SEMESTER - II

B.Tech (ECE) - R23

23BST08: PROBABILITY AND COMPLEX VARIABLES (ECE)

Credits: 3 **Sessional Marks: 30**

L:T:P::3:0:0 **University Exam Marks: 70**

Course Objectives:

- Equip students a comprehensive understanding of the mathematical operations involving multiple random variables.
- Explore the concepts of joint, marginal, and conditional distributions in depth.
- Understand the concept of complex functions, analytic functions, harmonic functions and Cauchy–Riemann equations which play a vital role in several engineering problems.
- Introduce the idea of poles and residues to evaluate complex integrals.

Course Outcomes: After successful completion of this course, the students should be able to:

CO1 Understand the concepts of Probability, Random Variables and their characteristics.
CO2 Learn how to deal with multiple random variables, conditional probability, joint distribution and statistical independence.
CO3 Formulate and solve the engineering problems involving random variables.
CO4 Analyse limit, continuity and differentiation of functions of complex variables and Understand Cauchy-Riemann equations, analytic functions and various properties of analytic functions.
CO5 Understand Cauchy theorem, Cauchy integral formulas and apply these to evaluate complex contour integrals. Classify singularities and poles; find residues and evaluate complex integrals using the residue theorem.

UNIT I: Probability & Random Variable

Probability through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events.

Random variables (discrete and continuous), probability density functions, properties, mathematical expectation. Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian,

UNIT II: Operations on Random variable

Moments-moments about the origin, Central moments, Variance and Skew, Chebyshev's inequality, moment generating function, characteristic function.

Multiple Random Variables: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Interval conditioning, Statistical Independence.

UNIT III: Operations on Multiple Random variables

Operations on Multiple Random Variables: Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties of Gaussian random variables.

UNIT IV: Complex Variable – Differentiation

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method.

UNIT V: Complex Variable – Integration

Line integral-Contour integration, Cauchy's integral theorem(Simple Case), Cauchy Integral formula, Power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series, Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine.

Textbooks:

1. Peyton Z. Peebles, "Probability, Random Variables & Random Signal Principles", 4th Edition,

TMH, 2002.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017, 44th Edition

Reference Books:

1. Athanasios Papoulis and S. Unnikrishna Pillai, "Probability, Random Variables and Stochastic Processes", 4th Edition, PHI, 2002
2. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley India
3. Henry Stark and John W.Woods, "Probability and Random Processes with Application to Signal Processing," 3rd Edition, Pearson Education, 2002.
4. B.V.Ramana, Higher Engineering Mathematics, Mc Graw Hill publishers.

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc20_ma50/preview
2. https://onlinecourses.nptel.ac.in/noc21_ma66/preview#:~:text=This%20course%20provides%20random%20variable,and%20simple%20Markovian%20queueing%20models.

Course Outcomes – Program Outcomes (CO-PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓	✓	✓		✓	✓	✓	✓				
CO2	✓	✓	✓		✓	✓	✓	✓				
CO3	✓	✓	✓			✓	✓					
CO4	✓	✓	✓	✓	✓	✓						
CO5	✓	✓	✓	✓	✓	✓						

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23BST13 – MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Credits: 2 **Sessional Marks: 30**
L:T:P::2:0:0 **University Exam Marks: 70**

Course Objectives:

- To inculcate the basic knowledge of microeconomics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Course Outcomes:

COs	Statements	Blooms Level
CO1	Define the concepts related to Managerial Economics, financial accounting and management	L2
CO2	Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets	L2
CO3	Apply the Concept of Production cost and revenues for effective Business decision	L3
CO4	Analyze how to invest their capital and maximize returns	L4
CO5	Evaluate the capital budgeting techniques.	L5
CO6	Develop the accounting statements and evaluate the financial performance of business entity	L5

UNIT - I Managerial Economics

Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting-Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT - II Production and Cost Analysis

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Short run and long run Production Function- Isoquants and Iso costs, Cost & Break-Even Analysis - Cost concepts, Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

UNIT - III Business Organizations and Markets

Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Price-Output Determination.

UNIT - IV Financial Accounting

Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

UNIT - V Capital Budgeting

Introduction – Nature, meaning, significance. Sources of Short-term and Long-term Capital, Types of Working Capital - Estimating Working capital requirements. Capital Budgeting– Features, Methods and Evaluation of Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

Textbooks:

Varshney & Maheswari: Managerial Economics, Sultan Chand.
Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books:

Ahuja Hl Managerial economics Schand.
S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

Online Learning Resources:

https://www.slideshare.net/123ps/managerial-economics-ppt
https://www.slideshare.net/rossanz/production-and-cost-45827016
https://www.slideshare.net/darkyla/business-organizations-19917607
https://www.slideshare.net/balarajbl/market-and-classification-of-market
https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
https://www.slideshare.net/ashu1983/financial-accounting

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1							√					
CO2											√	
CO3					√							
CO4											√	
CO5												√
CO6											√	

23ECT01-ELECTRONIC DEVICES & CIRCUITS

Credits-3 **Sessional Marks:30**
L: T: P::3:0:0 **University Exam Marks:70**

Course Objectives:

- Students will be able understand the basic principles of all semiconductor devices.
- Able to analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers, compare the performance of BJTs and MOSFETs
- Able to design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.

Course Outcomes: *After the completion of the course students will be able to*

- Understand principle of operation, characteristics and applications of Semiconductor diodes, Bipolar Junction Transistor and MOSFETs. (L2)
- Applying the basic principles solving the problems related to Semiconductor diodes, BJTs, and MOSFETs. (L3)
- Analyze diode circuits for different applications such as rectifiers, clippers and clampers also analyze biasing circuits of BJTs, and MOSFETs. (L4)
- Design of diode circuits and amplifiers using BJTs, and MOSFETs. (L4)
- Compare the performance of various semiconductor devices. (L4)

UNIT I

PN junction diode: Band structure of PN Junction, Quantitative Theory of PN Diode, types of PN junction diode, VI Characteristics, PN diode current equation, Diode resistance, Transition and Diffusion Capacitance, Transit time, effect of temperature on PN junction diode, Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Ripple Factor and Regulation Characteristics, Clipping and Clamping circuits, Voltage doubler ,Illustrative problems.

Special Diodes: Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator, Construction, operation and VI characteristics of Tunnel Diode, Varactor Diode, LED, LCD, Photo Diode, SCR and UJT.

UNIT II

Bipolar Junction Transistors: Transistor construction, BJT Operation, Transistor as an Amplifier and as a Switch, Common Emitter, Common Base and Common Collector Configurations, Limits of Operation, BJT Specifications.

Biasing and Stabilization: Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Collector to Base Bias, Self-Bias, Bias Stability, Thermal Runaway, Thermal Stability, Illustrative problems.

UNIT III

MOS Field Effect Transistors: Introduction, Device Structure and Physical Operation, CMOS, V - I Characteristics,MOSFET Circuits at DC, MOSFET as an Amplifier and as a Switch. Biasing in MOS Amplifier circuits - biasing by fixing VGS with and without source resistance, biasing using drain to gate feedback resistor, biasing using constant current source, body effect, Problem solving.

UNIT IV

BJT Small Signal Operation and Models- the transconductance, input resistance at the base, input resistance at the emitter, Voltage gain, separating the Signal and the DC Quantities, The Hybrid π Model, the T Model. Single Stage BJT Amplifiers - Common-Emitter (CE) amplifier without and

with emitter resistance, Common-Base (CB) amplifier, Common-Collector (CC) amplifier or Emitter Follower, Problem solving.

UNIT V

MOSFET Small Signal Operation Models– the dc bias, separating the DC analysis and the signal analysis, Small signal equivalent circuit models, the transconductance, the T equivalent circuit model, Single stage MOS Amplifiers – common source (CS) amplifier without and with source resistance, common gate (CG) amplifier, source follower, Problem Solving.

Textbooks:

1. Adel S. Sedra and Kenneth C. Smith, "Microelectronic Circuits – Theory and Applications", 6th Edition, Oxford Press, 2013.
2. J. Milliman and C Halkias, "Integrated electronics", 2nd Edition, Tata McGraw Hill, 1991.

References:

1. Donald A Neamen, "Electronic Circuits – analysis and design", 3rd Edition, McGraw Hill (India), 2019.
2. BehzadRazavi, "Microelectronics", Second edition, Wiley, 2013.
3. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits," 9th Edition, Pearson, 2006.
4. Jimmie J Cathey, "Electronic Devices and Circuits," Schaum's outlines series, 3rd edition, McGraw-Hill (India), 2010.

Course Outcomes-Program Outcomes -Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	H										M	M	H	L
CO2	L		H		M					M		M	M	H	L
CO3	L			H			M					M	M	H	L
CO4	L			H						M			M	H	L
CO5	L			H			M			M			M	H	L

23ECT02-DIGITAL CIRCUITS DESIGN

Credits-3 **Sessional Marks:30**
L: T: P::3:0:0 **University Exam Marks:70**

Course Objectives:

- Understand the properties of Boolean algebra, logic operations, and minimization of Boolean functions.
- Analyze combinational and analyze sequential logic circuits.
- Understand the concepts of FSM and compare various Programmable logic devices.
- Model combinational and sequential circuits using HDLs.

Course Outcomes: After completing the course, the student should be able to:

- Understand the properties of Boolean algebra, logic operations, concepts of FSM (L2)
- Apply techniques for minimization of Boolean functions (L3)
- Analyze combinational and Sequential logic circuits. (L4)
- Compare various Programmable logic devices. (L4)
- Design and Model combinational and sequential circuits using HDLs. (L5, L6)

UNIT – I
Review of Number Systems, Boolean Theorems and Logic Operations
Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members. Gray code,4 bit codes; BCD, Excess-3, 2421, 84-2-1 code etc. Error detection & correction codes: parity checking, even parity, odd parity, Hamming code. Boolean theorems, principle of complementation & duality, De-morgan theorems. Logic operations; Basic logic operations -NOT, OR, AND, Universal Logic operations, EX-OR, EX-NOR operations

UNIT – II
Minimization of Boolean Functions& Techniques
Standard SOP and POS Forms, NAND-NAND and NOR-NOR realizations, Realization of three level logic circuits.
Minimization and realization of switching functions using Boolean theorems, K-Map and tabular method(Quine-mccluskey method) with only four variables and single function.

UNIT – III
Combinational Logic Circuits
Combinational circuits, Design with basic logic gates, design procedure, adders, subtractors, 4-bit binary adder/ subtractor circuit, BCD adder, carry look- a-head adder, binary multiplier, magnitude comparator, data selectors, priority encoders, decoders, multiplexers, demultiplexers.

UNIT IV

Sequential Logic Circuits

Basic architectural distinction between combinational and sequential circuits, Design procedure, latches, flip-flops, truth tables and excitation tables, conversion of flip- flops, design of counters, ripple counters, synchronous counters, ring counter, Johnson counter, registers, shift registers, universal shift register.

UNIT V

VLSI Design flow& Programmable Logic Devices

Design entry, Schematic, HDL, different modeling styles in VHDL, Datatypes and objects, Dataflow, Behavioral and Structural Modeling, Synthesis and Simulation VHDL constructs and codes for combinational and sequential circuits. Types of FSM/ASM, capabilities and limitations of FSM, state assignment, realization of FSM using flip-flops.PROM, PAL, PLA, basic structure of CPLD and FPGA, advantages of FPGAs.

Textbooks:

1. M. Morris Mano, "Digital Design", 3rd Edition, PHI.
2. Switching Theory and Logic Design by A. AnandKumar,PHI Learningpvt.ltd,2016.
3. Douglas Perry, "VHDL", Tata McGraw Hill, 4th edition, 2002.

Reference Books:

1. Charles H. Roth, Jr, "Fundamentals of Logic Design", 4th Edition, Jaico Publishers.
2. ZviKohavi and NirajK.Jha, "Switching and Finite Automata Theory, 3rd Edition, Cambridge University Press, 2010.
3. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012
4. D.P. Leach, A.P. Malvino, "Digital Principles and Applications", TMH, 7th Edition.

Course Outcomes-Program Outcomes -Program Specific Outcomes(CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**M**	**H**	**L**										**H**	**M**	
CO2	**M**	**L**	**H**	**M**									**M**	**H**	
CO3	**M**	**L**	**H**	**M**									**M**	**H**	
CO4	**M**	**M**		**L**									**L**	**M**	**H**
CO5			**H**	**M**					**L**	**M**	**L**	**M**		**M**	**H**

23ECT03-SIGNALS, SYSTEMS AND STOCHASTIC PROCESSES

Credits-3 **Sessional Marks:30**
L: T: P::3:0:0 **University Exam Marks:70**

Course Objectives:

- Understanding the basics of signals and systems required for ECE courses.
- To teach concepts of signals and systems and its analysis using different transform techniques.
- To provide basic understanding of random processes which is essential for the random signals and systems encountered in communications and signal Processing areas.

Course Outcomes:

- Understand the mathematical description and representation of continuous-time and discrete-time signals and systems, Also, understand the concepts of various transform techniques and Random Processes (L2)
- Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems. (L3)
- Formulate and solve engineering problems involving random processes. (L3)
- Analyze the frequency spectra of various continuous-time signals using different transform methods. (L4)
- Classify the systems based on their properties and determine the response of them. (L4)

UNIT I

Signals & Systems: Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Analogy between vectors and signals-Orthogonality, mean square error,

Fourier series: Trigonometric & Exponential forms of Fourier series, Properties, Concept of discrete spectrum, Illustrative Problems.

UNIT II

Fourier Transform: Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform. Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Reconstruction of signal from its samples, Effect of under sampling – Aliasing. Illustrative Problems.

Laplace Transform: Definition, ROC, Properties, Inverse Laplace transforms, the s-plane and BIBO stability, Transfer functions, System Response to standard signals, Solution of differential equations with initial conditions, Illustrative Problems.

UNIT III

Signal Transmission through Linear Systems: Linear system, impulse response, Response of a linear system for different input signals, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between bandwidth and rise time, Energy and Power spectral densities, Illustrative Problems.

UNIT IV

Random Processes – Temporal Characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

UNIT V

Random Processes – Spectral Characteristics: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

Textbooks:

1. Peyton Z. Peebles, “Probability, Random Variables & Random Signal Principles”, 4th Edition, TMH, 2002.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems”, 2nd Edition, PHI, 2009.

Reference Books:

1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Athanasios Papoulis and S. UnnikrishnaPillai, “Probability, Random Variables and Stochastic Processes”, 4th Edition, PHI, 2002
3. Simon Haykin and Van Veen, “Signals & Systems”, 2nd Edition, Wiley, 2005.
4. Matthew Sadiku and Warsame H. Ali, “Signals and Systems A primer with MATLAB”, CRC Press, 2016.
5. Hwei Hsu, “Schaum's Outline of Signals and Systems”, 4thEdition, TMH, 2019.

Course Outcomes-Program Outcomes - Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H	M	L									H	L	
CO2			H	M	M				M	L	L		L	L	M
CO3		H	H	M	L				L	M			M	L	
CO4		H	H	M	L				L	M			L	M	
CO5		M	H	H									M	L	H

23HMT03 - ENVIRONMENTAL SCIENCE II-I

(COMMON TO ALL CSE,ECE,EEE,ME)

Credits: 0
L:T:P::20:0:0

Sessional Marks:30
University Exam Marks: 70

Course Objectives:

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

UNIT I

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem with BIO-Diversity and Conservation.

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem.
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution

d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Textbooks:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S.Azeem Unnisa, "Environmental Studies" Academic Publishing Company
4. K.Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

References:

Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.

1. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
2. J.P.Sharma, Comprehensive Environmental studies. Laxmi publications.
3. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited
4. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House

Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

Course Outcomes – Program Outcomes (CO-PO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	✓					✓						
CO2	✓	✓		✓		✓						
CO3	✓	✓				✓						
CO4	✓			✓		✓						

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23ECP01-ELECTRONIC DEVICES & CIRCUITS LAB

Credits-1.5 **Sessional Marks:30**
L: T: P::0:0:3 **University Exam Marks:70**

Course Objectives:

- Verify the theoretical concepts practically from all the experiments.
- Analyse the characteristics of Diodes, BJT, MOSFET, UJT.
- Design the amplifier circuits from the given specifications.
- Model the electronic circuits using tools such as PSPICE/Multisim.

Course Outcomes:

- Understand the characteristics and applications of basic electronic devices. (L2)
- Plot the characteristics of electronic devices. (L3)
- Analyze various biasing circuits and electronic circuits as amplifiers (L4).
- Design MOSFET / BJT based amplifiers for the given specifications. (L5)
- Simulate all circuits in PSPICE /Multisim. (L5).

LIST OF EXPERIMENTS: (**Execute any 12 experiments**).

Note: I.All the experiments shall be implemented using both Hardware and Software.

II. Data sheets has to be provided along with each device. Key parameters to be recorded**.**

1. Verify various clipping circuits using PN junction diode and draw the suitable graphs.
2. Verify various clamper circuits using PN junction diode and draw the suitable graphs.
3. Study and draw the ***output*** and ***transfer*** characteristics of MOSFET (Enhance mode) in Common Source Configuration experimentally. Find ***Threshold voltage (V_T), g_m, & K*** from the graphs.
4. Study and draw the ***output*** and ***transfer*** characteristics of MOSFET (Depletion mode) or JFET in Common Source Configuration experimentally. Find ***I_{DSS}, g_m, & V_P*** from the graphs.
5. Verification of the input and output characteristics of BJT in **Common Emitter** configuration experimentally and find required ***h – parameters*** from the graphs.
6. Study and draw the input and output characteristics of BJT in **Common Base** configuration experimentally and determine required ***h – parameters*** from the graphs.
7. Study and draw the Volt Ampere characteristics of UJT and determine ***η, I_P, I_v, V_P, &Vv*** from the experiment.
8. Design and analysis of voltage- divider bias/self-bias circuit using BJT.
9. Design and analysis of self-bias circuit using MOSFET.
10. Design a suitable circuit for switch using MOSFET/BJT.
11. Design a small signal amplifier using MOSFET (common source) for the given specifications. Draw the frequency response and find the bandwidth.
12. Design a small signal amplifier using BJT(common emitter) for the given specifications. Draw the frequency response and find the bandwidth.

    Note: Experiments may be carried out both using Hardware modules & Software tools

Tools / Equipment Required: Software Toollike Multisim/ Pspice or Equivalent,
DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

Course Outcomes-Program Outcomes -Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	H										M	M	H	L
CO2	L		H		M		L			M		M	M	H	L
CO3	L			H			M					M	M	H	L
CO4	L			H						M			M	H	L
CO5	L			H			M			M			M	H	L

23ECP02-DIGITAL CIRCUITS & SIGNAL SIMULATION LAB

Credits-1.5 **Sessional Marks:30**
L: T: P::0:0:3 **University Exam Marks:70**

Course Objectives:

- Verify the truth tables of various logic circuits.
- Design sequential/combinational circuit using Hardware Description Language and verify their functionality.
- Simulate various Signals and Systems through MATLAB
- Analyze the output of a system when it is excited by different types of deterministic and random signals.

Course Outcomes: After completing the course, the student should be able to:

- Verify the truth tables of various logic circuits. (L2)
- Understand how to simulate different types of signals and system response. (L2)
- Design sequential and combinational logic circuits and verify their functionality. (L3, L4)
- Analyze the response of different systems when they are excited by different signals and plot power spectral density of signals. (L4)
- Generate different random signals for the given specifications. (L5)

List of Experiments:

PART A

1. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.
2. Verification of functional table of 3 to 8-line Decoder /De-multiplexer
3. 4 variable logic function verification using 8 to1 multiplexer.
4. Design full adder circuit and verify its functional table.
5. Design a four-bit ring counter using D Flip–Flops/JK Flip Flop and verify output.
6. Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output
7. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
8. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip-Flops and Test It with a low frequency clock and sketch the output waveforms.
9. Design MOD–8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.
10. (a) Draw the circuit diagram of a single bit comparator and test the output
    (b) Construct 7 Segment Display Circuit Using Decoder and7 Segment LED and test it.

Note: Design and verify combinational and sequential circuits using Digital trainer kit/Hardware

Description Language

References:

1. M. Morris Mano, "Digital Design", 3rd Edition, PHI

PART B

List of Experiments:

1. Write a program to generate various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc function.
2. Perform operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings- Plot the discrete spectrum of the signal.
4. Write a program to find Fourier transform of a given signal. Plot its amplitude and phase spectrum.
5. Write a program to convolve two discrete time sequences. Plot all the sequences.
6. Write a program to find autocorrelation and cross correlation of given sequences.
7. Write a program to verify Linearity and Time Invariance properties of a given Continuous System.
8. Write a program to generate discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
9. Write a program to find magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
10. Write a program to generate Complex Gaussian noise and find its mean, variance, Probability Density Function (PDF) and Power Spectral Density (PSD).
11. Generate a Random data (with bipolar) for a given data rate (say 10kbps). Plot the same for a time period of 0.2 sec.
12. To plot pole-zero diagram in S-plane of given signal/sequence and verify its stability.

Note: Any 10 experiments. All the experiments are to be simulated using MATLAB or equivalent software.

References:

Stephen J. Chapman, "MATLAB Programming for Engineers", Cengage, November 2012.

Course outcomes-Program outcomes -Program Specific Outcomes (CO-PO- PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	M	H	H	L					L	M	L		H		
CO2	L	L	H	M					L	L	M			H	M
CO3	M	H											H	M	
CO4	H	L												H	M
CO5		L	L	M	H									M	H

23CSS01: Python Programming
(Skill Enhancement Course)

Credits: 2 **Sessional Marks: 30**
L:T:P :: 0:1:2 **University Exam Marks: 70**

Course Objectives
1. Introduce core programming concepts of Python programming language.
2. Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
3. Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

Course Outcomes
After completion of the course, students will be able to

CO1: Showcase adept command of Python syntax, deftly utilizing variables, data types, control structures, functions, modules, and exception handling to engineer robust and efficient code solutions. (L4)

CO2: Apply Python programming concepts to solve a variety of computational problems (L3)

CO3: Understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs (L3)

CO4: Become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas (L2)

CO5: Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries (L3)

UNIT – I
History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:
1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.

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4. Demonstrate the following Operators in Python with suitable examples.
   i) Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators
5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

UNIT – II

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.
Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.
Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

7. Write a program to define a function with multiple return values.
8. Write a program to define a function using default arguments.
9. Write a program to find the length of the string without using any library functions.
10. Write a program to check if the substring is present in a given string or not.
11. Write a program to perform the given operations on a list:
    i. Addition
    ii. Insertion
    iii. Slicing
12. Write a program to perform any 5 built-in functions by taking any list.

UNIT – III

Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.
Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

Sample Experiments:

13. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
14. Write a program to count the number of vowels in a string (No control flow allowed).
15. Write a program to check if a given key exists in a dictionary or not.
16. Write a program to add a new key-value pair to an existing dictionary.
17. Write a program to sum all the items in a given dictionary.

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UNIT – IV

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

18. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
19. Python program to print each line of a file in reverse order.
20. Python program to compute the number of characters, words and lines in a file.
21. Write a program to create, display, append, insert and reverse the order of the items in the array.
22. Write a program to add, transpose and multiply two matrices.
23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT – V

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

24. Python program to check whether a JSON string contains complex object or not.
25. Python Program to demonstrate NumPy arrays creation using array () function.
26. Python program to demonstrate use of ndim, shape, size, dtype.
27. Python program to demonstrate basic slicing, integer and Boolean indexing.
28. Python program to find min, max, sum, cumulative sum of array
29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:

a) Apply head () function to the pandas data frame
b) Perform various data selection operations on Data Frame

30. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

Reference Books

1. Gowri shankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

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Online Learning Resources/Virtual Labs:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

Course Outcomes – Program Outcomes – Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	L	-	H	-	-	-	-	-	-	-	-	H	-	-
CO2	-	L	H	-	-	-	-	-	-	-	-	-	H	-	-
CO3	M	H	-	-	-	-	-	-	-	-	-	-	H	-	-
CO4	M	-	-	-	H	-	-	-	-	-	-	-	H	-	-
CO5	-	M	-	H	-	-	-	-	-	-	-	-	H	-	-

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23BST12 - UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Credits – 3 **Sessional Marks: 30**
L:T:P::2:1:0 **University Exam Marks: 70**

Course Objectives:

- To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Course Outcomes:

COs	Statements	Blooms Level
CO1	Define the terms like Natural Acceptance, Happiness and Prosperity	L1, L2
CO2	Identify one's self, and one's surroundings (family, society nature)	L1, L2
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life	L3
CO4	Relate human values with human relationship and human society	L4
CO5	Justify the need for universal human values and harmonious existence	L5
CO6	Develop as socially and ecologically responsible engineers	L3, L6

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: self-exploration as the Process for Value Education

Lecture4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 Exploring Natural Acceptance

UNIT II Harmony in the Human Being (6 lectures and 3 tutorials for practice session)

Lecture 7: Understanding Human being as the Co-existence of the self and the body.

Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.

Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self

Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)

Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

UNIT V Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values

Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education

Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

Practice Sessions for UNIT I – Introduction to Value Education

PS1 Sharing about Oneself

PS2 Exploring Human Consciousness

PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being

PS4 Exploring the difference of Needs of self and body

PS5 Exploring Sources of Imagination in the self

PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

READINGS:

Textbook and Teachers Manual

a. The Textbook

R R Gaur, R Asthana, G P Bagaria, *A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria,*Teachers' Manual for A Foundation Course in Human Values and Professional Ethics,* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

1. *JeevanVidya: EkParichaya,* A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.

2. *Human Values*, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.

3. *The Story of Stuff* (Book).

4. *The Story of My Experiments with Truth* - by Mohandas Karamchand Gandhi

5. *Small is Beautiful* - E. F Schumacher.

6. *Slow is Beautifu*l - Cecile Andrews

7. *Economy of Permanence* - J C Kumarappa

8. *Bharat Mein Angreji Raj* – PanditSunderlal

9. *Rediscovering India* - by Dharampal

10. *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi

11. *India Wins Freedom* - Maulana Abdul Kalam Azad

12. *Vivekananda* - Romain Rolland (English)

13. *Gandhi* - Romain Rolland (English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf

7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf
8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
9. https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								√				
CO2						√						
CO3								√				
CO4				√								
CO5								√				
CO6						√						

Course Code:	23EET37 LINEAR CONTROL SYSTEMS	Credits3-0-0:3

Course Objectives:

1. Make the students learn about the mathematical modelling, feedback control System.
2. Impart Knowledge on State Space Analysis.
3. Familiarized the Concepts of stability analysis in Time and Frequency domains.
4. Study about Different types of Controllers.

Course Outcomes:

CO	Statements	Blooms Level
CO1	Understand the concepts of various mathematical representations of control systems, Time response of first order and second order systems, stability, frequency response and fundamentals of modern control systems	L2
CO2	Apply Block diagram reduction, Signal flow graph, Routh criterion, Root locus, Bode, Polar, Nyquist concepts for solving various numerical problems	L3
CO3	Analyze time response characteristics, frequency response characteristics, stability analysis of various control systems	L4
CO4	Design various compensators and controllers for different control systems by using design procedures	L5
CO5	Create suitable control systems for various real time applications	L5

UNIT I
CONTROL SYSTEMS CONCEPTS
Open loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula.
Introduction to Servo motors. Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor - AC servo motor, Synchros.

UNIT II
TIME RESPONSE ANALYSIS
Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, P, PI, PID Controllers.

UNIT III
STABILITY ANALYSIS IN TIME DOMAIN
The concept of stability – Routh's stability criterion – Stability and conditional stability limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT IV
FREQUENCY RESPONSE ANALYSIS
Introduction, Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Stability Analysis from Bode Plots. Polar Plots-Nyquist Plots- Phase margin and Gain margin-Stability Analysis.
Compensation techniques – Lag, Lead, Lag-Lead Compensator design in frequency Domain.

UNIT V

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state models - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model. Solving the Time invariant state Equations- State Transition Matrix and it's Properties. System response through State Space models.The concepts of controllability and observability. Duality between controllability and observability.

Textbooks:

1. **nagoorkani**
2. Modern Control Engineering by Katsuhiko Ogata, Prentice Hall of India Pvt. Ltd., 5th edition, 2010.
3. Control Systems Engineering by I. J. Nagrath and M. Gopal, New Age International (P) Limited Publishers, 5th edition, 2007.

Reference Books:

1. Control Systems Principles & Design by M.Gopal, 4th Edition, McGraw Hill Education, 2012.
2. Automatic Control Systems by B. C. Kuo and FaridGolnaraghi, John wiley and sons, 8th edition, 2003.
3. Feedback and Control Systems, Joseph J Distefano III, Allen R Stubberud& Ivan J Williams, 2nd Edition, Schaum's outlines, McGraw Hill Education, 2013.
4. Control System Design by Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado. Pearson, 2000.
5. Feedback Control of Dynamic Systems by Gene F. Franklin, J.D. Powell and Abbas Emami-Naeini, 6th Edition, Pearson, 2010.

Web Resources:

1. https://nptel.ac.in/courses/108102043
2. https://nptel.ac.in/courses/108106098.

Course Outcomes-Program Outcomes -Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	-	-	-	M	-	-	-	-	-	-	L	H	M	-
CO2	M	H	-	-	-	-	-	-	-	-	-	-	-	H	-
CO3	L	-	H	-	-	-	-	-	-	-	-	M	H	-	L
CO4	-	-	-	H	M	-	-	-	-	-	-	L	M	H	-
CO5	-	-	-	M	H	-	-	-	-	-	-	L	-	-	H

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23ECT04-EM WAVES AND TRANSMISSION LINES

Credits-3 **Sessional Marks:30**
L: T: P::3:0:0 **University Exam Marks:70**

Course Objectives:

- To understand and analyze different laws and theorems of electrostatic fields.
- To study and analyze different laws and theorems of magnetostatic fields.
- Analyzing Maxwell's equations in different forms.
- To learn the concepts of wave theory and its propagation through various mediums.
- To get exposure to the properties of transmission lines.

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

- Learn the concepts of wave theory and its propagation through various mediums. (L2)
- Understand the properties of transmission lines and their applications. (L2)
- Apply the laws & theorems of electrostatic fields to solve the related problems (L3)
- Gain proficiency in the analysis and application of magnetostatic laws and theorems (L4).
- Analyze Maxwell's equations in different forms. (L4)

UNIT I

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

UNIT II

Magnetostatics: Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems**.**

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface, Illustrative Problems.

UNIT III

EM Wave Characteristics: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types, Illustrative Problems.

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector and Poynting Theorem, Illustrative Problems.

UNIT IV

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

UNIT V

Transmission Lines – II: Input Impedance Relations, Reflection Coefficient, VSWR, Average Power, Shorted Lines, Open Circuited Lines, and Matched Lines, (concept to be explained: Relation with maximum power theorem). Low loss radio frequency and UHF Transmission lines, UHF Lines as Circuit Elements, Smith Chart – Construction and Applications, Quarter wave transformer, Single Stub Matching, Illustrative Problems.

Textbooks:

1. Elements of Electromagnetics, Matthew N.O. Sadiku, 4th Edition, Oxford University Press, 2008.
2. Electromagnetic Waves and Radiating Systems, E.C. Jordan and K.G. Balmain, 2nd Edition, PHI, 2000.
3. Electromagnetics, John D. Krauss, 3rd Edition, McGraw Hill, 1988.

References:

1. Electromagnetic Field Theory and Transmission Lines, G. S. N. Raju, 2nd Edition, Pearson Education, 2013.
2. Engineering Electromagnetics, William H. Hayt Jr. and John A. Buck, 7th Edition, Tata McGraw Hill, 2006.
3. Networks, Lines, and Fields, John D. Ryder,2nd Edition, PHI publications, 2012.

Course Outcomes-Program Outcomes -Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	L	H		M			M					M	M	H	L
CO2	L	H		L			L			L		M	M	H	L
CO3	L	H					H					M	M	H	L
CO4	L	H		L			H					M	M	H	L
CO5	L	H					H			L		M	M	H	L

23ECT05-ELECTRONIC CIRCUITS ANALYSIS

Credits-3 **Sessional Marks:30**
L: T: P::3:0:0 **University Exam Marks:70**

Course Objectives:

- Understand the characteristics of Differential amplifiers, feedback and power amplifiers.
- Analyze the response of tuned amplifiers
- Categorize different oscillator circuits based on the application
- Design the electronic circuits for the given specifications and for a given application.

Course Outcomes:

- Understand the characteristics of differential amplifiers, feedback and power amplifiers. (L2)
- Examine the frequency response of multistage and differential amplifier circuits using BJT & MOSFETs at low and high frequencies. (L3)
- Investigate different feedback and power amplifier circuits based on the application. (L4)
- Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillator circuits. (L4)
- Evaluate the performance of different tuned amplifiers (L5)
- Design analog circuits for the given specifications and application. (L6)

UNIT I Multistage and Differential Amplifiers

Introduction –Classification of Amplifiers- Distortion in amplifiers, Coupling Schemes, RC Coupled Amplifier using BJT, Cascaded RC Coupled BJT Amplifiers, Cascode amplifier, Darlington pair, Bootstrap amplifier, BJT Differential Pair, and other Nonideal Characteristics of the Differential Amplifier.

UNIT II Frequency Response

Low-Frequency Response of the CE and CS Amplifiers, Internal Capacitive Effects in BJT and JFET, High-Frequency Response of the emitter follower, CE, CG, CS and Cascode Amplifiers.

UNIT III Feedback Amplifiers

Feedback Amplifiers: Introduction, The General Feedback Structure, Some Properties of Negative Feedback, The Four Basic Feedback Topologies, The Feedback Voltage Amplifier (Series—Shunt), The Feedback Transconductance Amplifier (Series—Series), The Feedback Trans-Resistance Amplifier (Shunt—Shunt), The Feedback Current Amplifier (Shunt—Series).

UNIT IV Oscillators and Tuned Amplifiers

Oscillators: General Considerations, Phase Shift Oscillator, Wien-Bridge Oscillator, LC Oscillators, Relaxation Oscillator, Crystal Oscillators, Illustrative Problems.

Tuned Amplifiers: Basic Principle, Use of Transformers, Single Tuned Amplifiers, Amplifiers with multiple Tuned Circuits, Stagger Tuned Amplifiers.

UNIT V Power Amplifiers

Introduction, Classification of Output Stages, Class A Output Stage, Class B Output Stage, Class AB Output Stage, Biasing the Class AB Circuit, Power BJTs, Variations on the Class AB Configuration, Push pull amplifier and Complimentary symmetry power amplifiers.

Textbooks:

1. Jacob Millman. Christos C.Halkias, "Integrated Electronics", 4thEdition, McGraw Hill Education (India) Private Ltd., 2015.
2. Adel. S. Sedra and Kenneth C. Smith, "Micro Electronic Circuits," 6thEdition, Oxford University Press, 2011.

References:

1. BehzadRazavi, "Fundamentals of Micro Electronics", Wiley, 2010.
2. Donald A Neamen, "Electronic Circuits – Analysis and Design," 3rdEdition, McGraw Hill (India), 2019.
3. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits Theory", 9th Edition, Pearson/Prentice Hall, 2006.

Course Outcomes-Program Outcomes -Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H	M	M	L	M						L	H		
CO2	M	H	H	L	M	L				M		L	H	M	
CO3	L	M	H	M	H					M		M	M	H	M
CO4	H	H	H	L	M					L		L	H	H	M
CO5	H	H	M	M									M	H	L
CO6	H	H	H		L					L		M	L	H	H

23ECT06-ANALOG AND DIGITAL COMMUNICATIONS

Credits-3 **Sessional Marks:30**
L: T: P::3:0:0 **University Exam Marks:70**

Course Objectives:

- Introduce various modulation and demodulation techniques of analog and digital communication systems.
- Analyze different parameters of analog and digital communication techniques.
- Understand function of various stages of AM, FM transmitters and Know characteristics of AM &FM receivers.
- Analyze the performance of various digital modulation techniques in the presence of AWGN.

Course Outcomes:

- Recognize the basic terminology used in analog and digital communication technique for transmission of information/data. (L1)
- Explain the basic operation of different analog and digital communication systems at baseband and passband level. (L2)
- Compute various parameters of baseband and passband transmission schemes by applying basic engineering knowledge. (L3)
- Analyze the performance of different modulation & demodulation techniques to solve complex problems in the presence of noise. (L4)
- Evaluate the performance of all analog and digital modulation techniques to know the merits and demerits of each one of them in terms of bandwidth and power efficiency. (L5)

UNIT I Continuous Wave Modulation

Introduction: The communication Process, Communication Channels, Baseband and Passband Signals, Analog vs Digital Communications, Need for the modulation.

Amplitude Modulation (AM): AM and its modifications – DSB, SSB, VSB. Frequency Translation, Frequency Division Multiplexing (FDM).

Angle Modulation: Frequency Modulation (FM), Phase Modulation, PLL, Nonlinear Effects in FM, Superheterodyne Receivers, concept of Analog mixer, Gilbert multiplier.

UNIT II Noise and Pulse Modulation

Introduction to Noise: Types of Noise, Receiver Model,Noise in AM, DSB, SSB, and FM Receivers, Pre-Emphasis and De-emphasis in FM.

Introduction to Pulse Modulation: The Sampling Process, PAM, TDM, Bandwidth-Noise Trade off, Quantization process, PCM, Noise considerations in PCM systems, Delta Modulation, DPCM, Coding speech at low bit rates.

UNIT III Baseband Pulse Transmission

Introduction, Matched Filter, Properties of Matched Filter, Error rate due to noise, Inter Symbol Interference (ISI), Nyquist Criterion for distortion less baseband binary transmission, Correlative level coding, Baseband M-ary PAM transmission, QAM.

UNIT IV Digital Passband Transmission

Introduction, Passband Transmission Model, Gram-Schmidt Orthogonalization Procedure, Geometric Interpretation of Signals, Response of bank of correlators in noise, Correlation receiver, Probability of Error, Detection of Signals with unknown phase.

UNIT V Digital Modulation Schemes

Coherent Digital Modulation Schemes – ASK, BPSK, BFSK, QPSK, Non-coherent BFSK, DPSK. M-ary Modulation Techniques, Power Spectra, Bandwidth Efficiency, Timing and Frequency synchronization.
Information theory: Entropy, Mutual Information and Channel capacity theorem.

Textbooks:
1. Simon Haykin, "Communication Systems", JohnWiley& Sons, 4th Edition, 2004.
2. B. P. Lathi, Zhi Ding " Modern Digital and Analog Communication Systems", Oxford press, 2011.

References:
1.SamShanmugam, "Digital and Analog Communication Systems",JohnWiley& Sons, 1999.
2. Bernard Sklar, F. J. harris"Digial Communications: Fundamentals andApplications", Pearson Publications, 2020.
3. Taub and Schilling, " Principles of Communication Systems", Tata McGraw Hill, 2007.

Course Outcomes-Program Outcomes -Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	M								L				H	M
CO2	M	H		L											H
CO3	H				L					M					H
CO4		H		M						L					H
CO5		H		M	L									H	M

23ECP03-ELECTRONIC CIRCUITS ANALYSIS LAB

Credits-1.5 **Sessional Marks:30**
L: T: P::0:0:3 **University Exam Marks:70**

Course Objectives:

- Plot the characteristics of Differential amplifiers, feedback and power amplifiers.
- Analyze the response of tuned amplifiers and multivibrators.
- Categorize different oscillator circuits based on the application.
- Design the electronic circuits for the given specifications and for a given application.

Course Outcomes:

- Know about the usage of equipment/components/software tools used to conduct experiments in analog circuits. (L2)
- Conduct the experiment based on the knowledge acquired in the theory about various analog circuits using BJT/MOSFETs to find the important parameters of the circuit experimentally. (L3)
- Analyze the given analog circuit to find required important metrics of it theoretically. (L4)
- Compare the experimental results with that of theoretical ones and infer the conclusions. (L4)
- Design the circuit for the given specifications. (L6)

List of Experiments:

1. Design and Analysis of Darlington pair.
2. Frequency response of CE – CC multistage Amplifier
3. Design and Analysis of Cascode Amplifier.
4. Frequency Response of Differential Amplifier
5. Design and Analysis of Series – Series feedback amplifier and find the frequency response of it.
6. Design and Analysis of Series – Shunt feedback amplifier and find the frequency response of it.
7. Design and Analysis of Shunt – Series feedback amplifier and find the frequency response of it.
8. Design and Analysis of Shunt – Shunt feedback amplifier and find the frequency response of it.
9. Design and Analysis of Class A power amplifier
10. Design and Analysis of Class AB amplifier
11. Design and Analysis of RC phase shift oscillator
12. Design and Analysis of LC Oscillator
13. Frequency Response of Single Tuned amplifier
14. Design and Analysis BootstrapAmplifier
15. Design and Analysis Push pull Amplifier

Note: At least 10 experiments shall be performed. Both BJT and MOSFET based circuits shall be implemented.

Faculty members who are handling the laboratory shall see that students are given design specifications for a given circuit appropriately and monitor the design and analysis aspects of the circuit.

Course Outcomes-Program Outcomes -Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1		L	M	L	M							L	H	M	
CO2		H	L	M	M								H	H	L
CO3	M	H	M	L	M							L	H	H	M
CO4	L	H	L	M	M								M	H	M
CO5		H	H	M	H								L	H	L

23ECP04-ANALOG AND DIGITAL COMMUNICATIONS LAB

Credits-1.5 **Sessional Marks:30**
L: T: P::0:0:3 **University Exam Marks:70**

Course Objectives:

- Understand the basics of analog and digital modulation techniques.
- Integrate theory with experiments so that the students appreciate the knowledge gained from the theory course.
- Design and implement different modulation and demodulation techniques and their applications.
- Develop cognitive and behavioral skills for performance analysis of various modulation techniques.

Course Outcomes:

- Know about the usage of equipment/components/software tools used to conduct experiments in analog and digital modulation techniques. (L2)
- Conduct the experiment based on the knowledge acquired in the theory about modulation and demodulation schemes to find the important metrics of the communication system experimentally. (L3)
- Analyze the performance of a given modulation scheme to find the important metrics of the system theoretically. (L4)
- Compare the experimental results with that of theoretical ones and infer the conclusions. (L4)

List of Experiments:

I. Use Software tools if necessary.

Design the circuits and verify the following experiments taking minimum of six from each section shown below.

Section-A

1. AM Modulation and Demodulation
2. DSB-SC Modulation and Demodulation
3. Frequency Division Multiplexing
4. FM Modulation and Demodulation
5. Radio receiver measurements
6. PAM Modulation and Demodulation
7. PWM Modulation and Demodulation
8. PPM Modulation and Demodulation

Section-B

1. Sampling Theorem.
2. Time Division Multiplexing
3. Delta Modulation and Demodulation
4. PCM Modulation and Demodulation
5. BPSK Modulation and Demodulation
6. BFSK Modulation and Demodulation

7. QPSK Modulation and Demodulation
8. DPSK Modulation and Demodulation

Note: Faculty members (who are handling the laboratory) are requested to instruct the students not to use readymade kits for conducting the experiments. They are advised to make the students work in the laboratory by constructing the circuits and analyzing them during the lab sessions.

Course Outcomes-Program Outcomes -Program Specific Outcomes (CO-PO-PSO) Mapping:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1		L	H	M					L	L	L		H	M	
CO2	H	M	L	L					L	L	L				H
CO3		L	M	H					L	L	L			H	M
CO4	H	M							L	L	L		H	L	

23BSS01-SOFT SKILLS

(ECE,EEE)

Credits: 2 | Sessional Marks : 30
L: T: P :: 0:1:2 | University Exam Marks : 70

Course Objectives:

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To enhance healthy relationship and understanding within and outside an organization
- To function effectively with heterogeneous teams

Course Outcomes

CO1: List out various elements of soft skills (L1, L2)
CO2: Describe methods for building professional image (L1, L2)
CO3: Apply critical thinking skills in problem solving (L3)
CO4: Analyse the needs of an individual and team for well-being(L4)
CO5: Assess the situation and take necessary decisions (L5)
CO6: Create a productive workplace atmosphere using social and work-life skills ensuring personal and emotional well-being (L6)

UNIT I Soft Skills & Communication Skills

Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills - Significance, process, types - Barriers of communication - Improving techniques.

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity.
(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)
Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.
Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.
Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation.

UNIT II Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking - Positive thinking - Reflection

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT III Problem Solving & Decision Making

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Team building - Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision.
Case Study & Group Discussion

UNIT IV Emotional Intelligence & Stress Management

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

Activities:
Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

UNIT V Team building & Leadership Skills
Team-Building – Relationship building – Accountability – Planning – Public Speaking – Motivation – Risk-Taking - Adaptability - Strategic Thinking- Time Management

Activities
Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making , Group discussion etc.

NOTE-:

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.

Prescribed Books:

Mitra Barun K, Personality Development and Soft Skills, Oxford University Press, Pap/Cdr edition 2012

Dr Shikha Kapoor, Personality Development and Soft Skills: Preparing for Tomorrow, I K International Publishing House ,2018

Reference Books

Sharma, Prashant, Soft Skills: Personality Development for Life Success, BPB Publications 2018.

Alex K, Soft Skills S.Chand & Co, 2012 (Revised edition)

Gajendra Singh Chauhan & Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality Published by Wiley, 2013

Pillai, Sabina & Fernandez Agna, Soft Skills and Employability Skills, Cambridge University Press, 2018

Soft Skills for a Big Impact (English, Paperback, Renu Shorey) Publisher: Notion Press

Dr. Rajiv Kumar Jain, Dr. Usha Jain, Life Skills (Paperback English) Publisher : Vayu Education of India, 2014

Online Learning Resources:

https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q

https://youtu.be/xBaLgJZ0t6A?list=PLzf4HIIlsQ

1. https://youtu.be/2bf9K2rRWwo
2. https://youtu.be/FchfE3c2jzc
3. https://www.businesstrainingworks.com/training-resource/five-free-business-etiquette-training-games/
4. https://onlinecourses.nptel.ac.in/noc24_hs15/preview
5. https://onlinecourses.nptel.ac.in/noc21_hs76/preview
6. FwJZel_j2PUy0pwjVUgj7KlJ
7. https://youtu.be/-Y-R9hDl7lU

8. https://youtu.be/gkLsn4ddmTs

Course Outcomes – Program Outcomes (CO-PO) Mapping

Course Outcomes	Program Outcome											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO12
CO1		✓		✓						✓		✓
CO2				✓		✓				✓	✓	
CO3	✓			✓		✓		✓				
CO4		✓					✓		✓		✓	
CO5		✓	✓							✓		✓
CO6					✓			✓		✓		✓

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SEMESTER-II-II

23IIMP01: DESIGN THINKING & INNOVATION

Credits -2
L: T: P::1:0:2

Sessional Marks: 30
University Exam Marks: 70

Course Objectives: The objectives of the course are to

- Bring awareness on innovative design and new product development.
- Explain the basics of design thinking.
- Familiarize the role of reverse engineering in product development.
- Train how to identify the needs of society and convert into demand.
- Introduce product planning and product development process.

UNIT – I Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking. New materials in Industry.

UNIT - II

Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation. Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity. Flow and planning from idea to innovation. Debate on value-based innovation

UNIT - III Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes. Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT - IV Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modeling, how to set specifications, Explaining their own product design.

UNIT – V Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

Textbooks:

1. Tim Brown. Change by design. 1/e. Harper Bollins. 2009.
2. Idris Mootee. Design Thinking for Strategic Innovation. 1/e. Adams Media, 2014.

Reference Books:

1. David Lee. Design Thinking in the Classroom. Ulysses press. 2018.
2. Shrrutin N Shetty. Design the Future. 1/e. Norton Press. 2018.
3. William lidwell. Kritinaholden. &Jill butter. Universal principles of design, 2/e, Rockport Publishers. 2010.
4. Chesbrough.H. The era of open innovation, 2003.

Online Learning Resources:

- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview

Course Outcomes:

COs	Statements	Blooms Level
CO1	Define the concepts related to design thinking.	L1
CO2	Explain the fundamentals of Design Thinking and innovation.	L2
CO3	Apply the design thinking techniques for solving problems in various sectors.	L3
CO4	Analyse to work in a multidisciplinary environment.	L4
CO5	Evaluate the value of creativity.	L5

Course Outcomes - Program Outcomes - Program Specific Outcomes (CO-PO-PSO) Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	P
CO1			H							M			M		
CO2	H	M								M			M		
CO3		M	H							M					
CO4		H		M						M					
CO5		H								M					

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