VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY HYDERABAD
B.TECH. II YEAR
ELECTRONICS AND INSTRUMENTATION 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
22ES1EE201	Fundamentals of Electrical Engineering	3	0	0	3	3
22PC1EC203	Signals and Systems	3	0	0	3	3
22PC1EI201	Electronic Devices and Circuits-I	3	1	0	4	4
22PC1EI202	Electronic Measurements	3	0	0	3	3
22PC2EI212	Electronics and Measurements Laboratory	0	0	2	2	1
22PC2EC203	Signals and Systems Simulation Laboratory	0	0	2	2	1
22ES2EE201	Fundamentals of Electrical Engineering Laboratory	0	0	2	2	1
22SD5EI202	Field Project	0	0	2	2	1
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
22PC1EI203	Electronic Devices and Circuits -II	3	0	0	3	3
22PC1EC202	Switching Theory and Logic Design	3	0	0	3	3
22PC1EE205	Control Systems	3	0	0	3	3
22PC1EI204	Linear IC Applications	3	0	0	3	3
22HS1MG201	Engineering Economics and Accountancy	3	0	0	3	3
22PC2EI203	Electronic Circuits Laboratory	0	0	2	2	1
22PC2EI204	IC Applications Laboratory	0	0	2	2	1
22SD5DS203	Python Programming and Practice	0	0	2	2	1
22PW4EI201	Design Thinking	1	0	2	3	2
22MN6HS201	Intellectual Property Rights	2	0	0	2	0
Total		**18**	**0**	**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 learn the analytic functions and their properties
- To learn the concept of complex integration
- To learn the 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 ez, log(z), z2, 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, International Edition, 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

(22ES1EE201) FUNDAMENTALS OF ELECTRICAL ENGINEERING

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE PRE-REQUISITES: Circuit Theory

COURSE OBJECTIVES:

- To know about performance of DC machines
- To understand the operation of transformers and AC machines
- To analyze transient response of circuits with dc excitation
- To understand two port network parameters, filters and attenuators

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

CO-1: Appreciate the working of DC machines

CO-2: Understand the operation of transformers and AC machines

CO-3: Analyze transient response of circuits

CO-4: Evaluate two port parameters and design simple filters

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	-	-	1	-	-	1	3	2	-
CO-2	3	2	3	2	1	2	-	-	1	-	-	1	3	2	-
CO-3	3	3	2	1	1	2	-	-	1	-	-	1	3	2	-
CO-4	3	2	1	2	1	1	-	-	1	-	-	1	2	2	-

UNIT-I:

DC Generators: Principles of Operation, construction, EMF equation, Types of Generators, Magnetization Characteristics of DC Generators.

DC Motors: Principle, Types of DC Motors, speed –Torque Characteristics of DC shunt Motor, Losses and Efficiency, Swinburne's Test, Speed Control of Dc Shunt Motor- Flux and Armature Voltage control methods

UNIT-II:

Transformers: Principle of Operation, Types, Constructional Features, Phasor Diagram on No Load and Load, Equivalent Circuit, Losses, Efficiency and Regulation of Transformer, Simple Problems

Three Phase Induction Motor: Principle of operation -types, torque-Slip characteristics.

Alternators: Principle of operation

UNIT-III:

Transient Analysis (First and Second Order Circuits): Transient Response of RL, RC and RLC Circuits for DC excitations, Initial Conditions, Solution using Differential Equations approach and Laplace Transform Method.

UNIT-IV:

Two Port Networks: Impedance Parameters, Admittance Parameters, Hybrid Parameters, Transmission (ABCD) Parameters, Conversion of one Parameter to another, Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations, Image Parameters, Illustrative problems.

UNIT-V:

Filters: Classification of Filters, Classification of Pass band and Stop band, Characteristic Impedance in the Pass and Stop Bands, Constant-k and mderived filters-Low Pass Filter and High Pass Filters.

TEXT BOOKS:

1. Principles of Electrical Engineering, A. Sudhakar, Shyammohan S. Palli, 8th Edition, Tata McGraw-Hill, 2011
2. Introduction to Electrical Engineering, M. S. Naidu and S. Kamakshaiah, Tata McGraw-Hill, 2017
3. Network Analysis and Synthesis, C. L. Wadhwa, 3rd Edition, New Age International, 2018

REFERENCES:

1. Engineering Network Analysis and Filter Design, Gopal G. Bhise, Prem R. Chadha & Durgesh C. Kulshreshtha Gopal, 1st Edition, Umesh Publication, 1999
2. Engineering Circuit Analysis, W. H. Hayt, J. E. Kemmerly and S. M. Durbin, 8th Edition, McGraw-Hill, 2013
3. Circuit Theory, A. Chakrabarti, 6th Edition, Dhanpat Rai and Co., 2018
4. Network Analysis, N. C. Jagan and C. Lakshmi Narayana, 1st Edition, B. S. Publications, 2012
5. Circuits and Networks Analysis and Synthesis, A. Sudhakar, Shyammohan S. Palli, 5th Edition, Tata McGraw-Hill, 2010

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, Tata 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

(22PC1EI201) ELECTRONIC DEVICES AND CIRCUITS-I

TEACHING SCHEME		
L	T/P	C
3	1	4

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

COURSE PRE-REQUISITES: Engineering Physics

COURSE OBJECTIVES:

- To learn principle of operation, construction and characteristics of various electronic devices
- To understand the characteristics of diodes, transistors and FETs
- To analyze the frequency response of Transistor at low and high frequencies
- To provide the concepts involved in developing of electronic circuits

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the construction and operation of diodes, transistors and FETs
CO-2: Study the characteristics of diodes, transistors, and FETs & their biasing
CO-3: Analyze the frequency response of BJT at Low and high frequencies
CO-4: Develop applications using diodes & transistors

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	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO-2	3	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO-3	3	-	2	-	-	-	-	1	2	1	-	1	-	2	2
CO-4	3	-	-	-	-	2	2	1	2	1	-	1	-	2	2

UNIT – I:

P-N Junction Diode and Applications: Review of P-N Junction as a Diode, Diode Equation, Volt-Ampere Characteristics, Temperature dependence, Ideal and Practical Diode Equivalent Circuits, Transition and Diffusion Capacitances. Breakdown Mechanisms in Semi-Conductor Diodes, Zener Diode Characteristics. Half wave Rectifier, Full wave rectifier, Bridge Rectifier, Harmonic components in a Rectifier Circuit, Capacitor filters, π- section filters, Zener diode as Voltage Regulator.

UNIT – II:

Bipolar Junction Transistor, Biasing and Stabilization: The Bipolar Junction Transistor(BJT), Transistor Current Components, Transistor Construction, BJT Operation, Common Base, Common Emitter and Common Collector Configurations, BJT Specifications. The DC and AC Load lines, Quiescent operating point, Need for

Biasing, Analysis of Voltage Divider Bias, Bias Stability, Stabilization Factors, Stabilization against variations in V_{BE}, β and I_{CO}, Thermal Runaway, Thermal Stability.

UNIT – III:

Field Effect Transistor, Biasing: Construction and operation of Junction Field Effect Transistor (JFET), Volt-Ampere characteristics- Drain and Transfer Characteristics, FET as Voltage Variable Resistor, FET Biasing, Construction and operation of MOSFET, MOSFET characteristics in Enhancement and Depletion modes.

Small Signal Low Frequency Amplifiers: BJT Amplifiers: Small signal low frequency transistor amplifier circuits: h-parameter representation and analysis of single stage CE, CC, CB amplifiers - Computation of voltage gain, current gain, Input impedance and Output impedance; Comparison of CB, CE and CC amplifiers.

UNIT IV:

Frequency Response of BJT Amplifiers: Analysis at low and high frequencies, Effect of coupling and bypass capacitors, Hybrid-π Common Emitter transistor model, CE short circuit gain, CE current gain with resistive load, Single-stage CE transistor amplifier response.

UNIT – V:

Feedback Amplifiers and Oscillators: Concept of feedback, Types of feedback, general characteristics of negative feedback amplifiers, voltage series, voltage shunt, current series and current shunt feedback configurations and their analysis (BJT version), Illustrative problems.

Classification of oscillators, Conditions for oscillations, RC phase shift oscillator, Generalized analysis of LC oscillators – Hartley and Colpitts oscillators, Piezoelectric, crystal oscillator, Stability of oscillators.

TEXT BOOKS:

1. Electronic Devices and Circuits, J. Millman, Halkias and Satyabratha Jit, 2nd Edition, Tata McGraw-Hill, 2007
2. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 11th Edition, Pearson/Prentice Hall, 2006

REFERENCES:

1. Integrated Electronics, J. Millman, Christos. C. Halkias, and Satyabratha Jit, 2nd Edition, Tata McGraw-Hill, 2008
2. Electronic Devices and Circuits, T. F. Bogart Jr., J. S. Beasley and G. Rico, 6th Edition, Pearson Education, 2004
3. Electronic Devices and Circuits, David A. Bell, 5th Edition, Oxford University Press, 2008

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1EI202) ELECTRONIC MEASUREMENTS

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE OBJECTIVES:

- To understand different measurement methods and errors associated with them
- To know the different standards and calibration methodologies adopted in the measurement systems
- To know different AC and DC bridges for the measurement of R, L and C
- To know different types of oscilloscopes and analyzers (Analog and Digital)
- To acquire clear concepts about the DC and AC voltage and current measurements

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

CO-1: Understand the different methods of measurement systems, their characteristics and error analysis

CO-2: Analyze the bridge circuits to measure the unknown values of R, L and C

CO-3: Design and calibrate electronic measurement Systems for the measurement AC & DC voltage, current and power

CO-4: Study of digital systems for the measurement of frequency and time period

CO-5: Study of electronic counters, wave analyzers, CROs, and other display devices

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	-	2	1	-	-	-	-	-	1	-	-
CO-2	2	3	-	2	-	3	2	-	-	-	-	-	2	-	-
CO-3	2	3	-	3	-	2	1	-	-	-	-	-	2	-	-
CO-4	2	3	-	2	-	2	-	-	-	-	-	-	1	-	-
CO-5	2	3	-	-	-	2	-	-	-	-	-	-	2	-	-

UNIT – I:

Introduction to Measuring System: Static Characteristics, Error in measurement, Type of static errors, Dynamic characteristics, Statistical analysis, Probability of errors, Limiting errors, Standards - International standards, Primary standards, Secondary standards, Working standards.

UNIT – II:

Bridge Circuit and Measurements: Bridge Measurement – Wheatstone bridge, Kelvin bridge, AC bridges - Conditions for bridge balance, Maxwell's bridge, Anderson

bridge, Hays bridge, Schering bridge, Wien bridge, Wagner ground connection, Q-meter, Vector impedance meter.

UNIT – III:

Voltage, Current and Power Measurements: DC Ammeters and DC Voltmeters, AC voltmeter using rectifier, True RMS responding voltmeters, Electronic multimeters, Digital Voltmeters - General characteristics, Ramp type DVM, Integrating type DVM, Successive approximation type DVM, Calibration of voltmeter and ammeter, Wattmeter for power measurement, Watt-hour meter (Energy Meter), Power factor meters.

UNIT – IV:

Frequency and Time Measurements: Digital Frequency Meter: Principle of operation, Basic circuit, frequency measurement, High frequency measurements, Digital measurement of Time-Time base selector, Period measurement, Ratio and multiple ratio measurements, Electronic Counter - Totalizing, Frequency mode, Ratio mode, Period mode, Time interval mode.

Analyzers: Basic Wave Analyzer - Frequency selective wave analyzer and Heterodyne wave analyzer, Harmonic distortion analyzer - Tuned circuit and heterodyne, Spectrum analyzer, Logic analyzers.

UNIT – V:

Oscilloscope and Some Display Devices: Oscilloscopes: Basic CRO circuits, Lissajous patterns, Multi input oscilloscopes - Dual trace and Dual beam, Sampling oscilloscopes, Storage oscilloscope - Analog and Digital.

Display Devices: Segmental Display - 7 segment, 14 segment and Dot Matrix, LED and LCD.

TEXT BOOKS:

1. Electronic Instrumentation and Measurements Techniques, Helfrick and W.D. Cooper, PHI
2. Network Analysis, A. Sudhakar, Shyammohan Palli, McGraw-Hill
3. Electronic Instrumentation, H. S. Kalsi, Tata McGraw-Hill, 2004

REFERENCES:

1. Electrical and Electronic Measurements, Shawney, Khanna Publishers
2. Electronic Measurements and Instrumentation, Bernard Oliver, John Cage
3. Principles of Measurement Systems, John P. Bentley, 3rd Edition, Addison Wesley Longman, 2000
4. Electronic Instrumentation and Measurements, David A. Bell, 2nd Edition, PHI, 2003
5. Electronic Instruments and Instrumentation Technology, M. M. S. Anand, Prentice-Hall of India

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC2EI212) ELECRONICS AND MEASUREMENTS 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 identify various semiconductor diodes & transistors
- To understand characteristics and frequency response of semiconductor devices
- To make students design basic measuring circuits like bridges

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

CO-1: Understand the specifications of various semiconductor devices and their characteristics

CO-2: Analyze the frequency response of various semiconductor devices

CO-3: Appreciate the use of various bridges for the measurement of R, L and C

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	-	-	-	2	2	-	-	1	-	-	-	1	3	3
CO-2	1	2	-	-	2	2	1	-	1	-	-	-	2	3	3
CO-3	2	3	-	2	-	2	2	-	1	-	-	-	3	3	3

LIST OF EXPERIMENTS:

1. V-I characteristics of PN junction diode, Zener diode under forward and reverse bias.
2. Full-wave Rectifier without filter and with filters.
3. Input and Output characteristics of CE transistor configuration.
4. Input and Output characteristics of CB transistor configuration.
5. Input and Output characteristics of CC transistor configuration.
6. Characteristics of FET.
7. Frequency response of CE Amplifier.
8. Frequency response of CS Amplifier.
9. Measurement of Resistance using Wheatstone Bridge.
10. Measurement of Low Resistances using Kelvin Bridge.
11. Measurement of Capacitance using Schering Bridge.
12. Measurement of Inductance using Maxwell's Bridge and Measurement of L, C and R using Q-Meter.

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

(22ES2EE201) FUNDAMENTALS OF ELECTRICAL ENGINEERING 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 understand the construction of electrical equipment
- To apply different circuit reduction techniques using theorems
- To analyze the transient and steady state behavior of the RLC networks
- To practice the techniques to control and assess electrical machines

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

CO-1: Apply different network theorems to solve complex electrical circuits

CO-2: Analyze the transient and steady state behavior of the RLC networks

CO-3: Realize the compatibility of electrical machines in different engineering fields

CO-4: Control different electrical machines and evaluate their 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	3	2	1	1	1	1	-	-	1	-	-	1	2	3	-
CO-2	3	2	3	2	1	2	-	-	1	-	-	1	2	3	-
CO-3	3	3	2	1	1	2	-	-	1	-	-	1	3	3	-
CO-4	3	2	2	1	1	1	1	-	-	-	-	-	3	3	-

LIST OF EXPERIMENTS:

1. Verification of KCL, KVL.
2. Verification of superposition and reciprocity theorems.
3. Verification of maximum power transfer theorem.
4. Verification of Thevenin's and Norton's theorems
5. Analysis of series RL, RC and RLC circuits.
6. Series resonant frequency, bandwidth and Q-factor determination for RLC network.
7. Two port network parameters –Z and Y-parameters.
8. Load test on 1- φ transformer.
9. Speed control of DC shunt motor.
10. Torque-Speed characteristics of separately excited DC motor.
11. Brake test on 3- φ Induction motor.
12. Control of synchronous generator voltage through its field excitation.

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22SD5EI202) 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. 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

(22PC1EI203) ELECTRONIC DEVICES AND CIRCUITS – II

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE PRE-REQUISITES: Electronic Devices and Circuits-I

COURSE OBJECTIVES:

- To analyse the linear and non-liner wave shaping circuits
- To understand the principle of multistage amplification
- To identify the difference between Power amplification and voltage amplification
- To study the principle and working of various special purpose electronic devices

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

CO-1: analyze the linear and non-liner wave shaping circuits

CO-2: Design and implement multistage amplifiers

CO-3: analyze Power amplifiers, their classification, the coupling mechanisms and efficiency

CO-4: Understand various special devices, their operation, characteristics and applications

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	-	-	-	-	-	-	-	-	-	-	-	1	1	2
CO-2	2	2	1	-	-	2	2	-	-	-	-	-	2	2	2
CO-3	2	2	1	-	-	2	2	-	-	-	-	-	2	2	2
CO-4	1	-	-	-	-	2	-	-	-	-	-	-	1	2	2

UNIT – I:

Linear and Non-Linear Wave Shaping: High pass, Low pass RC circuits and their response for sinusoidal, step, pulse, square inputs. RC network as differentiator and integrator. Attenuators. Diode clippers, clipping at two independent levels, Transfer characteristics of clippers, clamping operation, clamping circuits, Clamping circuit theorem.

UNIT – II:

Multistage Amplifiers: Introduction, Methods of inter-stage coupling, BJT: n-stage RC coupled amplifier, Equivalent circuits, Miller's Theorem, Amplifier analysis, Darlington Pair.

UNIT – III:

Power Amplifiers: Classification of power amplifiers, Series-fed and Transformer coupled Class A audio power amplifier, Efficiency of Class A amplifier.

Class B amplifier, Transformer-coupled Class B push-pull amplifier, Complementary-symmetry Class B push-pull amplifier, Efficiency of Class B amplifier, Distortion in power amplifiers, Heat sinks.

UNIT – IV:

Special Purpose Electronic Devices: Principle of Operation and Characteristics of Tunnel Diode (with the help of Energy Band Diagram), Varactor Diode and Schottky barrier diode. Principle of Operation and Characteristics of UJT, UJT Relaxation Oscillator. Principle of Operation of Semiconductor Photo Diode, PIN Diode, Photo Transistor, LED and LCD.

UNIT – V:

Thyristors: Principle of Operation of SCR, Schockley diode, DIAC and TRIAC. Triggering of Thyristors, overview of Commutation Techniques of Thyristors.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms, J. Millman and H. Taub, McGraw-Hill, 1991
2. Integrated Electronics, Jacob Millman and Christos C. Halkias, Tata McGraw-Hill, 2008
3. Industrial and Power Electronics, G. K. Mithal and Maneesha Gupta, 19th Edition, Khanna Publishers, 2003

REFERENCES:

1. Electronic Circuit Analysis, S. Salivahanan, N. Suresh Kumar, 2nd Edition, Tata McGraw-Hill, 2012
2. Thyristors and Applications, M. Rammurthy, East-West Press, 1977
3. Integrated Circuits and Semiconductor Devices, Deboo and Burroughs, ISE
4. Micro Electronic Circuits–Sedra and Smith, 5th Edition, Ox

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV 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 will 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	2	3	1	2	1	-	-	-	-	-	1	3	2	-
CO-2	3	2	2	1	2	1	-	-	-	-	-	1	3	2	-
CO-3	2	3	3	1	2	1	-	-	-	-	-	1	3	3	-
CO-4	3	2	1	2	1	1	-	-	-	-	-	1	3	1	-
CO-5	3	3	1	1	1	-	-	-	-	-	--	-	2	1	-

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. 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

(22PC1EI204) LINEAR IC APPLICATIONS

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE OBJECTIVES:

- To study about electrical characteristics of analog ICs like Op-Amps, IC 555 timer, PLL
- To analyze and know the design concepts of various applications of ICs
- To describe the analog to digital and digital to analog techniques
- To study the design concepts of analog circuits using ICs and its applications

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

CO-1: Analyze the working of Op-Amps & ICs and their characteristics

CO-2: Design linear and non-linear applications of Op-Amps

CO-3: Design applications using special purpose ICs like 555 timer and 565 PLL

CO-4: Design A/D and D/A Converters using 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	2	1	1	1	1	1	-	1	1	1	-	1	1	1	1
CO-2	2	1	1	1	1	1	-	1	1	1	-	1	1	1	1
CO-3	2	1	1	1	1	1	-	1	1	1	-	1	1	1	1
CO-4	2	1	1	1	1	1	-	1	1	1	-	1	1	1	1

UNIT – I:

Integrated Circuits: Differential Amplifier- DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

Characteristics of Op-Amps & Integrated Circuits: Types, Classification, Package Types and Temperature ranges, Power supplies, Op-amp Block Diagram, ideal and practical Op-amp Specifications, DC and AC characteristics, 741 op-amp & its features

UNIT – II:

Linear Applications of Op-Amps: Inverting and Non-inverting amplifier, Op- Amp parameters & Measurement, Frequency Compensation techniques, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers.

UNIT – III:

Non-linear Applications of Op-Amps: Non- Linear function generation, Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log Amplifiers. **Active Filters, Analog Multipliers and Modulators:** Design & Analysis of Butterworth active filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters. Four Quadrant Multiplier, IC 1496, Sample & Hold circuits.

UNIT – IV:

Timers & Phase Locked Loops: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger; PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators. Applications of VCO (566).

UNIT – V:

Digital to Analog and Analog to Digital Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).

TEXTBOOKS:

1. Linear Integrated Circuits, D. Roy Choudhury, 2nd Edition, New Age International, 2003
2. Op-Amps & Linear ICs, Ramakanth A. Gayakwad, PHI, 1987
3. Operational Amplifiers, C. G. Clayton, Butterworth Company / Elsevier, 1971

REFERENCES:

1. Operational Amplifiers & Linear Integrated Circuits, Sanjay Sharma, 2nd Edition, S.K. Kataria & Sons, 2010
2. Design with Operational Amplifiers & Analog Integrated Circuits, Sergio Franco, McGraw-Hill, 1988
3. OP AMPS and Linear Integrated Circuits Concepts and Applications, James M. Fiore, Cengage Learning
4. Operational Amplifiers & Linear Integrated Circuits, R. F. Coughlin & Fredrick Driscoll, 6th Edition, PHI
5. Operational Amplifiers & Linear ICs, David A. Bell, 3rd Edition, Oxford University Press

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22HS1MG201) ENGINEERING ECONOMICS AND ACCOUNTANCY

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE OBJECTIVES:

- To understand the basic concepts of economics and different forms of business organizations
- To create awareness on basics of business economics and to analyze the concepts of demand and supply
- To describe each stage of product life cycle with the help different costs and their role in maintaining optimum cost of production and overall profitability by considering different market competitions
- To acquaint with the basic accounting knowledge and financial accounting process
- To evaluate the performance of the organization using various ratios

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

CO-1: Perform decision making function effectively in an uncertain framework by applying the based concepts of economics and select suitable form of business organization which meets the requirements of business

CO-2: Take the right decisions towards buying and selling of goods and services based on the demand and supply dynamics in the markets

CO-3: Fix the right price based upon production cost which can best meet the pre-determined objectives of the business under different market conditions

CO-4: Prepare book of accounts and understand overall position of the business

CO-5: Interpret the firm's financial performance using various ratios

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	2	1	3	1	-	-	-
CO-2	-	-	-	-	-	-	-	1	2	1	3	1	-	-	-
CO-3	-	-	-	-	-	-	-	1	2	1	3	1	-	-	-
CO-4	-	-	-	-	-	-	-	1	2	1	3	1	-	-	-
CO-5	-	-	-	-	-	-	-	1	2	1	3	1	-	-	-

UNIT-I:

Introduction to Economics: Definition, nature, scope and types of Economics. National Income (NI) & types of Inflation.

Forms of Organizing Private and Public-Sector Business Enterprises:
Private Sector Business Enterprises: (i) Sole Proprietorship – Definition, features, merits, limitations & suitability. (ii) Partnership – Definition, Partnership Act, features, types, merits, limitations, suitability. (iii) Joint-Stock Company – Definition, Companies Act, features, types, merits, limitations, suitability.
Public Sector Business Enterprises: Definition, features, objectives, merits, problems

UNIT-II:
Business Economics: Definition, nature and scope, linkages with other disciplines.
Demand Analysis: Law of Demand, Factors affecting demand; Elasticity of Demand-Types Measurement, Factors affecting and Significance,
Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.
Supply Analysis: Determinants of Supply, Supply function and Law of Supply.

UNIT-III:
Production, Cost, Market Structures & Pricing:
Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions - Cobb-Douglas.
Cost Analysis: Types of Costs, Short run and long run Cost Functions.
Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.
Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis (Simple problems)

UNIT-IV:
Introduction to Financial Accounting: Definition, basic principles and double-entry book-keeping, practice of accounting process-Journal, ledger, trial balance and final accounts (simple problems)

UNIT-V:
Ratio Analysis: Meaning, computation of ratios (i) Liquidity Ratios: Current Ratio and Quick Ratio, (ii) Solvency Ratios: Interest Coverage Ratio and Debt-Equity Ratio, (iii) Activity Ratios: Stock/Inventory Turnover Ratio and Debt Turnover Ratio, (iv) Profitability Ratios: Gross Profit Ratio, Net Profit Ratio & Earning Per Share (EPS) Ratio

TEXT BOOKS:

1. Managerial Economics, D.M. Mithani, 9th Edition, Himalaya Publishing House, 2022
2. Managerial Economics, Satya P. Das & J. K. Goyal, 2nd Edition, Sage Publications, 2022
3. Financial Accounting, S. N. Maheswari, 6th Edition, Vikas Publications, 2018

REFERENCES:

1. Managerial Economics, Dominick Salvatore, Siddhartha K. Rastogi, 9th Edition, Oxford Publications, 2020
2. Financial Accounting for Management: An Analytical Perspective, Ambrish Gupta, 6th Edition, Pearson Education, 2018
3. Business Economics, H. L. Ahuja, 13th Edition, S. Chand, 2019

4. Principles of Marketing: A South Asian Perspective, Kotler Philip, Gary Armstrong, Prafulla Y. Agnihotri, and Eshan-ul Haque, 13th Edition, Pearson Education/ Prentice Hall of India, 2010

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC2EI203) ELECTONIC 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 OBJECTIVES:

- To understand the linear and non-linear wave shaping
- To explain the operation, design and analysis of multistage amplifiers using BJT and MOS
- To develop power amplifiers and controlled rectifiers with desirable efficiency

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Design linear and nonlinear wave shapers for desired specifications
CO-2: Design multistage amplifiers to suit impedance and gain parameters requirements
CO-3: Design power amplifiers and controlled rectifiers for suitable efficiencies

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	-	-	-	2	2	2
CO-2	2	2	1	1	1	1	-	-	1	-	-	-	2	2	2
CO-3	2	2	2	1	1	2	-	-	1	-	-	-	2	2	2

LIST OF EXPERIMENTS:

Design and simulation of the following circuits using simulation software and implementation through hardware.

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Two stage RC coupled BJT Amplifier.
5. Darlington pair.
6. Cascode amplifier.
7. Characteristics of UJT and UJT Relaxation Oscillator.
8. Class A power Amplifier (Transformer less and with transformer load).
9. Class B Complementary Symmetry Amplifier.
10. Class C Tuned Amplifier.
11. MOS Amplifier.
12. SCR characteristics

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC2EI204) IC APPLICATIONS 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 understand the application of OP-AMP and manipulate the signals
- To understand to generate controlled oscillations using OP-AMP
- To understand the procedure to select IC that can chose any required inputs at any instances and generate required output voltage

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

CO-1: Design different signal manipulators using OP-AMP

CO-2: Design oscillators, waveform generators and filters using OP-AMP and other ICs

CO-3: Design systems using OP-AMP to yield high input impedance and controlled oscillations

CO-4: Verify the functionality of flip flops, counters, multiplexers, DACs and voltage regulators

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	1	1	1	-	1	2	1	-	1	2	2	2
CO-2	2	2	2	1	1	1	-	1	2	1	-	1	2	2	2
CO-3	2	2	2	1	1	1	-	1	2	1	-	1	2	2	2
CO-4	2	2	2	1	1	1	-	1	2	1	-	1	2	2	2

LIST OF EXPERIMENTS:

1. Verification of Logic Gates, Flip flops, Counters and Multiplexers.
2. Adder, Subtractor and Comparator using IC 741 OP-AMP.
3. Integrator and Differentiator using IC 741 OP-AMP.
4. Square Wave Generator and Triangular Wave Generator using OP-AMP.
5. Low pass and High Pass Filters using IC 741 OP-AMP.
6. Wien Bridge Oscillators using IC 741 OP-AMP.
7. 4-bit Digital to Analog converter using OP-AMP.
8. Schmitt Trigger circuits using IC 741.
9. Mono-stable Multivibrator using IC 555.
10. Astable Multivibrator using IC 555.
11. Three terminal voltage regulators-7805, 7809, 7912.

12. Instrumentation Amplifier.
13. Voltage controlled oscillator.

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	-
CO-5	2	2	1	1	1	1	-	-	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
1. 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

(22PW4EI201) 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. 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