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

III SEMESTER **R22**

Course Code	Title of the Course	L	T	P/D	CH	C
22BS1MT202	Complex Analysis and Transforms	2	1	0	3	3
22PC1EE202	Electromagnetic Fields	3	0	0	3	3
22PC1EE201	Electrical Machines-I	3	1	0	4	4
22PC1EC209	Basic Electronic Devices and Circuits	3	0	0	3	3
22PC1EC202	Switching Theory and Logic Design	3	0	0	3	3
22PC2EE201	Electrical Machines-I Laboratory	0	0	2	2	1
22PC2EC209	Basic Electronic Devices and Circuits Laboratory	0	0	2	2	1
22PC2EC202	Logic Design Laboratory	0	0	2	2	1
22SD5EE202	Field Project	0	0	2	2	1
22MN6HS102	Environmental Science	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
22PC1EE203	Electrical Machines-II	3	0	0	3	3
22PC1EE204	Power Systems-I	3	0	0	3	3
22PC1EC210	Analog Electronic Circuits	3	0	0	3	3
22PC1ME210	Fluid Mechanics and Machinery	3	0	0	3	3
22HS1MG201	Engineering Economics and Accountancy	3	0	0	3	3
22PC2EE203	Electrical Machines-II Laboratory	0	0	2	2	1
22PC2EC210	Analog Electronic Circuits Laboratory	0	0	2	2	1
22SD5DS203	Python Programming and Practice	0	0	2	2	1
22PW4EE201	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

(22BS1MT202) COMPLEX ANALYSIS AND TRANSFORMS

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 analytic functions and their properties
- To learn the concept of complex integration
- To learn the notion of conformal mapping
- To learn the calculation of Fourier coefficients and Fourier transform of a function
- To learn the classifications and method of solving Partial Differential Equations

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

CO-1: Apply Cauchy-Riemann equations to study analyticity of functions

CO-2: Evaluate contour integrals using Cauchy's theorem

CO-3: Analyze the image of the given curve under the given transformation

CO-4: Solve the problems using Fourier series and Fourier transforms

CO-5: Model the problem into PDE and solve it

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

UNIT-I:

Functions of a Complex Variable: Functions of a complex variable, Continuity, Differentiability, Analyticity, Cauchy-Riemann equations in Cartesian and polar coordinates (without proofs), Harmonic and conjugate harmonic functions, Milne – Thompson method.

UNIT – II:

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

singular point, pole of order m, essential singularity. Residues – Evaluation of residue by formulae, Residue theorem (without proofs).

UNIT – III:

Conformal Mapping: Transformation of, lnz, 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.

UNIT-IV:

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).

UNIT-V:

Partial Differential Equations: Definition of Partial Differential Equations, Solutions of first order linear (Lagrange's) equation and non-linear (standard type) first order equations, Partial Differential Equations of second order: Classifications-parabolic, elliptic and hyperbolic, solving partial differential equations using Method of separation of variables, wave equation Problems of vibrating string.

TEXT BOOKS:

1. Complex Variables and Applications, J. W. Brown and R. V. Churchill, 7th Edition, McGraw-Hill, 2004
2. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 36th Edition, 2010
3. Higher Engineering Mathematics, B.V. Ramana, Tata McGraw-Hill, 11th Reprint, 2010

REFERENCES:

1. Advanced Engineering Mathematics, Peter O'Neil, 5th Edition, Cengage Learning, 2000
2. Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2006

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1EE202) ELECTROMAGNETIC FIELDS

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE PRE-REQUISITES: Engineering Mathematics

COURSE OBJECTIVES:

- To introduce concepts of the electrostatic field
- To introduce concepts of the magnetic field
- To understand the concepts of time-varying fields
- To appreciate the modifications in Maxwell's equations

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

CO-1: Analyze static electric fields, electric dipole and capacitance

CO-2: Obtain magnetic fields and inductance due to simple configurations

CO-3: Understand magnetic materials, magnetic dipole and magnetic forces due to various configurations

CO-4: Analyze the concepts of time-varying fields and Maxwell's equations

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

UNIT-I:

Static Electric Field: Coulomb's law, Electric Field Intensity (EFI)-EFI due to a Line charge, Surface charge, Numerical problems on EFI; Work done in moving a point charge in an electrostatic field; Absolute Electric potential and Potential difference, Potential gradient.

Gauss law and its applications for Line and Surface charges, Maxwell's first equation DivD= ρV,; Laplace's and Poisson's equations, Solution of Laplace's equation in one variable.

UNIT-II:

Conductors, Dipole, Dielectrics and Capacitance: Electric dipole and Dipole moment, Potential, EFI due to dipole and Torque on an electric dipole; Conductors- Properties

when placed in electric field, Current and current densities, Ohms Law in Point form, Continuity equation of current; Dielectric-Polarization, Relation among EFI, Permittivity and Electric flux density. Boundary conditions of perfect dielectric materials; Capacitance of a parallel plate, spherical and co-axial capacitors, Parallel plate capacitor on composite dielectrics and Problems; Electrostatic Energy stored and Energy density in the static electric field.

UNIT-III:

Static Magnetic Fields and Magnetic Materials: Static magnetic fields-Biot- Savart's Law and its alternate forms, Maxwell's second equation div B=0, Magnetic Field Intensity due to straight current carrying filament, circular and solenoid current carrying wire using Biot-Savart's law.

Ampere's Circuital law and its application for MFI due to long current carrying filament& infinite sheet of current, Maxwell's third equation Curl H=JC; Nature of Magnetic materials, Magnetization and permeabilityRelation among MFI, Permeability and magnetic flux density, Magnetic boundary conditions.

UNIT-IV:

Magnetic Forces and Magnetic Dipole: Magnetic force-Moving charges in a magnetic field, Lorentz force equation, Force on a differential current element, straight long current carrying conductor in a magnetic field, Force between two straight long and parallel current carrying conductors and Problems.

Energy stored and Energy density; Magnetic dipole and dipole moment, Torque on a current loop placed in magnetic field; Comparison between Electric circuits and Magnetic Circuits.

UNIT-V:

Inductance, Time-Varying Fields and Maxwell's Equation: Inductances due to solenoids, toroids and cables and Numerical Problems; Scalar Magnetic Potential and limitations, Vector magnetic potential, vector Poison's equation.

Faraday's law for Electromagnetic induction, Its integral and point forms-Maxwell's fourth equation curl E=-δB/δt, Statically induced EMF and Dynamically induced EMF-Modification of Maxwell's Third equation for time varying fields from Gauss Law and Amperes law, Displacement current and Displacement current density, Poynting Theorem and Poynting vector.

TEXT BOOKS:

1. Engineering Electromagnetics, William H. Hayt & John A. Buck, 7th Edition, McGraw-Hill, 2006
2. Elements of Electromagnetics, M. N. O. Sadiku, Oxford University Publication, 2014

REFERENCES:

1. Electromagnetics, S. Kamakshaiah, Right Publishers, 2007
2. Electromagnetism-Problems with Solution, Pramanik, Prentice Hall India, 2012
3. The Electromagnetic Field in its Engineering Aspects, G. W. Carter, Longmans, 1954
4. Electricity and Magnetism, W. J. Duffin, McGraw-Hill, 1980

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1EE201) ELECTRICAL MACHINES-I

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, Network Analysis

COURSE OBJECTIVES:
- To understand the electro-mechanical energy conversion process and operation of DC machines and transformers
- To know the different testing methods for dc machines and transformers
- To know the behavior of DC machines and transformers
- To learn about different method to control the speed of DC motor and voltage of transformers

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Identify the different parts and their role in electro-mechanical energy conversion operation of DC machines and transformers
CO-2: Select DC machines and transformers for appropriate application
CO-3: Apply different strategies for starting and control of DC motor and to regulate transformer output voltage
CO-4: Assess the performance of DC machines and transformers through different testing methods

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

UNIT –I:
Electromechanical Energy Conversion: Energy stored in the magnetic field, Electro-magnetic force in Singly excited electromagnetic systems, Electromagnetic Torque in Multi Excited Systems.
DC Generator-I: DC Generator principle-Simple Loop generator, commutator action, construction, EMF equation, Armature windings-lap and wave windings

UNIT–II:
DC Generators-II: Types of DC Generators–OCC-voltage build-up in a shunt generator-critical field resistance and critical speed- Armature reaction-

compensating windings, Commutation- Methods of improving commutation-Internal and External characteristics of DC Generators

UNIT–III:

DC Motors: Principle, back EMF, Types of DC motors, Mechanical Power developed, Torque equation, Operating characteristics of dc motors. Starting &Speed control of DC shunt motors, Losses and efficiency, condition for maximum efficiency, Swinburne's test-Brake Test-Back-to back test-Field's Test

UNIT–IV:

Transformers-I: Principle and construction of single-phase transformers, EMF equation, ideal transformer, transformer on No-load, effect of saturation and hysteresis on no load, Transformer on Load, phasor diagrams, voltage regulation, losses and efficiency, Open circuit and short circuit tests, back-to-back test, All-Day efficiency.

UNIT–V:

Transformers-II: Parallel operation of single phase transformers, Three-phase transformers, Construction-different configurations, Open Delta connection, Scott connection, On Load and Off Load Tap-changers, Three-winding transformers, Autotransformers.

TEXTBOOKS:

1. Electric Machines, J. Nagrath and D. P. Kothari, McGraw-Hill, 2010
2. Electrical Machinery, P. S. Bimbhra, Khanna Publishers, 2011

REFERENCES:

1. Electric Machinery, E. Fitzgerald and C. Kingsley, McGraw-Hill, 2013
2. Performance and Design of AC Machines, M. G. Say, CBS Publishers,2002
3. Performance and Design of DC Machines, E. Clayton and N. N. Hancock, CBS Publishers, 2004
4. Electric Machinery Fundamentals, Stephen J. Chapman, 5th Edition, TMH, 2017

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC1EC209) BASIC ELECTRONIC DEVICES AND CIRCUITS

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 understand the construction, principle of operation and characteristics of various semiconductor devices
- To study the applications of various semiconductor devices
- To learn the biasing techniques of semiconductor devices
- To analyze low frequency BJT and FET amplifiers
- To understand the concepts of feedback in amplifiers and oscillators

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

CO-1: Know the principle of operation of diode, special purpose devices and its applications

CO-2: Understand the principle of operation of BJT, JFET and MOSFET

CO-3: Appreciate the need for biasing

CO-4: Explain the necessity of feedback in amplifiers and oscillators

CO-5: Design single stage amplifiers using BJT and FET

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

UNIT - I:

PN-Junction Diode and Applications: Review of p-n Junction as a Diode, Volt-Ampere Characteristics, Ideal and Practical Diode Equivalent Circuits, Transition and Diffusion Capacitances, Breakdown Mechanisms in Semi-Conductor Diodes, Zener Diode and its Characteristics. Half wave Rectifier, Full wave rectifier, Capacitor filters and π-section filters.

Special Purpose Devices: SCR, UJT, Varactor Diode and Photo Diode.

UNIT - II:

Bipolar Junction Transistor and Biasing: Principle of Operation, Common Base, Common Emitter and Common Collector characteristics, Transistor as a switch and an Amplifier, DC and AC Load lines, Biasing- Analysis of Fixed Bias, Collector to Base Bias and Voltage Divider Bias, Thermal Runaway and Compensation Techniques.

UNIT-III:

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

UNIT-IV:

Small Signal Low Frequency Amplifiers:

BJT Amplifiers: Transistor Hybrid model, h-parameter representation and analysis (Exact and approximate) of single stage CE, CC and CB amplifiers.

JFET Amplifiers: JFET Small Signal Model, Analysis of CS and CD JFET Amplifiers.

UNIT-V:

Feedback Amplifiers and Oscillators: Concept of feedback, General characteristics of Negative feedback amplifiers – Effect of Negative Feedback on Amplifier characteristics, voltage series, voltage shunt, current series and current shunt feedback configurations and their analysis (BJT version), Classification of oscillators, Conditions for oscillations, Design of RC phase shift oscillator(BJT version), Generalized analysis of LC oscillators – Design of Hartley and Colpitts oscillators(BJT version), piezoelectric crystal oscillator.

TEXT BOOKS:

1. Electronic Devices and Circuits, J. Millman, C. Halkias, and Satyabrata Jit, 4th Edition, Tata McGraw-Hill, 2015
2. Electronic Devices and Circuits, R. L. Boylestad and Louis Nashelsky, 11th Edition, Pearson/Prentice Hall, 2016

REFERENCES:

1. Integrated Electronics, J. Millman, C. Halkias, and Chetan D. Parikh, 2nd Edition, Tata McGraw-Hill, 2010
2. Electronic Devices and Circuits, T. F. Bogart Jr., J. S. Beasley and G. Rico, 6th Edition, Pearson Education, 2004
3. Microelectronic Circuits, Adel S. Sedra and Kenneth C. Smith, 7th Edition, Oxford, 2014

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/115102014
2. https://nptel.ac.in/courses/108102097
3. https://nptel.ac.in/courses/108102095

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

(22PC2EE201) ELECTRICAL MACHINES-I 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: Circuit Theory

COURSE OBJECTIVES:

- To expose the students to the operation of DC machines
- To perform different tests on transformers and DC machines
- To know different methods of controlling the speed of DC motors
- To examine the self-excitation phenomenon in DC generators

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

CO-1: Understand the process of Starting and controlling different DC machines

CO-2: Assess the performance of DC machines and transformers using different testing methods

CO-3: Identify different conditions to be satisfied for self-excitation of DC generators

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

LIST OF EXPERIMENTS:

1. Magnetization characteristics of DC shunt generator.
2. Swinburne's Test on DC Shunt Machine
3. Speed control of DC Shunt Motor.
4. Separation of losses of a DC Shunt Machine.
5. Load Test on DC Shunt Generator.
6. Load Test on DC Series Generator.
7. Hopkinson's Test on a Pair of Identical DC Shunt Machines.
8. Field's Test on a pair of Identical DC Series Machines.
9. Open circuit and short circuit tests on single phase Transformer.
10. Load Characteristics of DC Compound Generator.
11. Brake Test on DC Compound Motor.
12. Determination of Voltage Regulation of Single Phase Transformer by direct method

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. III Semester

(22PC2EC209) BASIC ELECTRONIC DEVICES AND 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: Applied Physics

COURSE OBJECTIVES:

- To know the characteristics of various devices like Diode and Zener Diode
- To Verify the operation of Special purpose devices
- To verify the applications of semiconductor devices
- To learn the operation, design and analysis of single stage amplifiers using BJT and FET
- 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: Analyse the characteristics of various semiconductor devices and Special purpose devices

CO-2: Implement the applications using Semiconductor devices

CO-3: Design single stage and multi-stage amplifiers and compute Frequency Response.

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

LIST OF EXPERIMENTS:

(Any Twelve experiments to be done)

1. V-I characteristics of PN junction diode under forward and reverse bias.
2. V-I characteristics of Zener diode and Zener voltage regulator
3. Full wave Rectifier without filter and with π filter
4. Characteristics of UJT
5. Input and Output characteristics of CE transistor configuration
6. Input and Output characteristics of CB transistor configuration

7. Transistor as a switch
8. Frequency response of CE Amplifier
9. Frequency response of CS Amplifier
10. Frequency response of Voltage series feedback amplifier
11. Design of RC phase shift Oscillator using transistor
12. Design of Colpitts Oscillator using transistor
13. Characteristics of FET under CS configuration
14. Design of Hartley Oscillator using transistor

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

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

(22SD5EE202) 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
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

(22MN6HS102) ENVIRONMENTAL SCIENCE

TEACHING SCHEME		
L	T/P	C
2	0	0

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

COURSE PRE-REQUISITES: Basic Knowledge of Environmental Issues

COURSE OBJECTIVES:
- To recognize the impacts of human interventions towards environment
- To list out the benefits in creating a sustainable world
- To sketch out various activities in achieving a cleaner environment
- To emphasize the role of frontier technologies for a better planet to live

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Gain a variety of experiences & acquire a basic knowledge about the environment & its allied problems
CO-2: Interpret the key components in safeguarding the environment
CO-3: Appraise the quality of environment in order to create a healthy atmosphere
CO-4: Familiarize with the importance of emerging technologies towards green revolution

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

MODULE 1:
Introduction to Environmental Science: Importance of Environmental Science, Overview of the environment & its components, Human intervention in destruction or sustenance of environment. Relationship between environmental science & society - Influence of Industry, Innovation & infrastructure on environment

MODULE 2:
Synergy With Environment: Health & Well Being-ensuring healthy lives and promoting wellbeing at all ages. Reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination. Life under water and on land-conservation & sustainable usage, measures to protect marine & coastal ecosystems from various impacts. Protect and restore terrestrial ecosystems, sustainably managing forests, combat desertification. Biodiversity a valuable

resource- biological diversity as a support for food, water, medicine, shelter, cleaning of air and water and other material goods for sustaining life and increase resilience

MODULE 3:

Climate Change: Science behind climate change-factors responsible for climate change, Scientific evidence about past climate and present. Expected consequences of climate change- Impacts of climate change on growth and development. Role of greenhouse gases- Global temperature rise & its impact on environment & human health. Carbon footprint-Briefing on Paris agreement, Identify key sectors for low carbon footprint. Climate change mitigation & adaptation strategies

MODULE 4:

Moving Towards Sustainability: Eco-Audit and its importance. Sustainable agriculture-Organic farming and hydroponics. Role of AI & IOT for efficient management of environmental issues-Health, air, water, and soil. Sustainable living practices-minimizing waste, limited use of earth's natural resources, wise use of environment and ensuring quality working/living environments

MODULE 5:

Innovations in Environmental Science: Sustainable cities and communities-case study, Responsible consumption & production- Refuse, Reduce, Reuse and Recycle with examples. Innovative approaches to waste management-smart waste management, Plastic recycling-innovative ideas.

TEXTBOOKS:

1. Environmental Studies for UG Courses, Erach Bharucha, UGC Publications, 2004
2. Environmental Studies, Rajagopalan, Oxford University Press
3. Introduction to Climate Change, Andreas Schmittner, Oregon State University, 2018

REFERENCES:

1. Green Development: Environment and Sustainability in a Developing World, Bill Adams, 4th Edition, Routledge Publishers, 2021
2. Fixing Climate, Robert Kunzig & Wallace S. Broecker, Main Edition, Profile Books Publisher, 2009
3. Plastic Waste and Recycling-Environmental Impact, Societal Issues, Prevention and Solutions, 1st Edition, Academic Press, 2020

ONLINE RESOURCES:

1. https://www.coursera.org/learn/beyond-the-sustainable-development-goals-addressing-sustainability-and-development
2. https://www.coursera.org/specializations/climatechangeandsustainableinvesting

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC1EE203) ELECTRICAL MACHINES-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: Circuit Theory, Network Analysis & EM-I

COURSE OBJECTIVES:

- To understand the armature windings and the flux patterns in AC machines
- To know the construction and operation of induction and synchronous machines
- To know the different testing methods for induction and synchronous machines
- To know the behavior of induction and synchronous machines

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

CO-1: Identify different parts of ac machines and develop AC windings to establish the rotating magnetic fields

CO-2: Understand the operation of AC machines and assess the performance for appropriate application

CO-3: Apply different strategies for control the AC machines in view of speed, voltage, active and reactive powers

CO-4: Assess performance of AC machines through different testing methods

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

UNIT – I:

Three Phase Induction Machines-I: Production of Rotating magnetic Field, Principle, Construction, Types, slip, rotor frequency, Torque equation, Torque-Slip Characteristics with different rotor resistances, Starting and Maximum Torques, Equivalent circuit, Phasor Diagram, Losses and Efficiency, Effect of variation of stator voltage, frequency on torque speed characteristics

UNIT – II:

Three Phase Induction Machines-II: Circle Diagram, Methods of starting, Braking, Speed control for induction motors, Cogging and Crawling, Induction Generator operation- Self-excitation, Doubly-Fed Induction Machines (Elementary treatment).

UNIT – III:

Single-Phase Induction Motors: Constructional features, double field revolving Theory, Split-phase starting methods- Resistance and capacitor split phase motors, shaded pole motors, applications, single phase induction motor equivalent circuit-determination of machine parameters.

UNIT – IV:

Synchronous Machines-I: Constructional features, AC Armature windings- Pitch Factor-Winding Distribution factor- winding factor -types- cylindrical rotor synchronous machine -generated EMF, armature reaction, phasor diagram, synchronous Impedance, voltage regulation, methods to find voltage regulation, Analysis of Salient pole machine - two reaction theory, phasor diagram, Slip Test, synchronization, power delivered, power angle characteristics,

UNIT – V:

Synchronous Machines-II: Effect of change of excitation and fuel input, Short circuit analysis, Synchronous motor, principle, Starting of Synchronous Motors, Phasor diagram, V-curves, Synchronous Condenser, Hunting.

TEXT BOOKS:

1. Electric Machines, J. Nagrath and D. P. Kothari, McGraw-Hill Education, 2010
2. Electrical Machinery, P. S. Bimbhra, Khanna Publishers, 2011

REFERENCES:

1. Performance and Design of AC machines, M. G. Say, CBS Publishers, 2002
2. Electric Machinery, E. Fitzgerald and C. Kingsley, McGraw-Hill Education, 2013
3. Alternating current machines, S. Langsdorf, McGraw-Hill Education, 1984
4. Principles of Electric Machines and Power Electronics, P. C. Sen, John Wiley & Sons, 2007

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC12EE04) POWER SYSTEMS-I

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE OBJECTIVES:

- To explain various generation sources such as hydro, thermal, nuclear and gas power plants
- To derive transmission line parameters and analyze different types of transmission lines
- To discuss travelling wave theory and corona in transmission lines
- To discuss various types of DC and AC distribution systems and voltage drop calculations in them

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Understand the functioning of different power plants
CO-2: Evaluate the performance of Transmission lines
CO-3: Analyze the travelling wave phenomenon and corona
CO-4: Assess the performance of DC and AC distribution 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
CO-1	2	-	2	-	-	2	2	-	2	-	2	2	2	-
CO-2	1	1	-	1	1	-	-	-	2	-	1	1	3	2
CO-3	3	2	1	1	1	1	1	-	2	2	-	1	-	-
CO-4	2	1	-	1	1	1	1	1	2	2	1	2	2	3

UNIT – I:

Generation of Electrical Energy:

Electrical Power Plants: Operation of Hydel, Thermal, Nuclear and Gas Power plant with layouts - Description of components - Choice of site - advantages and disadvantages, Introduction to renewable energy sources and plants (solar and wind).

UNIT–II:

Transmission Lines:

Transmission Line Parameters: Types of conductors - Calculation of resistance for solid conductors – Calculation of inductance for single phase and three phase lines, concept of GMR and GMD - Problems, Calculation of capacitance for single phase and three phase lines - Problems, concept of Transposed lines, Skin and Proximity effects.

Performance of Transmission Lines: Classification of Transmission Lines, Performance of Short, Medium lines – Nominal-T, Nominal-π representation-A,B,C,D Constants – Problems, Long Transmission Line - Rigorous Solution, Ferranti effect.

UNIT–III:

Power System Transients and Corona: Concept of transients - Travelling wave theory - Reflection and Refraction Coefficients - Termination of lines with Open Circuit and Short Circuit, Bewley's Lattice Diagrams-Problems

Corona - Description of the phenomenon, factors affecting corona, critical voltages and power loss - Problems.

UNIT –IV:

Mechanical Design of Overhead Transmission Lines: Concept of sag, factors affecting sag, Sag Calculations with equal and unequal heights of towers, Effect of wind and ice loading - Problems, Types of Insulators, String efficiency - Problems, Methods of improving string efficiency.

UNIT–V:

Distribution Systems: Classification of Distribution Systems-Comparison of DC Vs AC Distribution Systems - Requirements and Design features of Distribution Systems - Voltage Drop Calculations in D.C Distribution system - Radial system - fed at one end with Concentrated loading - fed at both the ends with equal and unequal Voltages with Concentrated loading, Ring Main Distribution system, Voltage Drop Calculations in A.C. Distribution system - Problems.

TEXTBOOKS:

1. Electrical Power Systems, C. L. Wadhwa, New Age International, 2017
2. Power System Analysis, John J. Grainger, William D. Stevenson, 4th Edition, Tata McGraw-Hill, 2017
3. Modern Power System Analysis, I. J. Nagrath and D. P. Kothari, 5th Edition, Tata McGraw-Hill, 2022

REFERENCES:

1. A Textbook on Power System Engineering, M. L. Soni, P. V. Gupta, U. S. Bhatnagar and A. Chakrabarti, Dhanpat Rai and Co., 1999
2. Principles of Power System, V. K. Mehta and Rohit Mehta, S. Chand & Co., 2005
3. A Course in Electrical Power Systems, J. B. Gupta, S. K. Kataria & Sons, 2013
4. Generation Distribution and Utilization of Electrical Energy, C. L. Wadhwa, New Age International, 2015

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC1EC210) ANALOG ELECTRONIC CIRCUITS

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE PRE-REQUISITES: Basic Electronic 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 learn about process of wave shaping
- To study the basics of operational amplifier and analyze data converters
- To know about various analog ICs and their applications

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

CO-1: Design and analyse the single stage and Multistage amplifiers

CO-2: Analyse various large signal amplifiers

CO-3: Construct the wave shaping circuits

CO-4: Understand the characteristics and design the basic applications of an operational amplifier

CO-5: Design A-D and D-A converters and 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
CO-1	3	2	3	3	-	-	-	-	-	-	-	-	1	2
CO-2	3	2	3	3	-	-	-	-	-	-	-	-	1	2
CO-3	3	2	3	3	-	-	-	-	-	-	-	-	1	3
CO-4	3	2	3	3	-	-	-	-	-	-	-	-	1	1
CO-5	3	2	3	3	-	-	-	-	-	-	-	-	1	2

UNIT - I:

Frequency Response of BJT Amplifiers: Low frequency Response of BJT Amplifiers, Effect of coupling and bypass capacitors, Miller 's Theorem.

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

UNIT - II:

Multistage Amplifiers: Methods of Inter Stage Coupling, Frequency response and Analysis of multistage amplifiers, Cascade amplifier, Darlington pair.

Large Signal Amplifiers: Power Amplifier- Series fed and Transformer coupled, Conversion Efficiency, Class B Power Amplifier- Push Pull and Complimentary Symmetry configurations, Conversion Efficiency, Cross Over Distortion and Class C Power Amplifiers.

UNIT-III:

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.

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

UNIT-IV:

Linear Integrated Circuits: 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.

OP-AMP Applications: Adders, Subtractors, Instrumentation amplifier, V to I and I to V converters, Sample and Hold circuits, Design of Differentiator and Integrator, Square Wave Generators.

UNIT-V:

Data Converters and Waveform Generators: D-A and A- D Converters: weighted resistor DAC, R-2R ladder DAC, Different types of ADCs- Successive approximation ADC, Parallel comparator type ADC.

555 Timer: Introduction to 555 timer, Design of Mono-stable Multivibrator using 555 Timer, Design of Astable Multivibrator using 555 Timer, SchmittTrigger and VCO.

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. Op-Amps and Linear Integrated Circuits, Ramakanth A. Gayakwad, 4th Edition, PHI, 2015

REFERENCES:

1. Electronic Circuit Analysis, S. Salivahanan, N. Suresh Kumar, 4th Edition, Tata McGraw-Hill Education, 2017
2. Pulse and Digital Circuits, K. Venkata Rao, K. Rama Sudha, G. Manmadha Rao, 1st Edition, Pearson Education, 2010
3. Linear Integrated Circuits, D. Roy Choudhary, Shail B. Jain, 5th Edition, New Age International, 2018

ONLINE RESOURCES:

1. https://nptel.ac.in/courses/115102014
2. https://nptel.ac.in/courses/108102097
3. https://nptel.ac.in/courses/108102095

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC1ME210) FLUID MECHANICS AND MACHINERY

TEACHING SCHEME		
L	T/P	C
3	0	3

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

COURSE PRE-REQUISITES: Mathematics, Physics and Engineering Mechanics

COURSE OBJECTIVES:

- To understand the properties of fluids, principles of buoyancy, flow, force and head calculations
- To understand the hydro dynamic force and impact of jet
- To principles of operation of different types of hydraulic turbines
- To principles of operation of different types of hydraulic pumps

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

CO-1: Apply the knowledge of fluids and properties to solve flow, force and velocity problems

CO-2: Apply the knowledge to find the head loss due to friction in pipe and other losses

CO-3: Apply the knowledge of fluid flow and dynamics in solving problems in hydraulic machines

CO-4: Perform model analysis of hydraulic machinery and select appropriate machines for hydro power plant

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

UNIT – I:

Fluid Statics: Properties of fluid – specific gravity, viscosity, surface tension, vapor pressure and their influence on fluid motion, Pressure at a point, measurement of pressure.

Fluid Kinematics: Classification of flows, flow lines - Streamline, path line and streak lines and stream tube, continuity equation, Stream function, velocity potential function.

UNIT – II:

Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equation, Venturimeter, Orifice meter, Pitot tube, Reynolds experiment –Darcy Weisbach

equation – Minor losses in pipes – pipes in series and pipes in parallel. Momentum equation.

UNIT – III:

Elements of Hydroelectric Power Station: Types of power plants, storage requirements, estimation of power from a given catchment area, head and efficiency.

Basics of Turbo Machinery: Hydrodynamic force of jets on flat, inclined and curved vanes - jet striking centrally and at tip, flow over radial vanes.

UNIT – IV:

Hydraulic Turbines: Classification of turbines, design of Pelton wheel, Francis turbine and Kaplan turbine – working proportion, work done, efficiency, draft tube-theory, functions and efficiency. Geometric similarity, Unit and specific quantities, characteristic curves, selection of type of turbine, cavitation, surge tank and water hammer.

UNIT – V:

Hydraulic Pumps: Classification, centrifugal pumps types, working, work done, manometric head, losses and efficiency, specific speed pumps in series and parallel– NPSH. Reciprocating Pump –types, Working, Discharge, slip, indicator diagrams.

TEXT BOOKS:

1. Hydraulics and Fluid Mechanics Including Hydraulics Machines, P. N. Modi, S. M. Seth, Standard Book House, 2009
2. Introduction to Fluid Mechanics, R. W. Fax , A. T. McDonald

REFERENCES:

1. Fluid Mechanics & Hydraulic Machines, R. K. Rajput, 3rd Edition, S. Chand & Co., 2006
2. Fluid Mechanics - Fundamentals & Applications, Yunus A. Çengel, John M. Cimbala, McGraw-Hill Higher, 2006
3. Fluid Mechanics and Hydraulic Machines, R. K. Bansal, Lakshmi Publications, 2005
4. Fluid Mechanics, V. L. Streeter & E. B. Wylie
5. Fluid Mechanics and Machinery, D. Rama Durgaiah, New Age International

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

(22PC2EE203) ELECTRICAL MACHINES-II 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: Circuit Theory, Network Analysis, Electrical Machines-I

COURSE OBJECTIVES:

- To understand the operation of synchronous machines
- To know different methods of finding voltage regulation of synchronous generators
- To understand different testing methods to assess electrical machines
- To learn how to convert phase between 3 to 2 and vice-versa

COURSE OUTCOMES: After completion of the course, the student should be able to
CO-1: Assess the performance of different machines using different testing methods
CO-2: Convert the phase from 3 phase to 2 phase and vice-versa
CO-3: Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods
CO-4: Start different machines and control the active and reactive power flows in synchronous machines

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

LIST OF EXPERIMENTS:

1. Sumpner's test on two identical single-phase transformers
2. Scott-connected Transformer
3. Separation of Iron losses of a single phase transformer
4. No-Load and blocked rotor tests on three-phase squirrel-cage Induction Motor.

Analysis through equivalent circuit diagram.

5. No-Load and blocked rotor tests on three-phase squirrel-cage Induction Motor.

Analysis through Eq. Circuit

6. Brake test on three phase slip ring induction motor
7. Speed Control of three phase slip ring Induction Motor
8. Regulation of three-phase Alternator by synchronous impedance method.
9. Regulation of three-phase Alternator by ZPF Method
10. Slip test on three-phase salient pole Alternator
11. V and inverted V curves of a three-phase synchronous motor
12. Equivalent circuit and Brake test on Single-phase Induction Motor

VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

B.Tech. IV Semester

(22PC2EC210) ANALOG ELECTRONIC 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: Basic Electronic Circuits

COURSE OBJECTIVES:

- To learn the operation, design and Analysis of single stage and Multistage amplifiers using BJT
- To understand the principle of large signal amplifiers
- To learn about process of wave shaping
- To study the basics of Operational Amplifier and analyse data converters
- To built basic applications of Operational Amplifier and design applications using special IC's

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

CO-1: Examine the effect of Single stage and multistage amplification on frequency response

CO-2: Analyse various large signal amplifiers and construct the wave shaping circuits

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

CO-4: Design basic applications using Operational Amplifier and 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
CO-1	2	2	2	-	-	-	-	-	3	-	2	-	3	2
CO-2	2	2	2	-	-	-	-	-	3	-	2	-	3	2
CO-3	2	2	2	-	-	-	-	-	3	-	2	-	3	1
CO-4	2	2	2	-	-	-	-	-	3	-	2	-	3	1

LIST OF EXPERIMENTS:

(Any Twelve experiments to be done)

1. Two stage RC coupled BJT Amplifier
2. Darlington amplifier.
3. Class B Complementary Symmetry Amplifier.
4. Linear Waves shaping - RC high pass and low Pass circuits

5. Non-linear wave shaping–Clippers
6. Non-linear wave shaping–Clampers
7. Inverting and Non-inverting Amplifiers using IC 741 OP-AMP
8. Adder, Subtractor and Comparator using IC 741 OP-AMP
9. Design of Integrator and Differentiator using IC 741 OP-AMP
10. Square Wave Generator and Triangular Wave Generator using OP- AMP
11. R-2R ladder D-A Converter
12. Design of Astable Multivibrator using 555 timer
13. Schmitt Trigger circuits using IC 555
14. Design of Monostable Multivibrator using 555 timer

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
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, 1st 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

(22PW4EE201) 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
CO-1	-	-	2	-	-	2	-	-	3	3	1	1	-	2
CO-2	-	-	3	2	1	3	-	-	3	2	1	1	2	1
CO-3	-	-	2	-	-	2	-	-	2	2	3	-	-	-
CO-4	-	-	3	-	2	-	-	-	2	3	1	-	-	1
CO-5	-	-	-	3	-	3	1	-	1	-	1	-	-	-

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