- To understand Laplace and Z-transforms properties for the analysis of signals and systems

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Classify signals and systems based on their characteristics

CO-2: Apply various transform techniques to analyze continuous time and discrete time signals

CO-3: Identify the conditions for transmission of signals through systems and conditions for physical realization of systems

CO-4: Apply convolution and correlation functions for various applications

CO-5: Analyze the sampling process and effects of various sampling rates

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO-2	3	3	-	2	-	-	-	-	-	-	-	-	3	-	-
CO-3	3	2	-		-	-	-	-	-	-	-	-	3	-	-
CO-4	3	3	-	2	-	-	-	-	-	-	-	-	2	-	-
CO-5	3	3	-	2	-	-	-	-	-	-	-	-	2	-	-

UNIT-I:

Representation of Signals: Continuous time and Discrete Time signals, Classification of Signals – Periodic and aperiodic, even and odd, energy and power signals, deterministic and random signals, causal and non-causal signals, complex exponential and sinusoidal signals. Concepts of standard signals. Various operations on Signals.

Signal Analysis: Analogy between vectors and signals, orthogonal signal space, Signal approximation using orthogonal functions, Closed or complete set of orthogonal functions.

UNIT-II:

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

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Inverse Fourier Transform, Introduction to Hilbert Transform.

UNIT-III:

Laplace Transforms: Laplace Transforms (L.T), Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of ROC, Properties of L.T, Inverse Laplace Transform.

Systems: Classification of Continuous time and discrete time Systems, impulse response, Transfer function, Response of a linear system, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution.

UNIT-IV:

Signal Transmission through Linear Systems: Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization.

Correlation: Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Energy Density Spectrum, Parsevals Theorem, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Relation between Convolution and Correlation, Detection of Periodic Signals in the presence of Noise by Correlation, Extraction of Signal from Noise by Filtering.

UNIT-V:

Sampling Theorem: Impulse Sampling- Graphical and analytical proof for sampling of Band Limited Signals, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Natural and Flat top Sampling, Discrete time processing of continuous time signals, Introduction to Band Pass Sampling.

Z–Transforms: Concepts of Z- Transform of a Discrete Sequence, ROC and it's properties, Properties of z-transforms. Inverse z-transform – Power series method, Residue Theorem method, Convolution method and Partial fraction expansion method.

TEXT BOOKS:

1. Signals, Systems and Communications, B. P. Lathi, BS Publications, 2009
2. Signals and Systems, Alan V.Oppenheim, Alan S. Willsky and S. Hamid Nawab, 2nd Edition, PHI ,2000

REFERENCES:

1. Signals and Systems, Simon Haykin and Barry Van Veen, 2nd Edition, John Wiley, 1998
2. Signals, Systems and Transforms, C. L. Philips, J. M. Parr and Eve A. Riskin, 3rd Edition, PE,2004
3. Fundamentals of Signals & Systems, Michael Roberts, 2nd Edition, Tata McGraw-Hill, 2010
4. Signals and Systems, H. P. Hsu, R. Ranjan, Scham's Outlines, Tate McGraw-Hill, 2006
5. Signals and Systems, A. Anand Kumar, 2nd Edition, PHI, 2012

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1EC204) PROBABILITY THEORY AND STOCHASTIC PROCESSES

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Matrices and Calculus, Ordinary Differential Equations and Vector Calculus

COURSE OBJECTIVES:

- To introduce elementary probability theory as a basis for understanding random signals and random process
- To apply statistical methods on random signals and processes
- To utilize the random signals and systems in communications and signal processing
- To introduce the concepts of internal noise and external noise with reference to a communication system
- To characterize and quantify the channel in terms of coding and capacity

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Apply the fundamentals of probability theory and solve real time probabilistic problems

CO-2: Evaluate and apply the statistical properties on random signals

CO-3: Determine the temporal and spectral characteristics of Random processes

CO-4: Understand the response of linear time Invariant system for a random process

CO-5: Analyse the noise characteristics of communication channel

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO-2	3	3	-	2	-	-	-	-	-	-	-	-	2	-	-
CO-3	3	3	-	2	-	-	-	-	-	-	-	-	2	-	-
CO-4	3	3	2	2	-	-	-	-	-	-	-	-	2	-	-
CO-5	3	3	2	2	-	-	-	-	-	-	-	-	2	-	-

UNIT – I:

Overview of Probability Theory: Definitions, scope and history, sets, sample space and events, axioms of probability, discrete, continuous and conditional probabilities, independence, Joint and conditional probability, total probability, Baye's rule and applications.

The Random Variable: Definition of a random variable, conditions for a function to be a random variable, discrete, continuous and mixed random variables, distribution and density functions and its properties, conditional distribution and density and its properties, Binomial, Poisson, Uniform, Gaussian, Exponential and Rayleigh distributions.

UNIT – II:

Operations on Single Random Variable: 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, Transformations of a random variable: monotonic and non–monotonic transformations for a random variable.

Multiple Random Variables: Joint distribution and density functions and its properties, Marginal distribution and density functions, Joint conditional distribution and density, Statistical independence, Sum of two random variables, Sum of several random variables, Central Limit Theorem.

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 of Gaussian random variables.

UNIT – III:

Random Processes–Temporal Characteristics: Concept of random process, Classification of processes, Deterministic and nondeterministic processes, Distribution and density functions, Concept of stationarity and statistical independence, First-order stationary processes, Second-order and Wide-sense stationary, Nth-order and Strict-sense stationary, Time averages and ergodicity, Autocorrelation function and its properties, Cross-correlation function and its properties, Covariance functions.

Random Processes – Spectral Characteristics: The power density spectrum: Properties, relationship between power density spectrum and Autocorrelation function, Cross-power density spectrum and its properties, Relationship between cross-power density spectrum and cross-correlation function.

UNIT – IV:

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 spectrums of input and output.

UNIT – V:

Modelling of Noise Sources: Resistive (Thermal) noise source, Arbitrary noise sources, Effective noise temperature, Average noise figure, Average noise figure of cascaded networks.

Introduction to Information Theory: Entropy, Information rate, Source coding: Huffman coding, Shannon-Fano coding, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law, Trade-off between bandwidth and SNR.

TEXT BOOKS:

1. Probability, Random Variables & Random Signal Principles, Peyton Z. Peebles, 4th Edition, Tata McGraw-Hill, 2017
2. Probability, Random Variables and Stochastic Processes, Athanasios Papoulis, S. Unnikrishna Pillai, 4th Edition, PHI, 2002

REFERENCES:

1. Probability and Random Processes with Applications to Signal Processing, Henry Stark and John W. Woods, 3rd Edition, Pearson Education, 2013
2. Statistical Theory of Communication, S. P. Eugene Xavier, 1st Edition, New Age International, 1997
3. Modern Digital and Analog Communication Systems, B. P. Lathi, Zhi Ding, 4th Edition, Oxford University Press, 2011

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC2EC201) ELECTRONIC CIRCUIT AND ANALYSIS LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE PRE-REQUISITES: Electronic Devices and Circuits

COURSE OBJECTIVES:

- To learn the operation, design And Analysis Of Single Stage amplifiers using BJT and MOSFET
- To know the operation, design And Analysis Of Various multistage amplifiers using BJT
- To understand the principle and design of feedback amplifiers and oscillators

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Design single stage amplifiers and compute the parameters

CO-2: Examine the effect of multistage amplification on frequency response

CO-3: Investigate the effect of feedback in amplifiers and oscillators

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	2	3	-	-	-	3	3	2	-	3	-	3
CO-2	3	2	2	2	3	-	-	-	3	3	2	-	2	-	2
CO-3	3	2	2	2	3	-	-	-	3	3	2	-	2	-	2

LIST OF PROGRAMS / EXPERIMENTS / EXERCISES:

Design and simulation of the following circuits (any eight) using simulation software and implementation through hardware.

CYCLE I:

1. Common Emitter Amplifier
2. Common collector Amplifier
3. Two stage RC coupled BJT Amplifier
4. Darlington amplifier.
5. Voltage series feedback amplifiers
6. Voltage shunt feedback amplifiers
7. RC phase shift oscillator
8. Colpitts oscillator
9. Hartley oscillator

10. MOSFET- CS amplifier

CYCLE II:

1. Development of one application which shall cover maximum no. of experiments in Cycle I.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC2EC202) LOGIC DESIGN LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE OBJECTIVES:

- To get familiarity with functionalities of IC's
- To model, and simulate digital circuits using Hardware Description Language (HDL)
- To learn writing test-benches for functional verification of the digital system

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Verify the functionality of various Digital ICs

CO-2: Apply Hardware Description Languages (HDL) for designing and functional verification of combinational circuits

CO-3: Design and verify the functionality of sequential circuits using Verilog HDL

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	2	2	3	-	-	-	3	3	2	-	3	-	3
CO-2	3	2	2	2	3	-	-	-	3	3	2	-	2	-	2
CO-3	3	2	2	2	3	-	-	-	3	3	2	-	2	-	2

LIST OF EXPERIMENTS:

A study on classification and basic information of Integrated Circuits (ICs).

CYCLE I:

PART-1

To Verify the Functionality of the following 74 Series ICs:

1. 3- 8 Decoder – 74LS138.
2. 8X1 Multiplexer– 74151 and 1X4 De-multiplexer- 74155.
3. 2-bit COMPARATOR -74LS85.
4. D-Flip- Flop – (74LS74) and JK Flip- Flop (74LS73).

PART-2

Design and simulate the following Circuits using HDL:

1. Logic Gates.
2. Adders and Subtractors
3. Code converters
4. Multiplexer and De-multiplexer.
5. Encoder and Decoder.

6. Parity generator and checker
7. Flip Flops using Truth table and FSM
8. Shift Registers
9. Asynchronous counters
10. Synchronous counters

CYCLE II:

1. Development of one application which shall cover maximum no. of experiments in Cycle I.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC2EC203) SIGNALS AND SYSTEMS SIMULATION LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE PRE-REQUISITES: Matrices and Calculus, Programming for Problem Solving

COURSE OBJECTIVES:

- To simulate various continuous/discrete signals
- To study various operations on signals and various transforms
- To understand the characteristics of LTI system and to find its response for various excitations
- To study different signal estimation techniques in the presence of noise
- To understand convolution and correlation concepts

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Classify signals and systems based on its characteristics and analyze the response of systems for various inputs

CO-2: Analyze the effect of various transformations applied on signals and applications of convolution and correlation

CO-3: Determine the spectral and temporal characteristics signals and random processes. overview of visualization, data types, basics of plotting graphs, different types of graphs in analytics

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	-	2	-	-	-	-	3	3	2	-	3	3	-
CO-2	3	2	-	2	-	-	-	-	3	3	2	-	2	2	-
CO-3	3	2	-	2	-	-	-	-	3	3	2	-	2	2	-

LIST OF PROGRAMS /EXPERIMENTS / EXERCISES:

CYCLE I:

1. Introduction to MATLAB.
2. Generation of various signals and sequences (Periodic and Aperiodic), such as unit Impulse, step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc and random signals.
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. Verification of Gibb's Phenomenon.
6. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
7. Computation of Unit sample, Unit step and sinusoidal responses of the given LTI system and Verifying its Physical realizability and stability properties.
8. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
9. Convolution between (i) Signals (ii) Sequences.
10. Auto Correlation and Cross Correlation of (i) Signals (ii) Sequences.
11. Verifying the applications of Correlation: Removal of noise by Autocorrelation / Cross correlation.
12. Verification of Sampling Theorem.
13. Generation of Gaussian noise (Real and Complex), Computation of its mean, M.S. Value and its Skew, Kurtosis and PSD, Probability Distribution Function.
14. Checking a Random Process for Stationary in Wide sense.
15. Verification of Wiener-Khinchine relation.

CYCLE II:

1. Development of one application which shall cover maximum no. of experiments in Cycle-I using Matlab GUI/ Simulink/ Octave/ Scilab.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PW4EC201) DESIGN THINKING

TEACHING SCHEME		
L	T/P	C
1	2	2

EVALUATION SCHEME		
CIE	SEE	TOTAL
40	60	100

COURSE OBJECTIVES:

- To instill a sense of significance towards applying creativity to product and service design
- To teach a systematic approach to identifying and defining a problem before brainstorming for a solution
- To inculcate core design principles and applied creativity to develop innovative strategies that better connect engineers and technologies with their end users
- To build a mindset leading to flow of creative ideas, validating those ideas and prioritizing the best ones among them.
- To motivate students to apply design thinking while implementing projects focusing on local, regional or global societal problems

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Demonstrate the understanding of design principles from a technology perspective

CO-2: Validate problem statements through user empathisation with societal, cultural, global and environmental consciousness

CO-3: Use specific and relevant ideation and brainstorming techniques to find innovative solutions

CO-4: Prototype a solution to address user challenges

CO-5: Investigate the cultural, emotional, environmental, technological and business factors relevant to developing new product or service design concept

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	-	-	2	-	-	2	-	-	3	3	1	1	-	2	1
CO-2	-	-	3	2	1	3	-	-	3	2	1	1	2	1	3
CO-3	-	-	2	-	-	2	-	-	2	2	3	-	-	-	2
CO-4	-	-	3	-	2	-	-	-	2	3	1	-	-	1	2
CO-5	-	-	-	3	-	3	1	-	1	-	1	-	-	-	2

UNIT-I:

Design Overview and Doing Design: Various perspectives of design; Good and Bad Design; Introduction to the Design Double Diamond: Discover-Define-Develop-Deliver; Discover Phase- Looking for problems; Identifying Stakeholders and Defining User Personas; User Empathization; Data collection, creating and conducting surveys

and Empathy Tools – What/How/Why, Five Why method, Empathy Maps, AEIOU method, Story Share and Capture

UNIT-II:

Need Analysis: Types of Users, Types of Needs; Market Size; Value Proposition to the Users; Identifying Addressable Needs and Touch points; Structuring Need Statements; Customer Experience (CX) Design; Service Design and Development Process; Customer Journey Map (CJM), Service Experience Cycle.

UNIT-III:

Ideation Process: Introduction to creativity and closed-world solutions, Idea generation techniques: Brainstorming, Mind Maps, SCAMPER, Systematic Inventive Thinking methods (Subtraction, Multiplication, Division, Task Unification and Attribute Dependency);

Strategic Innovation for Competition in Future: Linear Innovation vs. Non-linear innovation, Understanding and identifying weak signals, 3-box thinking, 3-Box framework and Box-3 ideation, Four-Action Framework (Eliminate-Reduce-Raise-Create, or ERRC Matrix).

UNIT -IV:

Building Prototypes: Building Conceptual model of product/service using various prototype methods, test a business model or business case to support the viability of the solution using MVP.

Design for Sustainability: Concern for Environment and Sustainability in Design, Case Studies to understand good Design For Environment (DFE) Decisions; Sustainable Design Approaches in the five stages of the Product Life Cycle.

UNIT -V:

Capstone Project (Interdisciplinary): Applying design thinking principles and methods for problem definition, ideation, prototyping, testing, refining and taking the solution to the users, using visual representation tools to indicate problem, User persona, needs, empathisation, ideas and prototype that leads to chosen solution, creating presentation.

TEXT BOOKS:

1. Change by Design, Tim Brown, Harper Business, 2012
2. The Design of Everyday Things, Donald A. Norman, MIT Press, 2013

REFERENCES:

1. The Art of Innovation, Tom Kelly, Jonathan Littman, Harper Collins Business, 2002
2. Design Thinking: Integrating Innovation, Customer Experience, and Brand Value, Thomas Lockwood, Allworth Press, 2009
3. Design Thinking for Start-ups: A Handbook for Readers and Workbook for Practitioners, Jimmy Jain, Notion Press, 2018

ONLINE RESOURCES:

1. https://www.ideou.com/pages/design-thinking
2. https://www.ibm.com/design/thinking/page/framework
3. https://onlinecourses.nptel.ac.in/noc20_mg38/preview
4. https://nptel.ac.in/courses/110106124

5. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22MN6HS103) HAPPINESS AND WELLBEING

TEACHING SCHEME		
L	T/P	C
2	0	0

EVALUATION SCHEME			
SE-I	SE-II	SEE	TOTAL
50	50	-	100

COURSE OBJECTIVES:

- To learn sustainable strategies to develop positive attitude and happy heart
- To develop self-awareness and self-discipline to meet the needs of happiness
- To practice good health & mindfulness for wellbeing
- To adapt personality attributes of happiness and success strategies
- To nature happiness development index for better living

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Recognize what is happiness in life and how to sustain it
CO-2: Focus on interpersonal skills for a mindful approach
CO-3: Develop to mindfulness to handle challenging situations
CO-4: Recognize the importance of positive attitude for personal and professional development
CO-5: Interpret the need for nurturing happiness development index through Indicators

COURSE ARTICULATION MATRIX:
*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	-	-	-	-	-	3	-	2	1	-	-	3	-	-	-
CO-2	-	-	-	-	-	3	-	3	1	-	-	3	-	-	-
CO-3	-	-	-	-	-	1	-	1	1	-	-	3	-	-	-
CO-4	-	-	-	-	-	2	-	2	1	-	-	3	-	-	-
CO-5	-	-	-	-	-	3	-	1	1	-	-	3	-	-	-

UNIT-I:

Introduction to Happiness: Definition & theories of happiness: Hedonism theory, Desire theory, Objective list theory. Identifying potential barriers of happiness: Devaluing happiness, chasing superiority, being needy, being overly control-seeking, distrusting others, distrusting life, and ignoring the source within. Strategies for overcoming the potential barriers

UNIT – II:

Power of Emotions & Relationships: Role of emotional intelligence, self-awareness, and empathy in creating harmonious relationship with ourselves and others. Balancing emotions. Hormones that promote happiness. The importance of social connections for happiness. Role of share & care, gratitude, forgiveness & kindness in building relationships

UNIT – III:

Health and Wellbeing: The link between health & happiness-exercise regularly, eat a healthy diet, get enough sleep for physical fitness. Mental wellbeing-Take notice, keep learning, stay connected with nature, and financial wellbeing. The practice of mindfulness and its benefits for mental and physical health. Moving from restlessness to restfulness- meditation and yoga to increase awareness and reduce stress

UNIT – IV:

Re-wirement for Wellbeing: Abundance in life, freedom of choice, accepting change, ways of implementation for wellbeing: practicing habits-be proactive, begin with end-in-mind, put-first things-first, think win-win, seek first to understand then to be understood, synergize, sharpen the saw, and effectiveness to greatness

UNIT – V:

Nurturing Happiness Development Index: Exploring the sources of temporary joy and lasting happiness. Acceptance, Appreciation, forgiveness, gracefulness, and creative procrastination. Time management with four D's (delete, delay, delegate, do). Developing happiness index-track changes in happiness levels over time and identify the indicators

TEXT BOOKS:

1. The How of Happiness: A Scientific Approach to Getting the Life You Want, Sonja Lyubomirsky, Penguin Books, 2008
2. Authentic Happiness: Using the New Positive Psychology to Realize Your Potential for Lasting Fulfilment, Martin Seligman, Atria Books, 2004
3. The Book of Joy: Lasting Happiness in a Changing World, Dalai Lama, Desmond Tutu, and Douglas Abrams, Avery, 2016

REFERENCES:

1. 7-Habits of Highly Successful People, Stephen Covey, Simon & Schuster, 2020
2. Mindfulness Book of Happiness: Mindfulness and Meditation, Aimen Eman, Publish Drive Edition, 2018
3. Mindfulness at Work: How to Avoid Stress, Achieve More and Enjoy Life, Dr. Stephen McKenzie, Exisle Publishing, 2014
4. The 8th Habit: From Effectiveness to Greatness, Stephen R. Covey, Free Press, 2004

ONLINE RESOURCES:

1. Life of Happiness And Fulfillment, Indian School of Business, Coursera https://in.coursera.org/learn/happiness
2. Science of Wellbeing, Yale University, Coursera, https://www.coursera.org/

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC1EC205) ANALOG CIRCUITS

TEACHING SCHEME		
L	T/P	C
3	1	4

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Electronic Circuit Analysis

COURSE OBJECTIVES:

- To understand the principle of large signal and tuned amplifiers
- To learn about process of wave shaping
- To study the basics of Operational Amplifier and analyze data converters
- To built basic applications of Operational Amplifier and active filters
- To know about various analog ICs and their applications

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Analyze various large signal and tuned amplifiers

CO-2: Construct the wave shaping circuits

CO-3: Understand the characteristics of an Operational Amplifier and design data converters

CO-4: Design basic applications and filters using Operational Amplifier

CO-5: Implement applications of special ICs

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	3	3	-	-	-	-	-	-	-	1	2	-	2
CO-2	3	2	3	3	-	-	-	-	-	-	-	1	2	-	2
CO-3	3	2	3	3	-	-	-	-	-	-	-	1	3	-	3
CO-4	3	2	3	3	-	-	-	-	-	-	-	1	3	-	3
CO-5	3	2	3	3	-	-	-	-	-	-	-	1	3	-	3

UNIT-I:

Large Signal Amplifiers: Class A Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Principle of operation of Class AB and Class –C Amplifiers.

Tuned Amplifiers: Introduction, frequency response of single Tuned, Double Tuned, stagger tuned and synchronous tuned Amplifiers.

UNIT-II:

Linear Wave Shaping: High pass, Low pass RC circuits and their response for sinusoidal, step, pulse, square inputs. RC network as a differentiator and integrator, Attenuators.

Non-Linear Wave Shaping: Diode clippers, clipping at two independent levels, Transfer characteristics of clippers, Clamping operation, clamping circuits, Clamping circuit theorem.

UNIT-III:

Op-AMP: Classification, basic information of Op-amp, ideal and practical Op-amp, internal circuits, Op-amp DC and AC characteristics, modes of operation-inverting, non-inverting, and differential, Comparators.

Data Converters: DAC and ADC Specifications, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC, Different Types of ADCs – Parallel Comparator Type ADC, Successive Approximation ADC

UNIT-IV:

OP-AMP Applications: Adders, subtractors Instrumentation amplifier, V to I and I to V converters, Sample and Hold circuits, differentiators, Integrators, Square Wave Generator.

Active Filters: Introduction to Active Filters, Analysis of 1st order LPF, HPF, BPF, BSF and All Pass Filters

UNIT-V:

Special ICs: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger, VCO, PLL-Introduction, block schematic, principles and description of individual blocks of 565, introduction to voltage regulators, Three Terminal Voltage Regulators.

TEXT BOOKS:

1. Integrated Electronics, J. Millman, C. Halkias, and Chetan D. Parikh, 2nd Edition, Tata McGraw-Hill , 2017
2. Pulse, Digital and Switching Waveforms, J. Millman, H. Taub and SuryaPrakash Rao M., 3rd Edition, McGraw-Hill, 2017
3. Linear Integrated Circuits, D. Roy Choudhary, Shail B. Jain, 5th Edition, New Age International, 2018

REFERENCES:

1. Electronic Circuit Analysis, S. Salivahanan, N. Suresh Kumar,Tata McGraw-Hill Education, 4th Edition, 2017
2. Op-Amps and Linear Integrated Circuits, Ramakanth A. Gayakwad, 4th Edition, PHI, 2015

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC1EC206) ANALOG AND DIGITAL COMMUNICATIONS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Probability Theory and Stochastic Processes, Signal and System

COURSE OBJECTIVES:

- To develop ability to analyze system requirements of analog and digital communication
- To understand the need for conversion from analog signals to digital
- To distinguish baseband and passband transmission system
- To design and analyze a digital communication system

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Design and analyze various analog and digital modulation and demodulation techniques

CO-2: Model the noise present in continuous wave modulation techniques

CO-3: Understand conversion process of analog signal to digital

CO-4: Distinguish between base band transmission and carrier digital modulation schemes

CO-5: Apply modulation techniques and coding schemes to design a digital communication system

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	3	1	-	3	2	-	-	-	-	1	2	2	-
CO-2	3	3	3	1	-	2	2	-	-	-	-	1	2	2	-
CO-3	3	3	3	1	-	2	2	-	-	-	-	1	2	2	-
CO-4	3	3	3	1	-	2	2	-	-	-	-	1	2	2	-
CO-5	3	3	3	1	-	3	2	-	-	-	-	1	2	2	-

UNIT – I:

Amplitude Modulation: Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves - Switching modulator, Detection of AM Waves - Envelope detector. DSBSC modulation - time and frequency domain description. SSB

modulation - time and frequency domain description. Noise in AM, DSB and SSB Systems.

Angle Modulation: Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Signal- Armstrong Method, Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM. Concept of Pre-emphasis and de-emphasis.

UNIT – II:

Introduction: Elements of a digital communication systems, advantages and disadvantages of digital communication systems, and Applications.

Pulse Digital Modulation: Elements of PCM: Sampling, Quantization and Coding, Quantization error, Non-uniform Quantization and Companding. Differential PCM (DPCM), Adaptive DPCM, Delta modulation and its drawbacks, Adaptive Delta modulation, Noise in PCM and DM systems.

UNIT – III:

Base Band Transmission: Requirements of a Line Encoding Format, Various Line Encoding Formats- Unipolar, Polar, Bipolar, Scrambling Techniques: BZ8S, HDB3, Computation of Power Spectral Densities of various Line Encoding Formats.

Pulse Shaping: Inter symbol interference, pulse shaping to reduce ISI, Nyquist's criterion, Raised cosine filter, Equalization, Correlative level coding: Duo-binary encoding, modified duo –binary coding

UNIT – IV:

Pulse Modulation: Types of Pulse modulation- PAM, PWM and PPM.

Digital Modulation Techniques: Introduction, ASK Modulator, Coherent ASK Detector, Non-Coherent ASK Detector, FSK, Bandwidth and frequency Spectrum of FSK, Non-Coherent FSK Detector, Coherent FSK Detector, BPSK, Coherent BPSK Detection, QPSK, DPSK and signal-space diagram.

UNIT – V:

Optimal Reception of Digital Signal: Baseband signal receiver, Probability of Error, Optimum Filter, Matched Filter, Probability of Error Using Matched Filter, correlator receiver, Calculation of Probability of Error for ASK, FSK, BPSK.

TEXT BOOKS:

1. Principles of Communication Systems, H. Taub, D. L. Schilling, Goutham Saha, 4th Edition, McGraw-Hill, 2013
2. Modern Digital and Analog Communication Systems, B. P. Lathi, Zhi Ding, 4th Edition, Oxford University Press, 2011

REFERENCES:

1. Analog and Digital Communication, K. Sam Shanmugam, Wiley, 2005
2. Analog and Digital Communications, Simon Haykin, John Wiley, 2005
3. Electronics & Communication System, George Kennedy and Bernard Davis, Tata McGraw-Hill, 2004

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC1EC207) ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Ordinary Differential Equations and Vector Calculus

COURSE OBJECTIVES:

- To understand the basic concepts of electrostatic and magnetostatic fields and apply them to analyze the field components
- To differentiate between the static and time varying fields using the Maxwell's equations
- To conceptualize the wave propagation characteristics and analyze the effect of boundary conditions for different media
- To gain knowledge about the basic parameters of transmission lines and the design aspects related

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Infer the field components using the concepts of electrostatics and magnetostatics

CO-2: Demonstrate an understanding of the static and time varying fields using the Maxwell's equations

CO-3: Analyze the wave propagation characteristics for different media boundary conditions

CO-4: Illustrate an understanding of Transmission line parameters and their design aspects

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	1	1	-	1	-	-	-	1	-	-	2	-	-
CO-2	3	3	2	1	-	1	-	-	-	1	-	-	2	-	-
CO-3	3	3	2	1	-	1	-	-	-	1	-	-	2	-	-
CO-4	3	3	1	1	-	1	-	-	-	1	-	-	2	-	-

UNIT-I:

Electrostatics: Review of Coordinate Systems, Coulomb's law, Electric field intensity – fields due to different charge distributions, Electric flux density, Gauss law and applications, Electric potential, Relations between E and V, Energy density, Convection and Conduction currents, Dielectric Constant, Isotropic and

Homogeneous Dielectrics, Continuity equation, Relaxation time, Poisson's and Laplace equations, Capacitance –parallel plate, coaxial, spherical capacitors.

UNIT-II:

Magnetostatics: Biot – Savart's law, Ampere's circuit law and applications, Magnetic flux density, Magnetic scalar and vector potentials, Forces due to Magnetic fields, Amperes Force law.

UNIT-III:

Maxwell's Equations (Time Varying Fields): Faraday's law and Transformer emf, inconsistency of the Amperes law and displacement current density, Maxwell's Two Equations for Magnetostatic Fields, Maxwell's Two Equations for Electrostatic Fields, Maxwell's Equations in Different Forms, Conditions at a Boundary Surface – Dielectric-Dielectric and Dielectric-Conductor Interfaces.

UNIT-IV:

EM Wave Characteristics: Wave equations for conducting and perfect dielectric media. Uniform plane waves, Relation between E and H, sinusoidal variations, wave propagation in loss less and conducting media, conductors and Dielectrics – characterization, wave propagation in good conductors and good dielectrics, polarization.

Reflection And Refraction of Plane Waves: normal and oblique incidences for both perfect conductor and perfect dielectrics, Brewster angle, Critical angle and Total internal reflection, Surface Impedance, Poynting vector and Poynting theorem.

UNIT-V:

Transmission Lines: Types, parameters, Transmission line equations, primary and secondary constants, Equivalent Circuit, Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless / Low Loss Characterization, Condition for Distortionless line, Minimum Attenuation, Loading – Types of Loading. SC and OC Lines, $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines, Reflection Coefficient, VSWR. Smith Chart – Configuration and Applications, Single Stub Matching.

TEXT BOOKS:

1. Engineering Electromagnetics, William H. Hayt Jr. and John A. Buck, 8th Edition, McGraw-Hill , 2014
2. Principles of Electromagnetics, Matthew N. O. Sadiku and S. V. Kulkarni, 6th Edition, Oxford University Press, Asian Edition, 2015

REFERENCES:

1. Electromagnetics with Applications, J. D. Kraus, 5th Edition, Tate McGraw-Hill
2. Transmission Lines and Networks, Umesh Sinha, Satya Prakashan, Tech. India Publications, 2001
3. Networks, Lines and Fields, J. D. Ryder, 2nd Edition, PHI, 1999

B.Tech. IV Semester

(22PC1EE205) CONTROL SYSTEMS

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Ordinary Differential Equations and Laplace Transform

COURSE OBJECTIVES:

- To understand the different ways of system representations such as Transfer function representation and state space representations and to assess the system dynamic response
- To assess the system performance using time domain analysis and methods for improving it
- To assess the system performance using frequency domain analysis and techniques for improving the performance
- To design various controllers and compensators to improve system performance

COURSE OUTCOMES: After completion of the course, the student should be able to

CO -1: Analyze the stability, steady state and transient performance of a system using time and frequency domain analysis

CO-2: Evaluate the effects of feedback on system performance

CO-3: Obtain the model of system using transfer function/ state space models

CO-4: Design suitable controller or compensator for the improving system performance

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	2	2	2	2	1	-	-	2	-	1	-	3	3	-
CO-2	2	2	2	1	2	1	-	-	2	-	1	-	3	2	-
CO-3	2	2	2	2	2	1	-	-	2	-	1	2	3	2	-
CO-4	2	2	3	3	2	1	1	2	2	-	2	2	3	2	-

UNIT – I:

Introduction to Control Problem: Open-Loop and Closed-loop systems, effects of Feedback. Mathematical models of physical systems. electrical analogous circuits of mechanical systems Transfer function models of linear time-invariant systems –RLC Circuits, DC and AC servo motors. Block diagram algebra and Signal Flow Graphs.

UNIT – II:

Time Response Analysis: Standard test signals. Time response of first and second order systems for standard test inputs. Application of initial and final value theorems. Design specifications for second-order systems based on the time- response
Stability: Concept of Stability, Routh-Hurwitz Criterion, Relative Stability analysis.

UNIT – III:
Root-Locus Technique: Construction of Root-Loci
Frequency-Response Analysis: Bode plots- transfer function from bode plot-phase and gain margins- stability analysis. Polar and Nyquist plots, Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margins. Relationship between time and frequency response.

UNIT – IV:
Introduction to Controller Design: Stability, steady-state accuracy, transient accuracy, disturbance rejection, insensitivity and robustness of control systems. Root-loci method of feedback controller design- Application of Proportional, Integral and Derivative Controllers. Design specifications in frequency-domain. Frequency domain methods of design- Lead and Lag compensators.

UNIT – V:
State Space Analysis: Concepts of state variables. State space model - RLC circuits and DC motor, canonical forms. State Transition Matrix and its properties- Transformations: State space to Transfer function and vice versa. Eigen values and Stability Analysis. Concept of controllability and observability.

TEXT BOOKS:

1. Control Systems Engineering, J. Nagrath and M. Gopal, New Age International, 2009
2. Modern Control Engineering, K. Ogata, Prentice Hall, 1991
3. Control systems Engineering, Norman S. Nise, 8th Edition, Wiley Publications, 2019

REFERENCES:

1. Modern Control Systems, Richard C. Dorf and Robert H. Bishop
2. Automatic Control System, B. C. Kuo, Prentice Hall, 1995
3. Control Systems: Principles and Design, M. Gopal, McGraw-Hill Education, 1997

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC1EC208) COMPUTER ORGANIZATION AND DESIGN

TEACHING SCHEME		
L	T/P	C
3	0	3

EVALUATION SCHEME				
SE	CA	ELA	SEE	TOTAL
30	5	5	60	100

COURSE PRE-REQUISITES: Switching Theory and Logic Design

COURSE OBJECTIVES:

- To describe the functional blocks of a computer to interpret the instructions and various addressing modes for the execution of instruction cycle
- To perform Arithmetic micro-operations on integers and floating-point numbers
- To analyze the cost performance and design trade-offs in designing and constructing a computer processor including memory
- To discuss the different ways of communicating with I/O devices & interfaces and the design techniques to enhance the performance using pipelining, parallelism

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Interpret the functional architecture of computing systems and computer arithmetic

CO-2: Impart the knowledge on micro programming

CO-3: Explore the functionality of memories and control unit

CO-4: Understand I/O functions and analyze instruction level parallelism, concepts of advanced pipeline techniques

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	3	1	1	-	1	-	-	-	1	-	-	2	-	-
CO-2	3	3	2	1	-	1	-	-	-	1	-	-	2	-	-
CO-3	3	3	2	1	-	1	-	-	-	1	-	-	2	-	-
CO-4	3	3	1	1	-	1	-	-	-	1	-	-	2	-	-

UNIT – I:

Functional Blocks of a Computer: CPU, memory, input-output subsystem, control unit. Instruction set architecture of a CPU – registers of basic computer, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Case study – Instruction set of some common CPUs.

UNIT – II:

Data Representation: Review of Signed number representation, fixed and floating-point representations, character representation.

Computer Arithmetic: Integer Addition and Subtraction - Ripple carry adder, carry look- ahead adder. Multiplication algorithms – Shift-and add, Booth multiplier, carry save multiplier. Division algorithms – Restoring and non-restoring techniques, floating point arithmetic.

UNIT – III:

Control Unit: Control memory, address sequencing, micro program example, and design of control unit, hardwired control, and micro programmed control.

UNIT – IV:

Memory Organization: Memory interleaving, concepts of hierarchical memory organization, Main memory, RAM and ROM chips, memory address map, Memory connection to CPU, Cache memory, hit ratio, cache size vs block size, mapping functions, replacement algorithms, write policies, virtual memory, Memory management hardware, secondary storage.

Semiconductor memory technologies, SRAM vs DRAM. ROM

UNIT – V:

Peripheral Devices and their Characteristics: Input-output subsystems, I/O device interface, I/O transfers, - program controlled, Interrupt driven and DMA, privileged and non –privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCSI, USB.

Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction pipeline, RISC pipeline Vector Processing, Array Processors

TEXT BOOKS:

1. Computer System Architecture, M. Morris Mano, 3rd Edition, Pearson, 2007
2. Computer Organization and Embedded Systems, Carl Hamacher, 6th Edition, McGraw-Hill Higher Education, 2011

REFERENCES:

1. Computer Organization and Design: The Hardware/Software Interfaces, David A. Patterson and John L. Hennessy, 5th Edition, Elsevier, 2012
2. Computer Architecture and Organization, John P. Hayes, 3rd Edition, WCB/McGraw-Hill, 2008
3. Computer Organization and Architecture: Designing for Performance, William Stallings, 10th Edition, Pearson Education, 2015
4. Computer System Design and Architecture, Vincent P. Heuring and Harry F. Jordan, 2nd Edition, Pearson Education, 2011

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC2EC205) ANALOG CIRCUITS LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE PRE-REQUISITES: Electronic Circuit Analysis

COURSE OBJECTIVES:

- To understand the operation of power amplifiers and wave shaping circuits
- To know about the operation of IC 741 and its applications
- To learn the working principle of IC 555 and IC 565

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Analyze large signal amplifier, tuned amplifier and wave shaping circuits
CO-2: Design applications using operational amplifier IC 741
CO-3: Construct applications using IC 555 and IC 565

COURSE ARTICULATION MATRIX:
*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	3	2	3	2	3	-	-	-	3	3	3	-	1	-	1
CO-2	3	3	3	2	3	-	-	-	3	3	3	-	3	-	3
CO-3	3	3	3	2	3	-	-	-	3	3	3	-	3	-	3

LIST OF PROGRAMS /EXPERIMENTS / EXERCISES:

Implement any eight experiments (software/ hardware) of the following:

CYCLE I:

1. Class B Complementary Symmetry Amplifier.
2. Single tuned amplifier
3. RC high pass and low Pass circuits for square input,
4. Dual Diode Clipper and positive Clamper.
5. Adder, Subtractor, Comparator, Integrator and Differentiator using IC 741 OP-AMP.
6. Active first order LPF, HPF using OP-AMP.
7. R-2R ladder D-A Converter.
8. Monostable and Astable Multivibrator using 555 timer.
9. Voltage controlled oscillator
10. Measurement of Capture range and lock range of 565.

CYCLE II:

1. Development of one application which shall cover maximum no. of experiments in Cycle I.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC2EC206) ANALOG AND DIGITAL COMMUNICATIONS LABORATORY

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE PRE-REQUISITES: Signals and Systems

COURSE OBJECTIVES:

- To introduce the principles of various analog and digital modulation methods and the study of their spectral characteristics
- To introduce practical implementation of discretization process of a continuous and analog signal
- To understand the principles of channel coding

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Design and implement various analog modulation and demodulation techniques and observe the time and frequency domain characteristics
CO-2: Design and implement various pulse modulation and demodulation techniques and observe the time and frequency domain characteristics
CO-3: Apply different types of sampling with various sampling rates and duty cycles
CO-4: Design and implement various digital modulation and demodulation techniques and observe the waveforms of these modulated signals practically

COURSE ARTICULATION MATRIX:
*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	1	-	3	1	2	2	-	2	3	2	-	1	1	-	1
CO-2	1	-	3	1	2	2	-	2	3	2	-	1	3	-	3
CO-3	1	-	3	1	2	2	-	2	3	2	-	1	3	-	3
CO-4	1	-	3	1	2	2	-	2	3	2	-	1	3	-	3

LIST OF EXPERIMENTS:

Implement any Twelve experiments (software/ hardware) of the following:

CYCLE I:

1. Amplitude modulation and demodulation
2. Frequency modulation and demodulation
3. DSB-SC Modulator & Detector
4. SSB-SC Modulator & Detector
5. Sampling of a continuous and analog signal & Reconstruction

6. Pulse Amplitude Modulation & Demodulation
7. Pulse Width Modulation & Demodulation
8. Pulse Position Modulation & Demodulation
9. PCM Generation and Detection
10. Delta Modulation
11. Generation & Demodulation of ASK
12. Generation & Demodulation of FSK
13. Generation and Demodulation of BPSK
14. Generation and Demodulation of DPSK
15. BER comparison of different modulation schemes in AWGN channel

CYCLE II:

2. Development of one application which shall cover maximum no. of experiments in Cycle I.

Note:

- Minimum 12 experiments should be conducted:
- All these experiments are to be simulated first either using MATLAB/ GNU Radio, COMSIM or any other simulation package and then to be realized in hardware.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22SD5DS203) PYTHON PROGRAMMING AND PRACTICE

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME					
D-D	PE	LR	CP	SEE	TOTAL
10	10	10	10	60	100

COURSE OBJECTIVES:

- To install and run the Python interpreter
- To learn control structures
- To understand Lists, Dictionaries in Python
- To handle Strings and Files in Python

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Develop application specific codes using Python
CO-2: Understand Strings, Lists, Tuples and Dictionaries in Python
CO-3: Verify programs using modular approach, file I/O, Python standard library
CO-4: Implement Digital Systems using Python

COURSE ARTICULATION MATRIX:
*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	2	1	1	1	1	-	-	1	-	1	1	-	2	-
CO-2	2	2	1	1	1	1	-	-	1	-	1	1	-	2	-
CO-3	2	2	2	1	1	2	-	-	1	-	1	1	-	2	-
CO-4	2	3	2	1	1	2	-	-	1	-	1	1	-	2	-

LIST OF PROGRAM MODULES AND EXERCISES:

1. BASICS:

a) Running instructions in Interactive interpreter and a Python Script.
b) Write a program to purposefully raise Indentation Error and correct it.

2. OPERATIONS:

a) Write a program to compute GCD of two numbers by taking input from the user.
b) Write a program add.py that takes 2 numbers as command line arguments and prints its sum.

3. CONTROL FLOW:

a) Write programs using for loop that loops over a sequence.
b) Write a Program for checking whether the given number is even or odd.
c) Write a Program to Print the Fibonacci sequence using while loop.
d) Write a program to print all prime numbers in a given interval (use break.)

4. LISTS:

a) Write a program to find mean, median, mode for the given set of numbers in a list.
b) Write a program to convert a list and tuple into arrays.
c) Write a program to find common values between two arrays.

5. DICTIONARY:

a) Write a program to count the numbers of characters in the string and store them in a dictionary data structure.
b) Write a program combine lists into a dictionary.

6. STRINGS:

a) Write a program to check whether a string starts with specified characters.
b) Write a program to check whether a string is palindrome or not.
c) Write a program to split and join a string.
d) Write a Program to Sort Words in Alphabetic Order.

7. FILES:

a) Write a program to print each line of a file in reverse order.
b) Write a program to compute the number of characters, words and lines in a file.
c) Write a program to count frequency of characters in a given file.

8. FUNCTIONS:

a) Write a function to implement Simple Calculator program.
b) Write a function to Find the factorial of a number using recursion.
c) Write a function dups to find all duplicates in the list.
d) Write a function unique to find all the unique elements of a list.
e) Write a function cumulative_ product to compute cumulative product of a list of numbers.
f) Write a function reverse to print the given list in the reverse order.
g) Write function to compute GCD, LCM of two numbers.

9. MULTI-D LISTS:

a) Write a program that defines a matrix and prints.
b) Write a program to perform addition of two square matrices.
c) Write a program to perform multiplication of two square matrices.

10. DATA SCIENCE:

a) Install NumPy package and explore it.
b) Install Pandas and explore Pandas data frame related operations (Reading files, Data preparation and preprocessing).
c) Install Matplotlib, seaborn packages and explore various plots.

11. DATA ANALYSIS AND CASE STUDY:

a) Exploratory data analysis.
b) Case Study on Classification and Regression.

12. DIGITAL LOGIC:

a) Write Python programs to implement Digital Logic Gates–AND, OR, NOT, EX-OR.
b) Write Python programs to implement Half Adder, Full Adder, and Parallel Adder.

TEXT BOOKS:

1. Python for Everybody: Exploring Data in Python 3, Charles Severance, 1st Edition, Shroff Publishers, 2017
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson, 1st Edition, 2018

REFERENCES:

1. Learning Python, Mark Lutz, 5th Edition, Orielly, 2013
2. Think Python: How to Think Like a Computer Scientist, Allen Downey, Shroff, 2nd Edition, O'Reilly, 2016
3. Core Python Programming, W. Chun, 1 Edition, Pearson Education, 2007
4. Fundamentals of Python: First Programs (Introduction to Programming), Kenneth A. Lambert, South-Western College Publishing, 2011

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22SD5EC202) FIELD PROJECT

TEACHING SCHEME		
L	T/P	C
0	2	1

EVALUATION SCHEME		
CIE	SEE	TOTAL
50	-	50

COURSE OBJECTIVES:

- To identify, analyze and solve industry / technical / societal problems creatively through sustained critical investigation
- To practice the skills, elegance and commitment to excellence needed to engage in lifelong learning
- To demonstrate an awareness and application of appropriate personal, social and professional ethical standards

COURSE OUTCOMES: After completion of the course, the student should be able to

CO-1: Understand the formulated industry / technical / societal problems

CO-2: Apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study

CO-3: Demonstrate skills and knowledge of current information, technological tools and techniques specific to the professional field of study

CO-4: Analyze and / or develop models for providing solution to industry / technical / societal problems

CO-5: Use effectively oral, written and visual communication

COURSE ARTICULATION MATRIX:

*(Define Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	2	-	-	-	-	3	3	-	3	-	1	3	-	-	-
CO-2	3	3	2	2	3	2	-	-	3	-	2	3	-	-	-
CO-3	-	-	3	-	3	2	-	2	3	3	3	3	-	-	-
CO-4	2	3	3	3	3	3	3	3	3	-	3	3	-	-	-
CO-5	-	-	-	-	2	-	-	3	3	3	-	3	-	-	-

COURSE OUTLINE:

Filed project-based learning offers students real world opportunities to research issues, think critically, gain new perspectives, solve problems and develop written and oral communication skills all within the framework of a team environment and guided by engaged and involved faculty

- A student shall undergo a one credit Field Project course in II year.

- It shall be a project based course involving the student to undertake issues for industries, companies, and any organizations which they encounter in their day-to-day work.
- Evaluation of the field project shall consist of Continuous Internal Evaluation (CIE) only for 50 marks.
- CIE shall be done by a Project Review Committee (PRC) consisting of the Head of the Department, faculty supervisor and a senior faculty member of the specialization / department.
- The internal evaluation shall be on the basis of two seminars for 50 marks one before SE-I and the other before SE-II as per the calendar dates and evaluation format.
- CIE shall be carried out for 50 marks on the basis of review presentation as per the calendar dates and evaluation format.
- The field project report shall be accepted for submission to the PRC only upon meeting the prescribed similarity index of less than 25%.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22MN6HS201) INTELLECTUAL PROPERTY RIGHTS

TEACHING SCHEME

L	T/P	C
2	0	0

EVALUATION SCHEME

SE-I	SE-II	SEE	TOTAL
50	50	-	100

COURSE OBJECTIVES:

- To familiarize students with the nuances of Intellectual Property Rights (IPR) to help them integrate the IPR process in their research activities
- To make the students capable of identifying their own protectable innovations and realizing the process of taking it from bench to market

COURSE OUTCOMES: After completing this course the student should be able to

CO-1: Get an adequate knowledge on patent and copyright for their innovative research works and academic projects

CO-2: Understand and acquire the knowledge of trademarks and registration aspects

CO-3: Interpret various forms of Intellectual Property on Design, Geographical Indication (GI), Plant Variety and Layout Design Protection and their registration aspects

CO-4: Obtain useful insights from the information in patent documents, especially on novelty of their idea from state-of-the art search, during their research career. This provides further way for developing their idea or innovations

CO-5: Get awareness about current trends in IPR and Govt. steps in fostering IPR

COURSE ARTICULATION MATRIX:

*(Correlation of Course Outcomes with Program Outcomes and Program Specific Outcomes using **mapping levels 1 = Slight, 2 = Moderate and 3 = Substantial**)*

CO	PROGRAM OUTCOMES (PO)												PROGRAM SPECIFIC OUTCOMES (PSO)		
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3
CO-1	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-
CO-2	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-
CO-3	-	-	--	-	-	2	-	3	-	-	-	2	-	-	-
CO-4	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-
CO-5	-	-	-	-	-	2	-	3	-	-	-	2	-	-	-

UNIT – I:

Overview of Intellectual Property: Introduction and the need for Intellectual Property Right (IPR) - Kinds of Intellectual Property Rights: Patent, Copyright, Trade Mark, Design, Geographical Indication, Plant Varieties and Layout Design – Genetic Resources and Traditional Knowledge – Trade Secret - IPR in India : Genesis and development – IPR in abroad - Major International Instruments concerning Intellectual Property Rights: Paris Convention, 1883, the Berne Convention, 1886, the Universal Copyright Convention, 1952, the WIPO Convention, 1967,the Patent Co-operation Treaty, 1970, the TRIPS Agreement, 1994

UNIT – II:

Patents: Patents - Elements of Patentability: Novelty, Non-Obviousness (Inventive Steps), Industrial Application - Non - Patentable Subject Matter - Registration Procedure, Rights and Duties of Patentee, Assignment and licence, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties - Patent office and Appellate Board

UNIT – III:

Copyrights: Nature of Copyright - Subject matter of copyright: original literary, dramatic, musical, artistic works; cinematograph films and sound recordings - Registration Procedure, Term of protection, Ownership of copyright, Assignment and licence of copyright - Infringement, Remedies & Penalties – Related Rights - Distinction between related rights and copyrights

UNIT – IV:

Trademarks:

Concept of Trademarks - Different kinds of marks (brand names, logos, signatures, symbols, well known marks, certification marks and service marks) - Non Registrable Trademarks - Registration of Trademarks - Rights of holder and assignment and licensing of marks - Infringement, Remedies & Penalties - Trademarks registry and appellate board

UNIT – V:

Design: meaning and concept of novel and original - Procedure for registration, effect of registration and term of protection

Geographical Indication (GI): meaning, and difference between GI and trademarks - Procedure for registration, effect of registration and term of protection

Plant Variety Protection: meaning and benefit sharing and farmers' rights – Procedure for registration, effect of registration and term of protection

Layout Design Protection: meaning – Procedure for registration, effect of registration and term of protection

Current Contour: India`s New National IP Policy, 2016 – Govt. of India step towards promoting IPR – Govt. Schemes in IPR – Career Opportunities in IP - IPR in current scenario with case studies

TEXTBOOKS:

1. Intellectual Property Rights: Protection and Management Nithyananda, K V, India, IN: Cengage Learning India Private Limited, 2019
2. Intellectual Property Rights, Neeraj, P., & Khusdeep, D, India, IN: PHI learning Private Limited, 2014
3. Intellectual property right, Deborah, E. Bouchoux, 4th Edition, Cengage learning

REFERENCE:

1. Law relating to Intellectual Property Rights, Ahuja, V K, India, IN: Lexis Nexis, 2017

ONLINE RESOURCES:

1. Intellectual Property Rights – An Overview, Subramanian, N., & Sundararaman, M. Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf, 2018
2. WIPO Intellectual property Handbook, World Intellectual Property Organisation, Retrieved from https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf, 2004