

**VASAVI COLLEGE OF ENGINEERING
(AUTONOMOUS)**

ACCREDITED BY NAAC WITH 'A++' GRADE

Ibrahimbagh, Hyderabad-31

Approved by A.I.C.T.E., New Delhi and

Affiliated to Osmania University, Hyderabad-07

**Sponsored
by
VASAVI ACADEMY OF EDUCATION
Hyderabad**



**SCHEME OF INSTRUCTION AND SYLLABI UNDER CBCS FOR
B.E. (ECE) III and IV Semesters
With effect from 2026-27
(For the batch admitted in 2025-26)
(R-25)**



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Phones: +91-40-23146040, 23146041

Fax: +91-40-23146090

Institute Vision

Striving for a symbiosis of technological excellence and human values

Institute Mission

To arm young brains with competitive technology and nurture holistic development of the individuals for a better tomorrow

Department Vision

Striving for excellence in teaching, training and research in the areas of Electronics and Communication Engineering and fostering ethical values

Department Mission

To inculcate a spirit of scientific temper and analytical thinking and train the students in contemporary technologies in Electronics and Communication Engineering to meet the needs of the industry and society with ethical values

B.E (ECE) Program Educational Objectives (PEO's)	
PEO I	Graduates will be able to identify, analyze and solve engineering problems.
PEO II	Graduates will be able to succeed in their careers, higher education, and research.
PEO III	Graduates will be able to excel individually and in multidisciplinary teams to solve industry and societal problems.
PEO IV	Graduates will be able to exhibit leadership qualities and lifelong learning skills with ethical values.

B.E. (ECE) PROGRAM OUTCOMES (PO's)	
Engineering Graduates will be able to:	
PO1	Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2	Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO3	Design / development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.
PO4	Conduct investigations of complex problems: Use research based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	Individual and team work: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, give and receive clear instructions.
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	Lifelong learning: Recognize the need, and for have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

B.E (ECE) PROGRAM SPECIFIC OUTCOMES (PSO's)	
PSO I	ECE students will be able to analyze and offer circuit and system level solutions for complex electronics engineering problems, keeping in mind the latest technological trends.
PSO II	ECE students will be able to apply the acquired knowledge and skills in modeling and simulation of communication systems.
PSO III	ECE students will be able to implement signal and image processing techniques for real time applications.

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 DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
 SCHEME OF INSTRUCTION AND EXAMINATION **(R-25)** :: B.E. ECE : THIRD SEMESTER (2026-27)

B.E (ECE) III – SEMESTER								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			Credits
		Hours per Week			Duration in Hrs	Maximum Marks		
		L	T	P		SEE	CIE	
THEORY								
U25PC310EC	Electronic Devices	2	1	-	3	60	40	3
U25PC320EC	Digital Logic Design	2	1	-	3	60	40	3
U25PC330EC	Signals and Systems	3	1	-	3	60	40	4
U25BS320MA	Partial Differential Equations and Numerical Methods	3	-	-	3	60	40	3
U25OE3XXXX	Open Elective - I	2	-	-	3	60	40	2
U25HS320EH	Skill Development Course-I: Communication Skills in English-I	1	-	-	2	40	30	1
U25BS330MA	Skill Development Course-II: Aptitude - I	1	-	-	2	40	30	1
U25HS310EH	Critical Thinking	1	-	-	2	40	30	1
PRACTICALS								
U25PC311EC	Electronic Devices Lab	-	-	2	3	50	30	1
U25PC321EC	Digital Logic Design Lab	-	-	2	3	50	30	1
U25PC331EC	Signals and Systems Lab	-	-	2	3	50	30	1
U25PC341EC	PCB Design and Simulation Lab	-	-	2	3	50	30	1
TOTAL		15	3	8		620	410	22
GRAND TOTAL		26				1030		
Left over hours will be allocated for: ECA-I Sports / Library / Mentor - Mentee Interaction / CC / RC / TC								
Note: 1) Every Student shall complete one NPTEL course certification of 8 weeks duration (equivalent to 2 credits weightage) by the end of VI-Semester. 2) Students willing to Opt B.E (ECE) Honours Degree in System on Chip Design shall complete one NPTEL Course Certification (equivalent to 2 Credits weightage) by the end of IV-Semester.								

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 SCHEME OF INSTRUCTION AND EXAMINATION **(R-25)** :: B.E. ECE : THIRD SEMESTER (2026-27)

Bridge Course for ECE Lateral Entry Students								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			Credits
		Hours per Week			Duration in Hrs	Maximum Marks		
		L	T	P		SEE	CIE	
THEORY								
UB25ES310EC	Programming Techniques for Problem Solving	2	-	2	3	50	-	-
UB25BS300MA	Foundation to Engineering Mathematics	2	-	-	3	50	-	-

<u>SERVICE COURSES OFFERED TO EEE</u>								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			Credits
		Hours per Week			Duration in Hrs	Maximum Marks		
		L	T	P		SEE	CIE	
THEORY								
U25ES310EC	Electronics Devices and Circuits	3	-	-	3	60	40	3
PRACTICALS								
U25ES311EC	Electronics Devices and Circuits Lab	-	-	2	3	50	30	1

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Electronic Devices

SYLLABUS FOR B.E. (ECE) III - SEMESTER

L:T:P (Hrs./week): 2:1:0	SEE Marks : 60	Course Code: U25PC310EC
Credits : 4	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand fundamental semiconductor carrier transport mechanisms and related physical principles. 2. To analyze the electrical behavior and modeling of PN junctions under different biasing conditions. 3. To explore applications of PN junctions and metal-semiconductor devices including special-purpose diodes. 4. To Study transistor-level device physics, including short-channel effects in modern MOSFETs. 5. To Learn CMOS fabrication steps and carrier transport models through TCAD simulations.	On completion of the course, students will be able to 1. Analyze carrier drift, diffusion, and recombination processes in semiconductors. 2. Interpret the I-V characteristics, capacitance, and transient behavior of PN junctions. 3. Apply PN junction and metal-semiconductor devices in practical circuits like rectifiers and regulators. 4. Analyze BJT and MOSFET device characteristics and explain short-channel effects and small-signal models. 5. Understanding of CMOS IC fabrication processes and TCAD-based modeling of carrier transport.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3											3		
CO2	3	3											3		
CO3	3	2	2				2						3		
CO4	3	3	2										3		
CO5	3	2	2		2								3		

UNIT-I:

Carrier Transport Mechanisms Review of semiconductor physics: Carrier Drift: Drift Current Density, Mobility Effects, Conductivity, Velocity Saturation. Carrier Diffusion: Diffusion Current Density, Total Current Density. Graded Impurity Distribution: Induced Electric Field, The Einstein Relation. Carrier Generation and Recombination.

UNIT-II:

PN Junction Characteristics: Basic Structure of the pn Junction, Zero Applied Bias: Built-in Potential Barrier, Electric Field, Space Charge Width. Forward and Reverse Applied Bias. Junction Capacitance, Non-uniformly Doped Junctions.pn

Junction Current equation, I-V characteristics, Temperature Effects. Small-Signal Model of the pn Junction. Charge Storage and Diode Transients: The Turn-off Transient, the Turn-on Transient. Junction Breakdown: Avalanche and Zener breakdown.

UNIT - III :

PN junction applications and Metal-Semiconductor: Full wave rectifier with filters. Non-linear wave shaping: Clipping and clamping circuits, Zener diode as regulator. Special Diodes: LED, Photo diode and Tunnel Diode. The Schottky Barrier Diode: Ideal Junction Characteristics, Comparison of the Schottky Barrier Diode and the PN Junction Diode, Metal-Semiconductor Ohmic Contacts.

UNIT - IV :

Transistors: Bipolar Junction Transistor I-V characteristics, Ebers-Moll Model, MOS structure and its Operating modes, MOS capacitor, C-V characteristics, MOSFET, I-V characteristics, and small signal models of MOS transistor, Short channel Effects in MOSFET.

UNIT - V :

IC fabrication process and Introduction to TCAD Simulation: Oxidation, diffusion, ion implantation, photolithography, Etching, Chemical vapor deposition, sputtering, twin-tub CMOS process, Introduction to Technology computer aided design tools, Carrier transport models: Drift-diffusion model, Hydrodynamic model and Monte Carlo Method.

Learning Resources:

1. D. Neamen, D. Biswas & quot; Semiconductor Physics and Devices, 4th Edition, McGraw-Hill Education 2012.
2. Christos C. Halkias, SatyabrataJit, Jacob Millman "Electronic Devices and Circuits (SIE)" 4th Edition, MC Graw Hill Publication 2015.
3. S. M. Sze and K. N. Kwok, "Physics of Semiconductor Devices," 3rd edition, John Wiley & amp; Sons, 2006.
4. VLSI Fabrication Principles, Silicon and Gallium Arsenide 2nd Edition- 1994 Sorab K Gandhi, Wiley- India Publications.
5. G. Streetman, and S. K. Banerjee, "Solid State Electronic Devices," 7th edition, Pearson, 2014.
6. <https://nptel.ac.in/courses/113106062/#> Electronic materials, Devices and Fabrication by Dr. S. Parasuraman IIT Madras.
7. <https://nptel.ac.in/courses/117106091/> Solid State Devices by Prof. S. Karmalkar, IIT Madras.

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 Minutes

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Digital Logic Design

SYLLABUS FOR B.E. (ECE) III - SEMESTER

L:T:P (Hrs./week): 2:1:0	SEE Marks : 60	Course Code: U25PC320EC
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand the basic concepts of digital systems. 2. Design and Analyze Combinational Logic Circuits. 3. Design and Analyze Sequential Logic Circuits. 4. Learn language fundamentals of Verilog to simulate and synthesize digital circuits. 5. Model Digital Systems Using HDL, Simulate and Test Logic Circuits	On completion of the course, students will be able to 1. Evaluate the basic principles of digital systems, including binary arithmetic, Boolean algebra and logic simplification. 2. Demonstrate the design of combinational logic systems. 3. Describe the design of Sequential Circuits. 4. Illustrate Use of Hardware Description Languages to model, simulate, and implement digital circuits. 5. Demonstrate the models of Digital systems using HDL.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3										3		
CO2	2	3	3										3		
CO3	2	3	3										3		
CO4	2		2		2	3							3		
CO5	2		2		2								3		

UNIT – I :

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra, Consensus theorem and De Morgan's Theorem, SOP & POS forms, Minimization of switching functions: Karnaugh Map method (up to 5 variables), Logic function Realization using basic gates, Binary codes.

UNIT - II :

Combinational circuits: Code Converters, Binary Half and Full adders, parallel adders, carry look ahead adder, Binary Subtractors, BCD adder, Encoders, Priority Encoders, Decoders, Comparators. Multiplexers,

Demultiplexers, and their applications, Implementations of Logic Functions using Decoders, Demultiplexers and Multiplexers, Quantum Logic Gates.

UNIT - III :

Sequential Logic Design: Latches and Flip flops, Ripple and Synchronous counters, Shift registers: Left shift and Right shift registers, Finite state machines, Introduction to PAL, PLA, FPGA.

UNIT - IV :

Introduction to HDLs: Basic Concepts of Verilog HDL, Data Types, System Tasks and Compiler Directives, Gate Level Modelling, Gate types and delays, Dataflow Modelling, continuous assignment and delays, Switch level Modelling, Design of Stimulus Block.

UNIT - V :

Behavioral Modelling: Structured procedures, procedural assignments, timing control, conditional statements, sequential and parallel blocks, Tasks and Functions, Design of Moore and Mealy FSMs using Verilog, Logic Synthesis, Introduction to Static Timing Analysis.

Learning Resources:

1. Morris Mano M. and Michael D. Ciletti, "Digital Design. With an Introduction to Verilog HDL ", 6th edition, Pearson 2018.
2. Parag K. LaLa Quantum computing: A Beginner's Introductions 1st edition
3. Samir palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis, "Second edition, Pearson 2008.
4. Charles H. Roth, Jr., Lizy Kurian John and Byeong Kil Lee "Digital Systems Design Using Verilog", First Edition.
5. https://onlinecourses.nptel.ac.in/noc22_ee110
6. https://onlinecourses.nptel.ac.in/noc25_ee180

The break-up of CIE: Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 Minutes

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Signals and Systems

SYLLABUS FOR B.E. (ECE) III - SEMESTER

L:T:P (Hrs./week): 3:1:0	SEE Marks : 60	Course Code: U25PC330EC
Credits : 4	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
- To define and classify continuous time signals & systems - To determine the frequency domain characteristics of continuous and discrete time signals using various transform techniques. - To verify the causality and stability of LTI system and find its response using convolution. - To define and classify discrete time signals & systems - To determine the frequency domain characteristics of discrete time signals using various transform techniques.	On completion of the course, students will be able to - Analyze different types of continuous time signals and systems, and investigate whether the system is stable. - Apply Fourier Transform on continuous time signals, and systems and identify whether the LTI system is distortion less or not. - Apply Laplace Transform to find response of LTI system, and convert continuous time signal into discrete time signal by applying sampling operation. - Analyze different types of discrete time signals and systems and apply Discrete Time Fourier Transform. - Apply Z Transform on discrete time signals and systems.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2									2		3	3
CO2	3	3	2									2		3	3
CO3	3	3	2									2		3	3
CO4	3	3	2									2		3	3
CO5	3	3	2	3								2		3	3

UNIT - I :

Continuous Time Signals & Systems: Signals and Systems as seen in everyday life, and in various branches of engineering and science. Elementary signals, Basic operations on signals and its classification. Introduction to systems and its classification. Orthogonal signals.

Fourier Series: Introduction, Existence and Convergence, Trigonometric and exponential Fourier series representations and their relations, Symmetry conditions, Properties, Complex Fourier spectrum.

UNIT - II :

Signal Representation by Continuous Exponentials: Introduction to Fourier Transform, Existence, Fourier transform of singularity functions and signals, Properties, Fourier transform of a periodic function.

Signal Transmission Through Linear Systems: Introduction to Linear Shift Invariant (LSI) system, Unit Impulse and step response, Convolution, Transfer function of an LSI system, Distortion less transmission.

UNIT - III :

Signal Representation by Generalized Exponentials: Introduction to Laplace transforms, Existence, Region of convergence (ROC) and its properties. Properties of Laplace transform. Inverse Laplace transform. Analysis and characterization of continuous LTI systems using Laplace Transform.

Sampling: Introduction to Sampling, Sampling Theorem, Aliasing, Sampling Techniques, Reconstruction: ideal interpolator, Zero – order hold and First order hold.

UNIT - IV :

Discrete Time Signals & Systems: Introduction, Elementary signals, Basic operations on signals and its classification. Introduction to systems and its classification. Discrete Fourier Series (DFS), Discrete Time Fourier Transform (DTFT). Linear Shift invariant (LSI) systems – Linear Convolution, Stability and Causality

UNIT - V :

Z-Transforms: Introduction to Z-Transform, Existence, Region of Convergence (ROC) and its properties. S-plane and Z-plane correspondence, Properties of Z-Transform, Inverse Z-Transform, Analysis and characterization of discrete LTI systems using Z-Transform.

Learning Resources:

1. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2 Ed., PHI.
2. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
3. Signals & Systems - Simon Haykin and Van Veen, Wiley, 2 Ed.
4. Signals and Systems – A. Rama Krishna Rao – 2008, TMH.
5. https://onlinecourses.nptel.ac.in/noc19_ee07/preview (Principle of Signals and Systems by Prof. Aditya K Jagannatham)

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Tests: 90 Minutes

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DEPARTMENT OF MATHEMATICS

Partial Differential Equations and Numerical Methods

For B.E. III - Sem., (CBCS) (For ECE Branch only)

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: U25BS320MA
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to : 1. Learn the formation of Partial Differential Equations and solution of linear and non-linear first order partial differential equations. 2. Study the applications of Partial Differential equations. 3. Understand the concepts of interpolation and to learn various methods for interpolating data points and approximating functions. 4. Learn numerical techniques for solving first-order ordinary differential equations. 5. Understand the principles of curve fitting using the method of least squares and the concept of correlation.	At the end of the course students should be able to: 1. Formulate the Partial differential equations and solve the linear and non-linear first order Partial differential equations. 2. Solve the one-dimensional wave equation, one-dimensional heat equation. 3. Apply Numerical methods to interpolate data points with equal and unequal intervals. 4. Use Numerical techniques to solve first-order ordinary differential equations. 5. Apply the Method of least squares to fit various curves to the given data and Calculate Karl Pearson's coefficient of correlation.

CO-PO/PSO Mapping

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

UNIT - I:

PARTIAL DIFFERENTIAL EQUATIONS:

Formation of first and second order Partial Differential Equations -
Solution of First Order Equations – Linear Equation - Lagrange's Equation-
Non-linear first order equations -Standard Forms.

UNIT - II:

APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS:

Method of Separation of Variables - One Dimensional Wave Equation- One Dimensional Heat Equation (Homogeneous)

UNIT - III:

INTERPOLATION:

Finite Differences- Interpolation- Newton's Forward and Backward Interpolation Formulae – Interpolation with unequal intervals – Lagrange's Interpolation Formula – Divided differences- Newton's Divided difference formula.

UNIT - IV:

NUMERICAL SOLUTIONS OF ODE:

Numerical Solutions of Ordinary Differential Equations of first order - Taylor's Series Method - Euler's Method -Modified Euler's Method -Runge-Kutta of 4th order (without proofs).

UNIT - V :

CURVE FITTING AND CORRELATION:

Curve fitting by the Method of Least Squares - Fitting of Straight Line - Second order curve (Parabola) - Exponential curve ($y = ab^x$) - Correlation – Karl Pearson's Co-efficient of Correlation.

Text Books:

1. Advanced Engineering Mathematics, Third Edition, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House.
2. Higher Engineering Mathematics, Dr.B.S.Grewal, 40th Edition, Khanna Publishers.

Reference Books:

1. Advanced Engineering Mathematics, Kreyszig E, 8th Edition, John Wiley & Sons Ltd, 2006.
2. A text book of Engineering Mathematics by N.P. Bali& Manish Goyal, Laxmi Publication.

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc24_ma37/preview
2. https://onlinecourses.swayam2.ac.in/cec24_ma19/preview

The break-up of CIE: Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 Minutes

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Skill Development Course - I:
Communication Skills in English - I
SYLLABUS FOR B.E. (ECE) III - SEMESTER

L:T:P (Hrs./week) : 1:0:0	SEE Marks : 40	Course Code: U25HS320EH
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVE	COURSE OUTCOMES
The course will enable the learners to: 1. Get students proficient in both receptive and productive skills especially 2. Enable students to understand the importance and method of exchanging information in a formal space- both written and spoken 3. Introduce students to an ideal structure for a presentation and discussion- individually and in groups 4. Develop and improve reading skills needed for college work and reproduce the content based on the situational need	At the end of the course the learners will be able to: - 1. Introduce themselves effectively and converse in a formal environment especially in the online space 2. Write emails with appropriate structure and content 3. Use appropriate structure based on the content employing appropriate transitions in written and spoken communication 4. Paraphrase and Summarise in Spoken and written formats

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									2	3		2			
CO2										3		2			
CO3									2	3		2			
CO4		2								3		2			

UNIT-I: Delightful Descriptions

Participants learn to introduce themselves confidently, make detailed observations, express opinions, and describe past experiences effectively in various contexts.

- 1.1 Introductions on an Online Forum
- 1.2 Making Observations and Giving Opinion
- 1.3 Recalling and Describing

UNIT-II: Formal Conversation Skills

Focuses on essential professional communication skills such as seeking and providing information, giving constructive feedback, and politely requesting permissions in formal settings.

- 2.1 Ask for Information
- 2.2 Give Information

- 2.3 Give Feedback
- 2.4 Seek Permission

UNIT-III: Technical Expositions and Discussions

Develops skills to present and discuss technical content logically using structures like classification, sequencing, comparison, cause-effect relationships, and problem-solution formats.

- 3.1 Classification
- 3.2 Sequence
- 3.3 Compare and Contrast
- 3.4 Cause and Effect
- 3.5 Problem and solution

UNIT-IV: Rational Recap

Enhances clarity in communication through accurate paraphrasing and summarizing, both in spoken and written forms, ensuring message retention and understanding.

- 4.1 Paraphrasing - Written
- 4.2 Summarizing - Written
- 4.3 Paraphrasing – Spoken
- 4.4 Summarizing – Spoken

METHODOLOGY

- Case Studies
- Demonstration
- Presentations
- Expert lectures
- Writing and Audio-visual lessons

ASSESSMENTS

- Online assignments
- Individual and Group

Learning Resources:

1. They Say / I Say: The Moves That Matter in Academic Writing" – Gerald Graff & Cathy Birkenstein
2. HBR Guide to Persuasive Presentations" – Harvard Business Review
3. Technical Communication" – Mike Markel & Stuart Selber
4. The Only Academic Phrasebook You'll Ever Need" – Luiz Otávio Barros
5. learn.talentsprint.com

The break-up of CIE: Internal Tests + Assignments + Quizzes

- | | | | |
|--------------------------|----------------------------------|-----------------------------------|-----------------------------------|
| 1. No. of Internal Tests | : <input type="text" value="2"/> | Max. Marks for each Internal Test | : <input type="text" value="20"/> |
| 2. No. of Assignments | : <input type="text" value="2"/> | Max. Marks for each Assignment | : <input type="text" value="5"/> |
| 3. No. of Quizzes | : <input type="text" value="2"/> | Max. Marks for each Quiz Test | : <input type="text" value="5"/> |

Duration of Internal Test: 90 Minutes

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DEPARTMENT OF MATHEMATICS

Skill Development Course - II: Aptitude - I

SYLLABUS FOR B.E. 2/4 - III SEMESTER (Common to all branches)

L:T:P (Hrs./week) : 1:0:0	SEE Marks : 40	Course Code: U25BS330MA
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVE	COURSE OUTCOMES
The course will enable the learners to: - Students will be trained to enhance their employability skills. - Students will be introduced to higher order thinking and problem solving skills in the following areas - Arithmetic Ability, Numerical Ability and General Reasoning. - Students will be trained to work systematically with speed and accuracy while problem solving. - Students will be trained to apply concepts like percentages and averages to solve complex problems. - Students will be trained to use effective methods like elimination of options and shortcuts to solve problem accurately.	At the end of the course the learners will be able to: - - Solve questions in the mentioned areas using shortcuts and smart methods. - Understand the fundamentals concept of Aptitude skills. - Perform calculations with speed and accuracy. - Solve complex problems using basic concepts. - Use shortcuts with ease for effective problem solving.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3		2								2			
CO2		3		2								2			
CO3		3		2								2			
CO4		3		3								2			
CO5		3		2								2			

UNIT-1: Quantitative Aptitude - Numerical Ability

- 1.1 Introduction to higher order thinking skills
- 1.2 Speed Math
- 1.3 Number systems
- 1.4 LCM & HCF

UNIT-2: Quantitative Aptitude- Arithmetic Ability Foundation

- 2.1 Ratio proportions
- 2.2 Partnership
- 2.3 Ages

2.4 Allegations and mixtures

2.5 Averages

UNIT-3: Quantitative Aptitude- Word Problems Part 1

3.1 Percentages

3.2 Profit and loss

UNIT-4: Reasoning Ability- General Reasoning Part 1

4.1 Blood Relations

4.2 Number Series

4.3 Coding and decoding

UNIT-5: Quantitative Aptitude- Word Problems Part 2

5.1 Time and Work

5.2 Chain Rule

5.3 Pipes and Cisterns

Prescribed textbook for theory:

1. Quantitative Aptitude S.CHAND by Dr. R S Aggarwal
2. A Modern Approach to Verbal & Non-Verbal Reasoning S.CHAND by Dr. R S Aggarwal

Suggested Reading

1. Learn.talentsprint.com/References Courses
2. Quantitative Aptitude Disha Publications
3. LOGICAL Reasoning Disha Publications

The break-up of CIE: Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 20
2. No. of Assignments	: 2	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 2	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 Minutes

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DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Critical Thinking

SYLLABUS FOR B.E. III SEMESTERS

L:T:P (Hrs./week): 1:0:0	SEE Marks : 40	Course Code: U25HS310EH
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. Understand the basics of logic, reasoning, and identifying biases. 2. Learn to evaluate evidence and differentiate between facts and opinions. 3. Introduce frameworks like SWOT and root cause analysis for problem-solving. 4. Develop critical thinking skills through case studies and ethical debates.	At the end of the course the learners will be able to: - 1. Students will identify assumptions, biases, and logical fallacies in real-world scenarios. 2. Learn to evaluate evidence and differentiate between facts and opinions. 3. Students will apply structured methods to analyze problems and propose actionable solutions. 4. Students will demonstrate critical thinking through group discussions and case study analyses.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2									1				
CO2		2									1				
CO3		1					1				1				
CO4		1					1				1				

OVERVIEW:

In a world where automation and AI are rapidly transforming the workforce, critical thinking has become a vital human skill that sets professionals apart. This course empowers engineering students to think independently, evaluate information logically, and make well-reasoned decisions. Through engaging with real-world problems, ethical dilemmas, and structured problem-solving tools, students will develop the ability to question intelligently, respond thoughtfully, and contribute meaningfully in AI-assisted environments.

UNIT-I: Fundamentals of Critical Thinking

Introduces the foundations of logical thinking and the importance of recognizing faulty reasoning.

- 1.1 Logic and Reasoning
- 1.2 Identifying Assumptions
- 1.3 Bias and Fallacies

Learning Outcomes:

- Understand and apply the basics of logical thinking and structured reasoning
- Identify personal and systemic assumptions in real-world and technical contexts
- Detect common biases and fallacies in digital content and AI-generated outputs

UNIT-II: Analytical Thinking

Equips students to analyze information critically and draw conclusions based on solid evidence.

- 2.1 Evaluating Evidence
- 2.2 Drawing Logical Conclusions
- 2.3 Differentiating Facts from Opinions

Learning Outcomes:

- Evaluate the reliability and relevance of data from human and AI sources
- Draw logical conclusions from complex and sometimes incomplete datasets
- Differentiate between subjective opinions and objective, verifiable information

UNIT-III: Problem-Solving Frameworks

Builds practical decision-making skills using structured, human-driven analytical tools.

- 3.1 Root Cause Analysis (5 Whys)
- 3.2 Decision Trees
- 3.3 SWOT Analysis

Learning Outcomes:

- Break down problems systematically to identify core issues beyond surface symptoms
- Use structured tools to support decision-making in multidisciplinary and tech-enabled environments
- Integrate strategic thinking with ethical judgment when proposing solutions

UNIT 4: Applications of Critical Thinking

Applies critical thinking to real-life contexts through discussions, debates, and case studies.

4.1 Case Studies

4.2 Group Discussions on Ethical Dilemmas

4.3 Critical Thinking in Action: Debating Complex Engineering Issues

Learning Outcomes:

- Apply critical thinking to analyze real-world problems in engineering, business, and society
- Collaborate effectively and respectfully in group settings, including diverse viewpoints
- Demonstrate ethical reasoning and informed argumentation in AI-influenced scenarios

Suggested Books

1. Martha Nussbaum Not for Profit: Why Democracy Needs the Humanities (2010).
2. The Invisible Man : Ralph Ellison
3. Thinking, Fast and Slow by Daniel Kahneman
4. The McKinsey Mind: Understanding and Implementing the Problem-Solving Tools and Management Techniques of the World's Top Strategic Consulting Firm by Ethan M. Rasiel and Paul N. Friga

Learning Resources

learn.talentsprint.com

The break-up of CIE: Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 1	Max. Marks for each Internal Test	: 20
2. No. of Assignments	: 1	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 1	Max. Marks for each Quiz Test	: 5

Duration of Internal Tests: 90 Minutes

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Electronic Devices Lab

SYLLABUS FOR B.E. (ECE) III - SEMESTER

L:T:P (Hrs./week) : 0:0:2	SEE Marks : 50	Course Code: U25PC311EC
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVE	COURSE OUTCOMES
1 To characterize diodes, BJTs experimentally.	On completion of the course, students will be able to
2 To analyze diode applications circuits.	1 Plot the characteristics of electronic devices to understand their behavior
3 To characterize MOSFETs experimentally.	2 Employ Diode as a circuit element to get a given output response.
4 To simulate and evaluate PN junction and MOSFET using TCAD tools.	3 Operate electronic test equipment and hardware/software tools to characterize the behavior of electronic devices.
5 To simulate and evaluate electronic devices using EDA tools.	4 Analyze the various device parameters effects on device characteristics
	5 Use TCAD tools to design and analyze PN junction and MOSFET devices and implementation of course based projects using EDA tools.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	2			2	2				3		
CO2	3	3	2	2				2	2				3		
CO3	3	3	2	2	2			2	2				3		
CO4	3	3	2	2	2			2	2				3		
CO5	3	3	2	2	3			3	3	3	3	1	3		

Cycle - I Experiments

1. Zener Diode Characteristics and Zener as Voltage Regulator.
2. Common Base characteristics of BJT and measurement of h - parameters.
3. Common Emitter characteristics of BJT and measurement of h - parameters.
4. MOSFET Characteristics and measurement of its small signal parameters.
5. Transistor as a Switch.
6. V-I Characteristics of different LEDs.
7. V-I Characteristics of photo transistor/diode.
8. Diode Clipper circuits.
9. Clamper circuits.
10. Design of Half wave and Full wave Rectifiers with and without Filters.

Cycle - II Experiments (Using TCAD Tool)

1. Design of p-n junction diode
2. Analysis of IV Characteristics for a p-n junction diode
3. Parametric analysis of p-n junction diode

New / Additional experiments planned

1. Design of MOSFET using TCAD.
2. Analysis of IV Characteristics of MOSFET.

Learning Resources:

1. "LAB MANUAL", Department of ECE, Vasavi College of Engineering.
2. Paul B Zbar and Alber P Malvino, Michael A Miller, "Basic Electronics: A Text Lab Manual", 7th edition, Tata McGraw Hill, 2009.
3. David A Bell, "Laboratory Manual for Electronic Devices and Circuits", 4th edition, PHI, 2001.
4. https://community.cadence.com/cadence_technology_forums/Cadence.Community

Tools:

1. Multisim/Cadence may be used to facilitate analysis of characteristics of devices.
2. TCAD tool can be used to do analysis on PN diode and MOSFET

Guidelines for course based projects:

- Batch size shall be 3 to 4 students per batch.
- Project topics may be chosen by the student with advice and approval from the faculty members offering the course.
- Students have to submit a one-page abstract in the beginning of project work
- Output of the course based project should be demonstrable / measurable / outcome based.
- Finalization of the project topics, batches formation and project review schedule should be completed by the end of week-2. Project work will be carried out by the students from week-3 onwards.
- One review will be conducted for evaluating the project from week-10 to week-13 as per the schedules announced.
- Students will give a 20 minutes presentation through power point presentation followed by a 10 minutes discussion.
- Students are required to submit project report.

The break-up of CIE:

- | | | |
|--|---|----|
| 1. No. of Internal Test | : | 1 |
| 2. Marks earmarked for Course-based Project | : | 05 |
| 3. Marks earmarked for day-to-day lab class assessment | : | 13 |
| 4. Marks earmarked for lab internal test | : | 12 |

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Digital Logic Design Lab

SYLLABUS FOR B.E. (ECE) III - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: U25PC321EC
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1 Understand the basic principles of Logic Gates. 2 Design and Analyse the functionality of Combinational Circuits. 3 Verify the behaviour of sequential Logic Circuits 4 Apply different models to write Verilog code. 5 Design FSMs using testbench and Analyse them.	On completion of the course, students will be able to 1 Describe the functionality of Logic Gates. 2 Evaluate the design of Combinational Circuit. 3 Analyse the given Sequential circuit for its specifications. 4 Write verilog code in different models to simulate and synthesize. 5 Demonstrate the output of FSMs.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	2		2			3	2				3		
CO2	2	3	2	3	2			3	2				3		
CO3	2	3	2	3	2			3	2				3		
CO4	2	3	2					3	2				3		
CO5	2	3	2					3	2				3		

CYCLE - I Experiments

- Adders, Subtractors.
- Multiplexers and Demultiplexers.
- Encoders, Decoders, Priority Encoder and Comparator.
- Implementation of logic functions using multiplexers.
- Arithmetic and Logic Unit with minimum of sixteen instructions.
- Flip-Flops (SR, JK, T and D)
- Registers, Counters.
- Sequence Detector using Mealy and Moore type state machines.

Note:

1. All the codes should be implemented appropriately using Gate level, Dataflow and Behavioral Modeling.
2. All the programs should be simulated using test benches.

CYCLE - II Experiments

9. Transistor Level implementation of Inverter, NAND and NOR, Half Adder and Full Adder.
10. Transistor Level implementation of 4:1 Multiplexer, 2:4 Decoder.
11. 16-bit adder using 4-bit tasks and functions.
12. Mini Project.

New / Additional experiments planned

1. Binary multipliers
2. BCD Adders.

The break-up of CIE:

1. No. of Internal Test	:	1
2. Max. Marks for internal tests	:	12
3. Marks for day-to-day laboratory class work	:	18

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Signals and Systems Lab

SYLLABUS FOR B.E. (ECE) III - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: U25PC331EC
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
- To understand and apply Matrix operations in MATLAB. - To analyze and generate various continuous and discrete time signals in MATLAB. - To master various transform techniques in MATLAB. - To examine system response using convolution. - To understand the Sampling Theorem and aliasing in MATLAB.	On completion of the course, students will be able to - Write MATLAB codes for the generation of continuous time signals. - Apply various transforms on signals to find its Spectrum using MATLAB. - Find the response of the system using convolution function in MATLAB. - Perform sampling of continuous time signal. - Write MATLAB codes for the generation of discrete time signals.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3			2			3				1		3	3
CO2	3	3		2	2			3				1		3	3
CO3	3	3			2			3				1		3	3
CO4	3	3			2			3				1		3	3
CO5	3	3		2	2			3				1		3	3

CYCLE - I Experiments

- Basic operations on Matrices.
- Continuous time signal generation.
- Operations on Continuous time signal.
- Fourier series analysis.
- The Fourier transform and its properties.
- Continuous time Convolution.

CYCLE - II Experiments

7. Laplace Transform and its properties.
8. Verification of Sampling Theorem.
9. Discrete time signal generation and operations.
10. Z – Transform and its properties.
11. Generation of signal using Vector Signal Generator (VSG).
12. Spectrum analysis using Network Analyzer.

New / Additional experiments planned

1. GUI based Signal processing application on FT and IFT in Communication Systems.
2. Develop an AI model to predict future samples of a communication signal using previous observations.
3. Spectrum analysis using Vector Network Analyzer (VNA).
4. Generation of Sine wave using Simulink.

Learning Resources/ Tools :

1. Taan S. ElAli and Mohammad A. Karim, "Continuous Signals and systems with MATLAB", 2/e, 2009, CRC Press.
2. Edward W.Kamen and Bonnie S. Heck, "Fundamentals of Signals and Systems Using MATLAB", PHI Inc.

The break-up of CIE:

- | | | |
|---|---|---------------|
| 1. No. of Internal Test | : | <div>1</div> |
| 2. Max. Marks for internal tests | : | <div>12</div> |
| 3. Marks for day-to-day laboratory class work | : | <div>18</div> |

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

PCB Design and Simulation Lab

SYLLABUS FOR B.E. (ECE) III - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: U25PC341EC
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
- To introduce students to EDA tools and their role in modern PCB design and development. - To develop the ability to design, simulate, and analyze electronic circuits - To impart knowledge on power supply design and signal processing circuits - To enable students to design PCB layouts and understand fabrication processes and materials. - To provide hands-on experience in building practical electronic applications such as sensors, alarms, and detector circuits.	On completion of the course, students will be able to - Use EDA tools to create schematics and perform circuit simulations effectively. - Design and analyze basic electronic circuits such as RLC circuits, rectifiers, - Develop and simulate analog circuits such as power supplies, filters, and amplifiers. - Design PCB layouts considering fabrication constraints and thermal management techniques. - Implement real-time electronic projects such as IR sensors, security alarms, and mobile detector circuits.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	3							1	3	2	
CO2	3	3	2	2	2							1	2	2	
CO3	3	3	3	2	2							1	3	3	
CO4	2	2	3	2	3	1	1					1	2	2	
CO5	2	2	3	3	2				2	1		1	2	3	2

Cycle – I:

1. Introduction to EDA Tool for PCB Design
2. Schematic Creation and Simulation of an electronic circuit
3. Design and Simulation of RLC Circuits
4. Design and Simulation of a Half and Full Wave Rectifier
5. Design and Simulation of a $\pm 5V$ Power supply.

6. Design and Simulate Simple 7 Segment Circuits

Cycle – II:

7. Design of a PCB layout for a Low pass filter
8. Design of a PCB layout for a CE Amplifier
9. Design of a PCB Layout for an IR Proximity Sensor
10. Design of a PCB Layout for a Laser Light Security Alarm.
11. Design of a PCB Layout for a Mobile Phone Detector Circuit.
12. PCB Thermal management techniques.

Additional Experiments:

1. Design of multilayer PCB layout for Switching Voltage Regulator
2. Signal Routing in Multilayer PCB layout

Learning Resources/ Tools:

Tools: Altium Designer, KiCAD,

1. Walter C Bosshart "Printed Circuit Boards: Design and Technology" Tata McGraw-hill, 2009.
2. Majid Pakdel "Fast PCB Design with Altium Designer" Central West Publisher, First Edition 2021.
3. R S Khandpur "Printed Circuit Boards: Design, Fabrication, Assembly & Testing" Tata McGraw-hill, 2005.

The break-up of CIE:

1. No. of Internal Test	:	1
2. Max. Marks for internal tests	:	12
3. Marks for day-to-day laboratory class work	:	18

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Programming Techniques for Problem Solving

Bridge Course SYLLABUS FOR B.E. III - SEMESTER

L:T:P (Hrs./week): 2:0:2	SEE Marks : 50	Course Code: UB25ES310EC
Credits : -	CIE Marks : -	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Acquire skills and methods for a given computing problem. 2. Develop solutions using structured programming concepts. 3. Write programs in C Language. 4. Implement user defined classes using C++. 5. Demonstrate different features of OOP using C++.	On completion of the course, students will be able to 1. Design modular programs involving input output operations, decision making and looping constructs. 2. Apply the concept of arrays for storing, sorting and searching data. 3. Apply the concept of pointers for dynamic memory management and process strings. 4. Design programs to store data in structures. 5. Develop programs using OOP principles using C++.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3		2			2				1	3	1	1
CO2	3	3	3		2			2				1	3	1	1
CO3	3	3	3		2			2				1	3	1	1
CO4	3	3	3		2			2				1	3	1	1
CO5	3	3	3		2			2				1	3	1	1

UNIT-I

Introduction to Programming Language- Background of C, structure of a C Programs, Identifiers, Types, Variables, Constants, Input/Output, Operators, Expressions, Precedence and Associativity.

Selection: Logical Data and Operators, if... else, switch Statements, Standard Functions.

Repetition: Loops, while, for, do-while Statements, Loop Examples, break and continue.

UNIT-II

Functions: Designing Structured Programs, Functions Basics, User Defined Functions.

Recursion-Recursive Functions.

Arrays: One-Dimensional Arrays, Linear Search and Binary Search, Selection Sort and Bubble Sort, Two-Dimensional Arrays.

UNIT-III

Pointers: Introduction, Pointers to Pointers, Arithmetic operations using pointers.

Strings – Concepts, C Strings, String Input/output, Functions, Arrays of Strings, String Manipulation Functions.

UNIT-IV

Structure: Definition and Initialization of Structures, Accessing Structures, Nested Structures, Arrays of Structures, Structures and Functions, Pointers to Structures, Unions.

Introduction to Object-Oriented Programming: Background of C++, Differences, Introduction to Classes and Objects, Members, Member functions and friend functions.

UNIT-V

Static Polymorphism: Function Overloading, Operator Overloading

Inheritance: Derived Classes, Virtual Base Class.

Dynamic Polymorphism: Virtual functions, Function Overriding, Templates.

Exception Handling in C++

Learning Resources:

1. B.A. Forouzan & Richard F. Gilberg, "A Structured Programming Approach using C", 3rd Edition, Cengage Learning, 2013.
2. Walter Savitch, "Problem solving with C++", 6th Edition, Pearson Education, 2009.
3. Gottfried, "Programming with C", 3rd Edition, TMH, 2010.

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DEPARTMENT OF MATHEMATICS

Foundation to Engineering Mathematics

Bridge Course for B.E. III-Semester (CBCS) (Common to all branches)

L:T:P (Hrs./week): 2:0:0	SEE Marks: 50	Course Code: UB25BS300MA
Credits : -	CIE Marks: -	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to: 1. Study the concepts of vector differentiation, Directional derivative, Divergence and Curl of a vector point function. 2. Understand the concepts of Descriptive Statistics. 3. Learn the basics of Set theory, Permutations and Combinations and Probability. 4. Understand the concept of Rank of a matrix, Echelon form, System of Linear Equations and Eigen Values and Eigen Vectors.	At the end of the course students will be able to: 1. Solve problems on fitting of a straight line to the given data and also to find co-efficient of correlation and to determine regression lines and their application problems. 2. Apply the concepts of Descriptive Statistics to calculate Mean, Median, Mode, Measures of Dispersion, Mean Deviation and Standard Deviation. 3. Solve the problems on Permutations, Combinations and Probability. 4. Compute the Rank of a matrix and Eigen values and Eigen vectors of a matrix.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2										1			
CO2	3	2										1			
CO3	3	2										1			
CO4	3	2										1			

UNIT – I :

CALCULUS: Differentiation of standard functions (Formulae) - Partial Derivatives – Scalar and Vector point functions -Vector Differentiation- Level Surfaces-Gradient of a scalar point function- Normal to a level surface- Directional Derivative – Divergence and Curl of a Vector field - Solenoidal and Irrotational vector

UNIT - II :

DESCRIPTIVE STATISTICS: Mean-Median-Mode-Measures of Dispersion: Range-Mean Deviation-Standard Deviation

UNIT - III :

BASICS OF PROBABILITY: Basics concepts of set theory - Permutations & Combinations - Random event & Experiment-Sample space - Classical definition of Probability - Axioms of probability

UNIT - IV :

MATRICES: Rank of matrix- Echelon form - System of Linear Equations- Consistency of Homogeneous and Non-homogeneous system of equations- Eigen values and EigenVectors.

Learning Resources:

1. Advanced Engineering Mathematics, Third Edition, R. K. Jain and S. R. K. Iyengar, Narosa Publishing House.
2. Higher Engineering Mathematics, Dr.B.S. S Grewal 40th Edition, Khanna Publishers.
3. Fundamentals of Mathematical Statistics, S. C. Gupta, V.K. Kapoor, S Chand & Sons

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Electronic Devices and Circuits

SYLLABUS FOR B.E. (EEE) III - SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: U25ES310EC
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Introduce the fundamental principles of semiconductor devices including diodes, BJTs, FETs, MOSFETs, IGBTs, and their characteristics. 2. Provide a strong understanding of rectifier circuits, filters, and voltage regulation techniques for DC power supplies. 3. Develop the ability to analyze small-signal low-frequency models of Bipolar Junction Transistors in amplifier configurations. 4. Enable students to analyze and design small-signal low-frequency FET amplifier circuits using equivalent circuit models in various configurations. 5. Familiarize students with practical applications of diodes and special-purpose diodes in real-world electronic circuits.	On completion of the course, students will be able to 1. Define and describe the principle of operation of electronic devices like PN junction diode, Zener diode, power diode, BJT, FET, MOSFET and IGBT etc. 2. Analyze and design various rectifier circuits with and without filters for a regulated DC power supply. 3. Analyze the small signal low frequency Bipolar junction Transistor model in exact and approximate model. 4. Analyze the small signal low frequency Field effect transistor amplifiers in different configurations with the help of their equivalent circuits. 5. Illustrate the use of diode in practical applications and gain knowledge on special diodes

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2											2	
CO2	3	2	2											2	
CO3	3	3	1											2	
CO4	3	3	1											2	
CO5	3	3	1											2	

UNIT – I :

Semiconductor Diodes and Rectifiers: Introduction to PN junction Diode, Temperature dependence of V-I characteristics, PN junction as a rectifier, fullwave rectifiers, L, C, π – section filters, Regulation and Ripple characteristics. Power diode: Working and Characteristics, Zener diode: Breakdown mechanisms–Zener and Avalanche, Working and characteristics, Zener diode as a voltage regulator.

UNIT - II :

BJT circuits: BJT structure and modes of operation, Early effect, BJT input and output characteristics in CB and CE configurations. BJT as a switch. amplifier. BJT biasing techniques thermal runaway, operating point, bias stabilization circuits. BJT as an amplifier.

UNIT - III :

Small Signal analysis of Transistor Circuits: Small signal low frequency h-parameters model of BJT, h-parameters, analysis of BJT amplifier with exact and approximate models, comparison of CB and CE amplifier configurations, Miller's theorem, RC coupled amplifier.

UNIT - IV :

Metal Oxide Semiconductor Field Effect Transistors: Enhancement and Depletion mode MOSFETs, V-I characteristics. MOSFET biasing, MOSFET as a switch. MOSFET as an amplifier: common-source amplifier and common-gate amplifier. Small signal equivalent circuits-gain, input and output impedances, transconductance. IGBT, working and characteristics.

UNIT - V :

Special devices: Elementary treatment on the functioning of UJT, SCR, tunnel diode, varactor diode, photo diode, phototransistor, Schottky Barrier Diode.

Learning Resources:

1. Jacob Millman and Christos C. Halkias, Satyabratajit "Electronics Devices and Circuits", Mc Graw hill, 3rd edition, 2010.
2. Jacob Millman and Christos C. Halkias, Chetan D Parikh, "Integrated Electronics" Mc Graw Hill, 2009.
3. Adel S. Sedra and Kenneth C. Smith "Micro Electronic Circuits theory and applications" 7th edition Oxford publications, 2017.
4. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", PHI, 11th edition 2015.
5. A.S. Sedra and K.C. Smith, "Microelectronic Circuits", Seventh Edition New York, Oxford University Press, 2014.
6. <https://nptel.ac.in/courses/108102095/>
7. <https://nptel.ac.in/courses/117101106/>

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Electronics Devices and Circuits Lab

SYLLABUS FOR B.E. (EEE) III - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: U25ES311EC
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Introduce practical skills in designing and testing various rectifier circuits with different filter combinations. 2. Develop the ability to set up and bias transistors for proper operation in amplifier circuits. 3. Enable students to extract and interpret device parameters from the static and dynamic characteristics of BJTs and FETs. 4. Equip students to measure and analyze the frequency response of RC-coupled BJT and FET amplifiers and compute their bandwidth. 5. Provide hands-on experience in analyzing the V-I characteristics of the Unijunction Transistor (UJT) and estimating its parameters.	On completion of the course, students will be able to 1. Design various rectifiers with different filter combinations. 2. Setup bias point in a transistor. 3. Estimate the parameters from BJT and FET characteristics. 4. Compute the bandwidth of RC coupled BJT and FET amplifiers from the frequency response. 5. Estimate the parameters from V-I characteristics of UJT.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1					2		2				2	
CO2	3	2	3					2		2				2	
CO3	3	2	2					2		2				2	
CO4	3	2	2					2		2				2	
CO5	3	2	2					2		2				2	

Experiments

1. Zener diode as a Voltage Regulator
2. Design of Full wave Center tapped Rectifier with and without Filters.
3. Common Emitter characteristics of BJT and measurement of h-parameters
4. Applications of Cathode ray oscilloscope.
5. MOSFET Characteristics and measurement of its small signal parameters.

6. BJT biasing.

CYCLE - II Experiments

7. MOSFET biasing.
8. Analysis and band width calculation of Single stage RC coupled CE Amplifier.
9. Analysis and bandwidth calculation of Emitter follower.
10. Single stage MOSFET Common Source RC coupled Amplifier
11. Analysis and bandwidth calculation of Source follower.
12. Characteristics of UJT.

New / Additional experiments planned

1. MOSFET as a switch in Microwind and in Multisim tools.
2. V-I Characteristics of Light Emitting Diode.

Mini Project(s)

Designing of various basic applications using devices.

Learning Resources/ Tools :

1. Paul B.Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text-Lab Manual", 7th Edition, TMH 2001.
2. S. Poorna Chandra, B. Sasikala, Electronics Laboratory Primer, A design approach, Wheeler publishing, 2005.

The break-up of CIE:

1. No. of Internal Test	:	1
2. Max. Marks for internal tests	:	12
3. Marks for day-to-day laboratory class work	:	18

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS) :: IBRAHIMBAGH, HYDERABAD – 500 031.
 DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
 SCHEME OF INSTRUCTION AND EXAMINATION **(R-25)** :: B.E. ECE : FOURTH SEMESTER (2026-27)

B.E (ECE) IV – SEMESTER								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			Credits
		Hours per Week			Duration in Hrs	Maximum Marks		
		L	T	P		SEE	CIE	
THEORY								
U25PC410EC	Electronic Circuits	3	1	-	3	60	40	4
U25PC420EC	Data Structures	2	1	-	3	60	40	3
U25PC430EC	Probability Theory and Random Process Applications	2	1	-	3	60	40	3
U25PC440EC	Electromagnetic Field Theory	3	1	-	3	60	40	4
U25OE4XXXX	Open Elective – II	3	-	-	3	60	40	3
U25BS430MA	Skill Development Course - III: Aptitude - II	1	-	-	2	40	30	1
U25PE410EC	Skill Development Course - IV: Technical Skills – I	1	-	-	2	40	30	1
U25HS030EH	Human Values and Professional Ethics – II	1	-	-	2	40	30	1
PRACTICALS								
U25PC411EC	Electronic Circuits Lab	-	-	2	3	50	30	1
U25PC421EC	Data Structures Lab	-	-	2	3	50	30	1
U25PC421EC	Probability Theory and Random Process Applications Lab	-	-	2	3	50	30	1
U25PW419EC	Mini Project - I	-	-	2	-	50	30	1
TOTAL		16	4	8		620	410	24
GRAND TOTAL		28				1030		
Left over hours will be allocated for CCA-I / Sports / Library / Mentor - Mentee Interaction / CC / RC / TC								
Note: 1) Every Student shall complete one NPTEL course certification of 8 weeks duration (equivalent to 2 credits weightage) by the end of VI-Semester.								
2) Students willing to Opt B.E (ECE) Honours Degree in System on Chip Design shall complete one NPTEL Course Certification (equivalent to 2 Credits weightage) by the end of IV-Semester.								

With effect from the academic year 2026-27

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS) :: IBRAHIMBAGH, HYDERABAD – 500 031
 DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
 SCHEME OF INSTRUCTION AND EXAMINATION **(R-25)** :: B.E. - ECE : FOURTH SEMESTER (2026 - 27)

Bridge Course for ECE Lateral Entry Students								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P		SEE	CIE	
THEORY								
UB25HS410EH	English Language and Communication	2	-	-	3	50	-	-
PRACTICALS								
UB25HS411EH	English Language and Communication Skills Lab	-	-	2	3	50	-	-

<u>SERVICE COURSES OFFERED TO EEE</u>								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			Credits
		Hours per Week			Duration in Hrs	Maximum Marks		
		L	T	P		SEE	CIE	
THEORY								
U25ES410EC	Analog Electronics Circuits	3	-	-	3	60	40	3
PRACTICALS								
U25ES411EC	Analog Electronics Circuits Lab	-	-	2	3	50	30	1

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Electronic Circuits

SYLLABUS FOR B.E. (ECE) IV - SEMESTER

L:T:P (Hrs./week): 3:1:0	SEE Marks : 60	Course Code: U25PC410EC
Credits : 4	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce various biasing techniques of MOSFET 2. To understand and analyse multistage amplifiers 3. To understand and analyse feedback amplifiers 4. To interpret and design oscillators using MOSFET 5. To introduce different power amplifiers	On completion of the course, students will be able to 1. Understand the importance of Q-point in the design of an Amplifier. 2. Analyze and design various small signal amplifier circuits. 3. Analyze the effect of negative feedback in amplifier circuits. 4. Design of oscillator circuits for the given specifications. 5. Design of power amplifier circuits for audio frequency applications.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2										3		
CO2	2	3	2	3									3		1
CO3	2	3	2	2									3		1
CO4	3	3	2			1							3	1	1
CO5	3	3	2			1							3	1	

UNIT – I :

Transistor Biasing: Transistor Biasing: MOSFET Modes of operation, operating point, FET Biasing Techniques, Problems on biasing, MOSFET Small signal low frequency model, MOS Transistor as an amplifier, Classification of amplifiers.

UNIT - II :

MOSFET applications:

MOSFET high frequency equivalent circuits, Mid-band analysis in single and multistage amplifiers. Low frequency and high frequency analysis of single and multistage RC coupled amplifiers. Differential amplifier: small signal and large signal analysis.

UNIT - III :

Feedback amplifiers: The feedback concept, general characteristics of negative feedback, Effect of negative feedback on input and output impedances, Feedback topologies: Voltage series, current series, voltage shunt, current shunt, effect of feedback on gain, bandwidth etc., calculation with practical circuits, and concept of stability.

UNIT - IV :

Oscillators: Positive Feedback and conditions for sinusoidal oscillations, RC oscillators (phase shift, Wien bridge etc.), LC oscillator (Hartley, Colpitt etc.) and Crystal oscillator, Amplitude and frequency stability of oscillator.

UNIT - V :

Large signal amplifiers: FET as large signal audio amplifier, Classes of operation, Harmonic distortion, power dissipation, efficiency calculations. Design considerations of audio power amplifiers under Class-A, Class-B, Class-D, Class-AB operations, Qualitative analysis on R.F. Tuned amplifiers.

Learning Resources:

1. Adel S.Sedra and Kenneth C. Smith" Micro Electronic Circuits theory and applications" 7th edition Oxford publications, 2017.
2. Jacob Millman, Christos Halkias, Chetan Parikh, "Integrated Electronics", 2nd Edition, McGraw Hill Publication, 2009.
3. Paul R. Gray & Robert G. Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3rd Edition
4. <https://nptel.ac.in/courses/108106084>
(Analog Circuits, Dr. Nagendra Krishnapura, Dept of Electrical Engineering, IIT Madras).

The break-up of CIE: Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 Minutes

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Data Structures

SYLLABUS FOR B.E. (ECE) IV - SEMESTER

L:T:P (Hrs./week): 2:1:0	SEE Marks : 60	Course Code: U25PC420EC
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand space and time complexities for a given logic. 2. Describe the linear and nonlinear data structures. 3. Implement stack and queues using different data structures. 4. Implement different sorting techniques. 5. Use data structures to implement trees and graphs.	On completion of the course, students will be able to: 1. Compute time and space complexities of Algorithms. Design a solution to a given problem using arrays. 2. Represent a polynomial, Sparse Matrices and perform different operations. 3. Develop applications using stacks, queues and linked lists. 4. Implement different sorting algorithms and compare the performance. 5. Construct trees and graphs, and able to find the MST of a Graph.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1		1							1	3	1	1
CO2	3	2	3		1							1	3	1	1
CO3	3	2	3		1							1	3	1	1
CO4	3	2	3		1							1	3	1	1
CO5	3	2	3		1							1	3	1	1

UNIT – I :

Introduction to Data Structures: Introduction, Algorithm Analysis: Time and space complexities, Classification of Data Structures.

Functions: Recursion – Towers of Hanoi, generation of Permutations, Ackerman function, Review of dynamic memory allocation functions in C.

UNIT - II :

Arrays, Strings and Structures: Array Data Structure, Pointers, Library Functions of Strings, Pattern matching algorithm; structures, pointer to a structure and self-referential structure.

Polynomial: Construction and operations.

Sparse matrix: Introduction, Representation, transpose and different operations.

UNIT - III :

Stacks and Queues: Stacks and Queues using arrays, Circular Queues.

Stack Applications: Evaluation of Expressions, Infix to Postfix conversion, Evaluation of Postfix Expression.

Linked Lists: Introduction, types, definition, advantages; Singly Linked List, Operations on SLL: Insertion, deletion and traversal.

UNIT - IV :

Introduction to Doubly Linked Lists and Circular Linked Lists; Stack and Queue using Linked Lists.

Sorting: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort; Performance analysis of different sorting algorithms.

UNIT - V :

Trees: Introduction, Binary Trees, Binary Tree Traversals, Introduction to Heaps, Heap Sort.

Binary Search trees (BST): Introduction and Operations.

Graphs: Introduction and terminology, representations, Minimum Spanning Tree (MST): Kruskal's and Prim's Algorithms.

Learning Resources:

1. Horowitz E, Sahni S and Susan Anderson-Freed, Fundamentals of Data structures in C, 2nd Edition (2008), Universities Press.
2. Gilberg R. F and Forouzan B. A, Data Structures: A Pseudocode Approach with C, Second Edition(2007), Cengage Learning
3. <https://ocw.mit.edu/courses/6-851-advanced-data-structures-spring-2012/>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Probability Theory and Random Process Applications

SYLLABUS FOR B.E. (ECE) IV - SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: U25PC430EC
Credits : 4	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To familiarize the students in the concepts of: 1. Understand probability theory and random variables for modeling communication systems. 2. Analyze statistical properties and operations on random variables relevant to signal processing. 3. Apply stochastic process concepts to model time-varying communication signals. 4. Evaluate the impact of noise on communication system performance using key metrics like SNR and BER. 5. Understand information theory fundamentals and apply source coding techniques for efficient communication.	On completion of the course, students will be able to 1. Apply probability concepts and random variable models to communication systems. 2. Compute statistical measures and transformations of random variables. 3. Analyze and model random processes in communication systems. 4. Evaluate noise effects and performance metrics such as BER and SNR. 5. Apply information theory concepts including entropy, mutual information, and coding techniques.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3			2									2	
CO2	3	3			2									2	
CO3	3	3		2	2									3	
CO4	2	2		2	2	1								3	
CO5	2	2			2									3	

UNIT – I: Probability and Random variables

Probability Definitions and Axioms, Joint Probability, Conditional Probability, Bernoulli's trails, Total Probability, Bayes' Theorem, Priori probability, Aposteriori probability. Applications: Binary symmetric channel, Mary PAM, Block transmission, multi antenna fading. Maximum Aposteriori receiver.

Random variables

Definition of a Random Variable, Conditions for a Function to be a random Variable, Single/Joint Distribution and Density functions, Marginal Distribution Functions, Statistical Independence, Sum of Several Random Variables, Central Limit Theorem (Proof not expected), law of large numbers, Some standard

distribution/density functions: Binomial, Poisson, Uniform, Gaussian, Geometric, Rayleigh. Application: Rayleigh fading wireless channel

UNIT – II: Operations on random variables

Expectation, Single/Joint moments about the Origin and Central Moments: mean, variance, skew, correlation, covariance, Chebyshev and Schwarz Inequality, Single/Joint Characteristic Function, Single/Joint Moment Generating Function, Transformation of random variables, IID gaussian random variables. Applications: Array processing and array gain with uniform linear arrays

UNIT – III: Random process

The Stochastic Process Concept, Classification of Processes, Stationarity and Statistical Independence, Time Averages and Ergodicity, Mean Ergodic Processes, Correlation Ergodic Processes, Autocorrelation Function, Cross Correlation Function and its Properties, Power Density Spectrum (PSD), Wiener-Kinchin theorem Gaussian Random Processes. Applications: Narrowband wireless signal with random phase

Unit-IV: Noise Analysis

Noise and classification of noise, Thermal noise, Equivalent noise resistor, Equivalent noise temperature, White Noise and Colored Noise, Noise figure, Noise floor, figure of merit, Bit error rate (BER), Signal to noise ratio (SNR), transmission of WSS random signal through LTI system. Applications: AWGN channel model, Noise figure of two port network

UNIT-V: Information Theory

Uncertainty, Information and entropy, Memory less sources, Markov Sources/chains, Entropy of a discrete random variable, joint, conditional, mutual information, Shannon source coding theorem, Shannon's capacity, Shannon Capacity for AWGN Channel.

Learning Resources:

1. H. Stark and J. Woods, Probability and Random Processes with Applications to Signal Processing, Third Edition, Pearson Education
2. A. Papoulis and S. Unnikrishnan Pillai, Probability, Random Variables and Stochastic Processes, Fourth Edition, McGraw Hill.
3. Peyton Z. Peebles, Probability, Random Variables & Random Signal Principles, 4th edition, Tata McGraw Hill, 2001.
4. Fundamentals of Wireless Communication by David Tse
5. <https://nptel.ac.in/courses/117104117>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 Minutes

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Electromagnetic Field Theory

SYLLABUS FOR B.E. (ECE) IV - SEMESTER

L:T:P (Hrs./week): 3:1:0	SEE Marks : 60	Course Code: U25PC440EC
Credits : 4	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To familiarize the students in the concepts of: 1. Introduce the fundamental principles governing electric and magnetic fields. 2. To understand the concept of electric work, potential, and energy stored due to different charge configurations. 3. Familiarize students with the concepts of magnetostatics and enable them to compute magnetic fields in various engineering scenarios. 4. To understand the formulation of Maxwell's equations and the propagation and reflection characteristics of electromagnetic waves in dielectric media. 5. To understand electromagnetic wave propagation in conductors and through material boundaries along with the basic principles of transmission lines.	On completion of the course, students will be able to 1. Apply the fundamental laws of electric field to analyse the electric fields due to various charge distributions. 2. Solve for electric potential and energy density due to different charged objects. 3. Apply concepts of magnetostatics to evaluate the magnetic fields for different engineering problems. 4. Application of Maxwell's equations for time varying electromagnetic fields. 5. Analyze the characteristics of electromagnetic waves through conductors and material boundaries and the principles of transmission lines.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3										2		3	
CO2	3	3										2		3	
CO3	3	3										2		3	
CO4	3	3										2		3	
CO5	3	3					3					2		3	

UNIT – I:

Cartesian, Cylindrical and spherical coordinate systems - Review of vector analysis – Divergence, Gradient Curl. Coulomb's Law. Electric Field Intensity. Electric field due to different charge distributions: Line charge, Sheet charge and Volume charge distributions.

UNIT - II:

Electric flux, flux density, Gauss's Law and applications, Energy and Potential, Potential field due to different charge distributions, Potential gradient. Energy density, Boundary conditions in static electric field, Capacitance of parallel plate capacitor, Coaxial cable, Continuity equation, current density, Poisson's equation, Laplace's equation.

UNIT - III:

Steady magnetic field, Biot-Savart's law, Ampere's law, Magnetic scalar and vector potentials. Magnetic boundary conditions, Magneto motive force, Permeability, Self and mutual inductances, Evaluation of inductance of solenoid. Prediction of Electric and magnetic field components using AI tools.

UNIT - IV:

Time varying fields & Maxwell's equations: Faraday's Law, Modified Ampere's law, Displacement Current, Maxwell's Equation in Point Form & Integral Form. Wave Propagation in Free Space and dielectric medium.

UNIT - V:

Wave Propagation in conductors, Skin Effect. Poynting's theorem, Reflection of EM waves at normal incidence, Reflection and Transmission through a Layered Medium.

Transmission lines: Primary and secondary constants, terminated lines: open circuit, short circuit, matched load. Campbell's equation, Application of Smith chart

Learning Resources:

1. Engineering Electromagnetics, 8th Edition, William H. Hayt, Jr. John A. Buck, Tata McGraw Hill Education, 2017.
2. Principles of Electromagnetics, Mathew N.O. Sadiku and SV Kulkarni, 6th ed., Oxford Univ. Press, 2015.
3. Electromagnetics with Applications, John D Kraus and Daniel A. Fleisch, McGraw Hill, 1999.
4. R.K. Shevgaonkar, Electromagnetic Waves, Tata McGraw Hill India, 2005.
5. E.C. Jordan & K.G. Balmain, Electromagnetic Waves & Radiating Systems, Prentice Hall India.
6. Umesh Sinha, "Transmission Lines and Network", Satya Prakashan Publishing Company, New Delhi, 2012.
7. John D Ryder, Networks lines and Fields, Second edition, Pearson Education India, 2015.
8. <https://archive.nptel.ac.in/courses/108/104/108104087/>

Guidelines for course based projects:

- Batch size shall be 3 to 4 students per batch.
- Project topics may be chosen by the student with advice and approval from the faculty members offering the course.
- Students have to submit a one-page abstract in the beginning of project work
- Output of the course based project should be demonstrable / measurable / outcome based.
- Finalization of the project topics, batches formation and project review schedule should be completed by the end of week-2. Project work will be carried out by the students from week-3 onwards.
- One review will be conducted for evaluating the project from week-10 to week-13 as per the schedules announced.
- Students will give a 20 minutes presentation through power point presentation followed by a 10 minutes discussion.
- Students are required to submit project report.

Assessment and Evaluation of Course Based Project:

The total marks should be a maximum of five (05) earmarked for Course-based project. The marks secured by the students in the respective Course-based project should be considered in lieu of one assignment i.e., for five marks. However, the total marks towards assignment marks for that course should be the average of marks secured in the other two assignments and marks secured in the Course-based project.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 2	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Tests: 90 Minutes

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DEPARTMENT OF MATHEMATICS

Skill Development Course - III: Aptitude - II

SYLLABUS FOR B.E. IV – SEMESTER (COMMON TO ALL BRANCHES)

L:T:P (Hrs./week): 1:0:0	SEE Marks : 40	Course Code: U25BS430MA
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: - Students will be trained to enhance their employability skills. - Students will be introduced to higher order thinking and problem solving skills in the following areas - Arithmetic Ability, Numerical Ability and General Reasoning. - Students will be trained to work systematically with speed and accuracy while problem solving. - Students will be trained to apply concepts like percentages and averages to solve complex problems. - Students will be trained to use effective methods like elimination of options and shortcuts to solve problem accurately.	At the end of the course the learners will be able to: - - Solve questions in the mentioned areas using shortcuts and smart methods. - Understand the fundamentals concept of Aptitude skills. - Perform calculations with speed and accuracy. - Solve complex problems using basic concepts. - Use shortcuts with ease for effective problem solving.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3		2								2			
CO2		3		2								3			
CO3		3		2								2			
CO4		3		3								2			
CO5		3		2								2			

UNIT-1: Quantitative Aptitude- Arithmetic Ability Advanced-1

- 1.1 Time speed and distance
- 1.2 Boats and Streams
- 1.3 Problems on trains

UNIT-2: Reasoning Ability- Logical Reasoning

- 2.1 Seating Arrangements- Linear; Circular; Complex
- 2.2 Venn diagrams
- 2.3 Syllogism
- 2.4 Cubes & Cuboids
- 2.5 Dices

UNIT-3: Reasoning Ability- Non Verbal Reasoning

3.1 Figure Series

3.2 Directions

3.3 Clocks

3.4 Calendars

UNIT-4: Quantitative Aptitude- Arithmetic Ability Advanced -2

4.1 Mensuration Part -1

4.2 Mensuration Part -2

4.3 Logarithms

Prescribed textbook for theory:

1. Quantitative Aptitude S.CHAND by RS AGARWAL

2. A Modern Approach to Verbal & Non-Verbal Reasoning S.CHAND by Dr. R S Aggarwal

Suggested Reading

1. Learn.talentsprint.com/References Courses

2. Quantitative Aptitude Disha Publications

3. LOGICAL Reasoning Disha Publications

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 20
2. No. of Assignments	: 2	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 2	Max. Marks for each Quiz Test	: 5

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Skills Development Course – IV: Technical Skills - I

Advanced Digital System Design

SYLLABUS FOR B.E. (ECE) IV - SEMESTER

L:T:P (Hrs./week) : 1:0:0	SEE Marks : 40	Course Code: U25PE410EC
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
- To introduce number systems and combinational logic elements such as multiplexers, decoders, and encoders, and their use in digital circuit design. - To explain the principles of sequential logic design, including latches, flip-flops, and finite state machines (Mealy and Moore), with methods for state minimization. - To analyze timing aspects of sequential circuits, understand setup/hold time, synchronization methods, and techniques for avoiding timing violations. - To develop skills in writing synthesizable Verilog code for combinational and sequential circuits, testbench creation, and performing code coverage analysis.	On completion of the course, students will be able to - Understand different types of number systems and apply them to in the design combinational circuits. - Design and analyze various sequential digital circuits. - Illustrate the need for Timing Constraints and Clock Synchronization. - Synthesize different combinational and Sequential circuits using Verilog HDL for the verification.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1		3								2		
CO2	2	2	3	3	3								2		
CO3	2	2	1		3								2		
CO4	2	2	1		3								2		

UNIT-I:

Number systems and combinational Logic: A unified treatment of unsigned and signed numberingsystems used in computers; Multiplexer as a universal programming element; decoders and encoders; priority encoders and their variants; Case studies in combinational logic circuits.

UNIT-II:

Sequential logic: Construction of latch; construction of Flipflop from latch; Finite state machines – Types of FSMs – Mealy and Moore – minimization of state machines, design methods; Case studies in sequential logic circuits.

UNIT-III:

Timing aspect of sequential logic circuits – setup time, hold time and clock to output delay; how to overcome timing violations; max clock skew; synchronization of single-bit and multi-bit signals across clock domains; asynchronous and synchronous resets.

UNIT-IV:

Different ways of Verilog coding for Logic synthesis – coding style for combinational design blocks and sequential design blocks; blocking and nonblocking assignments; How to write simple test benches; Different types of code coverage.

Learning Resources:

1. Digital Design – Principles and Practices – by John F Wakerly; Prentice Hall of India.
2. Fundamentals of digital logic with Verilog Design – by Brown and Vrasenic; McGraw Hill.
3. The art of Digital Design – by Franklin Prosser and David Winkel; Prentice Hall.

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	1	Max. Marks for each Internal Tests	:	30
2. No. of Assignments	:	-	Max. Marks for each Assignment	:	-
3. No. of Quizzes	:	-	Max. Marks for each Quiz Test	:	-

Duration of Internal Tests: 90 Minutes

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Skills Development Course - IV: Technical Skills - I

Introduction to Protocols and their Applications

SYLLABUS FOR B.E. (ECE) IV - SEMESTER

L:T:P (Hrs./week) : 1:0:0	SEE Marks : 40	Course Code: U25PE410EC
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Comprehensive Understanding of Wi-Fi protocol standards 2. Getting familiarity with SiWx917 Hardware board 3. Implementing protocols with simplicity studio 4. Developing practical use cases with different sensors	On completion of the course, students will be able to 1. Understand Wi-Fi Protocols and standards 2. Get Practical Competence with SiWx917 hardware board and its programming aspects 3. Implement Advanced Wi-Fi Protocol features and battery life management techniques. 4. Building practical use cases with SiWx917 hardware board.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3													2	
CO2	3	2			3				1				2		
CO3	3	2			3				1				2	2	
CO4	3	2	1		3				1				2	2	

UNIT-I:

Introduction to Microcontrollers and Wi-Fi: Introduction to Microcontrollers, Inside SiWx917 Wireless SoC and the Wireless Pro Kit. Introduction to Computer Networks and Wi-Fi Technology Life Cycle. IEEE 802.11 Amendments and key players. OSI Networking Model and Wi-Fi in OSI Basics of SiWx917 GPIO.

Wi-Fi MAC Layer and Security: Wi-Fi MAC Layer: Wi-Fi Frame Format and Types, Carrier Sense and Medium Access. WLAN Connection Process Cryptography Fundamentals and WLAN Security (WPA, WPA2 and WPA3)

LAB Activities:

- Set up the SiWx917 development environment using Simplicity Studio.
- Embedded Application Build Process and Toolchain.

- Write a program to blink an LED using GPIO.
- Program the SiWx917 to scan for available Wi-Fi networks and connect to an open Wi-Fi network.
- Introduction to Wireshark
- Capture Wi-Fi frames using Wireshark to study WLAN connection process.
- Application to connect the SiWx917 to a secured network (WPA2/WPA3).

UNIT-II:

Microcontroller Peripherals and IP Networking: Serial Communication Peripherals: UART, I2C and SPI. IP Networking Concepts: IP Addressing, TCP, UDP, DHCP, DNS, SNTP.

Wi-Fi Physical Layer: Introduction to Digital Communications and Modulation. Coding and Modulation Schemes in Wi-Fi. Constellation diagram. PHY and RF Terminologies: Power, bandwidth, data rate, SNR, RSSI, link budget, path loss, ISI, channel utilization, spectral efficiency, PAPR. Basics of Multipath Channel and OFDM. Overview of OFDM Transceiver Architecture. Functional blocks of a Wireless router/AP

LAB Activities:

- I2C and SPI modules in SiWx917.
- Integrate a temperature sensor via I2C and send sensor data over Wi-Fi.
- Log the current time using SNTP along with the current temperature.

UNIT-III:

Wi-Fi Generations and Features: Overview of Wi-Fi generations (802.11a/b/g/n/ac). Key features and enhancements at PHY and MAC layers. Basics of Channel Bonding, MIMO, Spatial. Multiplexing and Cyclic Shift Diversity. Quality of Service in Wi-Fi. Fragmentation and Aggregation in Wi-Fi. Roaming in Wi-Fi. Wi-Fi 6/802.11ax Transmit Beamforming, OFDMA, MU-MIMO, BSS Coloring. Power Save Mechanisms in Wi-Fi. Target Wake Time in Wi-Fi 6

LAB Activities:

- Application to send low-priority (background) and high-priority (video) data streams.
- Analyze QoS tagging using Wireshark.
- Application to enhance throughput with 802.11n Aggregation.
- Analyze the Wi-Fi throughput with and without Aggregation.
- Application to create Wi-Fi Roaming scenario based on RSSI.

- Implement Legacy power save application using SiWx917.
- Application to demonstrate Target Wake Time Feature of Wi-Fi 6.
- Estimate Battery Life using power save mechanisms in SiWx917 using Energy Profiler.

UNIT-IV:

Building Real-World Applications with SiWx917: Practical use cases of Wi-Fi in IoT (smart homes, healthcare, etc.). Basics of MQTT Protocol.

LAB Activities:

- Build a Wi-Fi-enabled temperature monitoring system using MQTT with SiWx917.
- Implement the SiWx917 as a soft AP for local device connections.
- Firmware Update over Wi-Fi.

Learning Resources:

1. https://www.silabs.com/support/resources.p-wireless_wi-fi_siwx917-wireless-socs
2. <https://docs.silabs.com/simplicity-studio-5-users-guide/5.3.0/ss-5-users-guide-overview/>

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	1	Max. Marks for each Internal Tests	:	30
2. No. of Assignments	:	-	Max. Marks for each Assignment	:	-
3. No. of Quizzes	:	-	Max. Marks for each Quiz Test	:	-

Duration of Internal Tests: 90 Minutes

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Skills Development Course – IV: Technical Skills - I

GUI Programming to Design and Test Electronic Applications

SYLLABUS FOR B.E. (ECE) IV - SEMESTER

L:T:P (Hrs./week) : 1:0:0	SEE Marks : 40	Course Code: U25PE410EC
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Develop hierarchical electronic applications that are scalable, readable, and maintainable to reduce development time and improve application stability. 2. To introduce the LabVIEW environment and explore its features for test, measurement, and control applications. 3. To equip students with the skills to create interactive user interfaces and use LabVIEW programming structures effectively. 4. To enable students to acquire, process, and store data using LabVIEW and NI myDAQ for real-time applications.	On completion of the course, students will be able to 1. Understand broad working knowledge of the LabVIEW environment. 2. Use building blocks of graphical programming for developing applications. 3. Create, test and debug electronic applications. 4. Use sequential and state machine programming concepts to implement complete applications, interface sensors and hardware using NI myDAQ and apply LabVIEW for real-time data acquisition and control tasks.

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2		3							2	2		
CO2	3	2	2		3							2	2		
CO3	3	2	2		3							2	2		
CO4	3	2	2		3							2	2		

UNIT-I:

Introduction to LabVIEW: Importance of Test & Measurement, different types of electronic test equipment, Text-based programming versus graphical programming, installing LabVIEW, exploring components and features of LabVIEW, common types of LabVIEW applications.

UNIT-II:

Basic Building blocks of graphical programming: Variables and data types, decision-making structures, creating and leveraging structures, loops, creating user interface with charts, graphs and buttons, creating your first

application in LabVIEW, troubleshooting, testing and debugging VI design.

UNIT-III:

Modularity with SubVIs: SubVI design, implementing "subvi" for creating application using multiple windows, Accessing Files in LabVIEW, creating, writing, reading, deleting, sorting operations on files, Introduction to NI myDAQ for Data Acquisition System, sensor interfacing and signal manipulation using NI MyDAQ.

UNIT-IV:

State-Machine Architecture: Architecture of state machine, Sequential and state machine programming concepts, implementing complete application using state machine architecture, connecting and testing hardware, application development with NI myDAQ, Case studies based on real-time scenarios, course projects.

Learning Resources:

4. LabVIEW Course Manual.
5. LabVIEW for Everyone: Graphical Programming Made Easy and Fun, By Jeffrey Travis, Jim Kring.
6. Johnson, G., LabVIEW Graphical Programming, McGraw, Hill.

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	:	1	Max. Marks for each Internal Tests	:	30
2. No. of Assignments	:	-	Max. Marks for each Assignment	:	-
3. No. of Quizzes	:	-	Max. Marks for each Quiz Test	:	-

Duration of Internal Tests: 90 Minutes

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

HUMAN VALUES AND PROFESSIONAL ETHICS-II

SYLLABUS FOR B.E. COMMON TO ALL BRANCHES

L:T:P (Hrs./week) : 1:0:0	SEE Marks : 40	Course Code: U25HS030EH
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. Create an awareness on the interrelation between Society, Ethics and Human Values. 2. Understand how ethical dilemmas apply to real life scenarios. 3. Develop ethical human conduct and professional competence. 4. Understand the role of good ethical practices and apply it in a project.	At the end of the course the learners will be able to: - 1. Identify ethical risks in everyday life and in societies that can lead to unethical choices, such as structures that diffuse responsibility or a group that has collectively de-stigmatized unethical behavior. 2. Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, and the objective presentation of data. 3. Assess their own ethical values and the social context of problems and articulate what makes a particular course of action ethically defensible 4. Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						2		3		1		2			
CO2						2		3		1		2			
CO3						2		3		1		2			
CO4						2		3	2	1		2			

UNIT-I: NORMATIVE ETHICS & SOCIETAL ETHICS

This unit deals with normative ethics, the branch of moral philosophy, or ethics, concerned with criteria of what is morally right and wrong. It includes the formulation of moral rules that have direct implications for what human actions, institutions, and ways of life should be like. This unit also covers societal ethics which is the systematic reflection on the moral dimensions of social structures, systems, issues, and communities.

1.1 Ethical Decision-Making Frameworks

1.2 Emerging Ethical Challenges

1.3 Building a Just Society

UNIT-2: PROFESSIONAL ETHICS - NEED FOR ETHICAL CODES

This unit covers the code of Professional Ethics- it is designed to ensure that students learn the necessary skills that groom them to behave like employees should, one that is socially acceptable and respectful of one another. It establishes the rules for behavior and sends a message to every employee that universal compliance is expected.

2.1 The Importance of Ethical Conduct

2.2 Personal & Professional Accountability

2.3 Maintaining Public Confidence

2.4 Understanding Ethical Codes

UNIT-III: PRIVACY

This unit covers "Cyber ethics" - the code of responsible behavior on the Internet. Just as we are taught to act responsibly in everyday life with lessons such as "Don't take what doesn't belong to you" and "Do not harm others," we must act responsibly in the cyber world as well.

The basic rule is "Do not do something in cyberspace that you would consider wrong or illegal in everyday life."

3.1 Defining Privacy

3.2 Privacy in the Digital Age

3.3 The Ethics of Surveillance

UNIT-IV: Engineering Ethics for Future Innovators

This unit equips students, the future innovators of tomorrow, with a foundation in engineering ethics. Students will explore the ethical responsibilities engineers hold regarding safety, public well-being, and sustainability. Real-world scenarios and case studies will be examined to understand how ethical considerations impact engineering decisions.

4.1 Safety and Public Welfare

4.2 Sustainability and Environmental Impact

4.3 The Ethics of New Technologies

MODE OF DELIVERY

● Questionnaires ● Quizzes ● Case-studies ● Observations and practice ● Home and classroom assignments	● Discussions ● Skits ● Short Movies/documentaries ● Team tasks and individual tasks ● Research based tasks ● Project
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Relevant Websites, CD's and Documentaries

- <https://plato.stanford.edu/>

Learning Resources:

- learn.talentsprint.com

1. Moral Machines: Ethical Robotics and Artificial Intelligence by Wendell Wallach
2. Thinking Like an Engineer: Studies in the Ethics of a Profession by Paul Dufour
3. Engineering Ethics: Contemporary and Enduring Debates by Deborah G. Johnson
4. Engineering Ethics: Concepts and Cases by Charles E. Harris, Michael S. Pritchard, Michael J. Rabins, Ray James, and Elaine Englehardt

The break-up of CIE : Internal Tests + Assignments + Quizzes

- | | | | | | |
|--------------------------|---|--------------------------------|------------------------------------|---|---------------------------------|
| 1. No. of Internal Tests | : | <input type="text" value="1"/> | Max. Marks for each Internal Tests | : | <input type="text" value="20"/> |
| 2. No. of Assignments | : | <input type="text" value="2"/> | Max. Marks for each Assignment | : | <input type="text" value="5"/> |
| 3. No. of Quizzes | : | <input type="text" value="2"/> | Max. Marks for each Quiz Test | : | <input type="text" value="5"/> |

Duration of Internal Tests: 90 Minutes

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Electronic Circuits Lab

SYLLABUS FOR B.E. (ECE) IV - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: U25PC411EC
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To Design and simulate potential Divider biasing techniques of MOSFET 2. To design and conduct single and multistage amplifiers 3. To analyze and verify the characteristic parameters of various feedback amplifiers 4. To interpret and design oscillators using MOSFET 5. To conduct and compare efficiency of different power amplifiers	On completion of the course, students will be able to: 1. Design different types of amplifiers with different operating point. 2. Elaborate different types of amplifiers with and without feedback 3. Analyze various types of transistor amplifiers. 4. Analyze various types of oscillators. 5. Compare the theoretical and practical performance characteristics and implement course project.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3					3	2				3		
CO2	3	3	3					3	2				3		
CO3	2	3	2	3				3	2				3		3
CO4	2	3		3	3			3	2				3		3
CO5	3		2		3			3	2		3	3	3		

CYCLE-I Experiments

1. FET transistor biasing techniques.
2. Design and Verify Frequency Response of Single Stage Amplifier
3. Frequency response of multi-stage RC-Coupled amplifier using MOSFET.
4. Frequency response of Voltage series feedback amplifier.
5. Frequency response of Current Shunt feedback amplifier.
6. Design of Oscillators: RC Phase shift.
7. Design of Oscillators: Hartley and Colpitts.
8. Design of Power amplifiers: Class – A and Class – B.

CYCLE-II Experiments (simulation using Cadence)

9. MOSFET characteristics
10. Design and Simulation of Common Source Amplifier.
11. Simulation of Differential Amplifier.
12. Simulation of Source Follower

New/Additional experiments planned

1. Design of tuned Amplifier.
2. Design and Implementation of Crystal oscillator.

Learning Resources:

1. Paul R.Gray & Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley, 3rd Edition.
2. Phillip E. Allen, Douglas Holberg, "CMOS Analog Circuit Design" oxford university press, 2nd Edition.

Guidelines for course based projects:

- Batch size shall be 3 to 4 students per batch.
- Project topics may be chosen by the student with advice and approval from the faculty members offering the course.
- Students have to submit a one-page abstract in the beginning of project work
- Output of the course based project should be demonstrable / measurable / outcome based.
- Finalization of the project topics, batches formation and project review schedule should be completed by the end of week-2. Project work will be carried out by the students from week-3 onwards.
- One review will be conducted for evaluating the project from week-10 to week-13 as per the schedules announced.
- Students will give a 20 minutes presentation through power point presentation followed by a 10 minutes discussion.
- Students are required to submit project report.

The break-up of CIE:

1. No. of Internal Test	:	1
2. Marks earmarked for Course-based Project	:	05
3. Marks earmarked for day-to-day lab class assessment	:	13
4. Marks earmarked for lab internal test	:	12

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Data Structures Lab

SYLLABUS FOR B.E. (ECE) IV - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: U25PC421EC
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Design and analyze linear and nonlinear data structures. 2. Construct programs to work with Polynomials and Sparse Matrices 3. Acquire programming skills to implement sorting and searching techniques. 4. Understanding the concepts of Linked Lists 5. Use data structures to implement Trees and Graphs.	On completion of the course, students will be able to: 1. Implement insert, delete, search, sort and traverse operations on array and linked list. 2. Develop applications using stack and queue. 3. Apply nonlinear data structures to solve a problem. 4. Implement appropriate sorting technique for a given data set. 5. Implement hashing techniques to perform dictionary operations.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1		2			2				1	3	1	1
CO2	3	2	3		2			2				1	3	1	1
CO3	3	2	3		2			2				1	3	1	1
CO4	3	2	3	2	2			2				1	3	1	1
CO5	3	2	3	2	2			2				1	3	1	1

All the programming exercises will be implemented in Visual Studio Code (VSC) Platform

Programming Exercises

1. Implementation of 1D and 2D arrays and different operations.
2. Representation of Polynomial and performing Arithmetic operations
3. Programs on Sparse Matrices and related operations.
4. Implementation of String-Matching algorithms.
5. Implementation of Singly Linked List and Doubly Linked List.

6. Implementation of Stacks, Queues. (Using both Arrays and Linked Lists).
7. Implementation of Infix to Postfix Conversion
8. Postfix Expression Evaluation.
9. Implementation of Bubble, Selection, Merge Sorts.
10. Implementation of Quick, and Insertion Sort.
11. Implementation of Binary Search Tree.
12. Implementation of Heap Sort.

New Experiments

1. Implementation of Circular Queue.
2. Implementation of Sparse Matrix operations using Linked Lists.

Learning Resources:

1. Horowitz E, Sahni S and Susan Anderson-Freed, Fundamentals of Data structures in C, 2nd Edition (2008), Universities Press.
2. Gilberg R. F and Forouzan B. A, Data Structures: A Pseudocode Approach with C, Second Edition(2007), Cengage Learning.
3. <https://ocw.mit.edu/courses/6-851-advanced-data-structures-spring-2012/>

The break-up of CIE:

1. No. of Internal Test	:	1
2. Marks earmarked for day to day lab class assessment	:	18
3. Marks earmarked for lab internal test	:	12

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Probability Theory and Random Process Applications Lab

SYLLABUS FOR B.E. (ECE) IV - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: U25PC431EC
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1 Implement probability models and random variable simulations using MATLAB. 2 Analyze statistical properties of random variables and signals through computational methods. 3 Simulate stochastic processes and study their characteristics in communication systems. 4 Evaluate noise effects and system performance metrics such as SNR and BER. 5 Apply information theory concepts and coding techniques using MATLAB.	On completion of the course, students will be able to 1. Simulate probability models and random variables in MATLAB. 2. Compute and analyze statistical measures of random signals. 3. Generate and analyze random processes and their properties. 4. Model noise and evaluate communication system performance. 5. Implement source coding and information theory concepts.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2			3									3	
CO2	2	3			3									3	2
CO3	2	3			3									3	2
CO4	2	2			3									3	2
CO5	2	3			3									3	

1. Audio Signal Probability Analysis using Gaussian Modelling, and Rayleigh Distribution.
2. Simulation of Binary Symmetric Channel (BSC) with Bayesian Receiver: ML vs MAP Performance Analysis.
3. Simulation and Statistical Analysis of a Rayleigh Fading Channel.
4. M-ary PAM Image Transmission.
5. Statistical Moment Analysis of Live Audio.
6. Characteristic Functions (CF) & Moment Generating Functions (MGF) of an audio signal.

7. Transformation of Random Variables & Independent Identically Distributed (IID) Gaussian Analysis.
8. ULA Beamforming and Spatial Signal Analysis.
9. Stationarity and Ergodicity Analysis of Audio Signals.
10. Autocorrelation and Cross-correlation Analysis of Real-time Audio Signals.
11. Noise Classification, Thermal Noise, Req, Teq, White vs Coloured Noise.
12. Noise Figure, Noise Floor, Figure of Merit, WSS + LTI System.
13. AWGN Channel Model, SNR, BER (BPSK), Figure of Merit
14. Noise Figure of Two-Port Network

Additional New Experiment:

1. Predict Bit Error Rate (BER) under varying SNR conditions using machine learning.

Learning Resources:

1. H. Stark and J. Woods, Probability and Random Processes with Applications to Signal Processing, Third Edition, Pearson Education.
2. <https://www.mathworks.com/matlabcentral/fileexchange/>.
3. Introduction to MATLAB for Engineers By William John Palm, William J. Palm III · 2012, ISBN: 9781259012051, 1259012050

Tools: MATLAB

The break-up of CIE:

- | | | |
|--|---|----|
| 1. No. of Internal Test | : | 1 |
| 2. Marks earmarked for day to day lab class assessment | : | 18 |
| 3. Marks earmarked for lab internal test | : | 12 |

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Mini Project - I

SYLLABUS FOR B.E. (ECE) IV - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: U25PW419EC
Credits : 1	CIE Marks : 30	Duration of SEE : 3

COURSE OBJECTIVES	COURSE OUTCOMES
- To introduce students to the process of identifying and defining engineering problems through structured literature surveys. - To encourage analytical thinking for proposing feasible and innovative solutions to identified problems. - To develop foundational skills in designing, implementing, and testing basic engineering solutions. - To familiarize students with the use of current tools and technologies relevant to their project domain. - To promote teamwork and communication skills through the presentation and documentation of project work.	On completion of the course, students will be able to - Identify the problem through the literature survey - Propose a solution to address the problem - Design/Develop/Implement /Solve the problem and test the solution - Adapt to contemporary technologies - Demonstrate the work through presentation and documentation

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3				2	3					2			
CO2	3	2	3	3	3	2	3		2			2			
CO3	2		3		3			3				2			
CO4	2					2						3			
CO5									3	3	3				

Note: COs must be mapped with one of the relevant PSOs based on the domain of the project.

The students are required to carry out mini projects in relevant areas of Electronics Communication Engineering such as Electronic Devices and Circuits, Embedded Systems, RF Technology, Microwave and Wireless Communications, Communication Systems, Signal Processing, Image and Video Processing, VLSI, Networking.

Course of Action:

- 1) Students are divided into teams of 2 or 3 for each project.
- 2) Faculty supervisors are allotted for the teams.
- 3) The project titles are to be submitted by the students and approved by their supervisor.
- 4) Progress of the project will be reviewed weekly.

A. Grades awarded to the Mini Project - I.

Outstanding	–	≥ 45 marks
Excellent	–	≥ 40 - 44 marks
Very Good	–	≥ 35 - 39 marks
Good	–	≥ 30 - 34 marks
Average	–	≥ 25 - 29 marks

Continuous Internal Evaluation (CIE) – 30 marks:

Evaluation Criteria	Maximum Marks
Literature Survey	6
Problem Formulation	6
Design/ Methodology	6
Implementation &Results	6
Presentation & Documentation	6

Semester End Examination (SEE) – 50 marks:

Evaluation Criteria	Maximum Marks
Literature Survey	10
Problem Formulation	10
Design/ Methodology	10
Implementation &Results	10
Presentation & Documentation	10

Note: Rubrics are used for assessment and evaluation.

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

English Language and Communication

SYLLABUS FOR B.E. IV - SEMESTER, **Bridge Course** for Lateral Entry Students

L:T:P (Hrs./week): 2:0:0	SEE Marks: 50	Course Code: UB25HS410EH
Credits : -	CIE Marks: -	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
By the end of the course, learners will be able to: - Understand the fundamental concepts, types, and significance of communication and listening in personal, academic, and professional contexts. - Develop effective interpersonal communication and writing skills through teamwork, leadership, paragraph writing, and the correct use of grammar. - Apply appropriate communication styles, workplace correspondence conventions, and vocabulary-building strategies for professional interactions. - Analyze communication barriers and reading texts critically to enhance comprehension and communication effectiveness.	On completion of the course, learners will be able to: - Explain the role, importance, and types of communication, and demonstrate effective listening skills in diverse communication situations. - Apply principles of team building, leadership, paragraph writing, and grammatical accuracy (subject-verb agreement, tense, and aspect) in oral and written communication. - Demonstrate effective workplace communication by using appropriate communication styles, drafting professional letters and emails, and employing an enriched vocabulary. - Analyze reading passages and communication barriers, and employ suitable strategies and vocabulary resources to improve comprehension and communication effectiveness.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1									2	3					
CO2									2	3					
CO3									2	3					
CO4									2	3					

UNIT–1: Foundations of Communication

- 1.1 Role, Importance, Types of Communication: Intrapersonal, Interpersonal and Extra personal Communication.
- 1.2 Importance and Types of Listening.
- 1.3 Grammar Focus: Subject–Verb Agreement.

UNIT–2: Interpersonal Communication

- 2.1 Team Building: Stages of Team Development by Bruce Tuckman; Qualities of an Effective Team Player and Leader.
- 2.2 Fundamentals of Writing: Principles of Paragraph Writing – Coherence, Cohesion and Unity; Use of Appropriate Linkers and Connectives.
- 2.3 Grammar Focus: Tense and aspect

UNIT-3: Communication at the Workplace

- 3.1 Styles of Communication and Channels and Flow of Communication in Academic and Workplace Organizations.
- 3.2 Letter writing and email etiquette.
- 3.3 Vocabulary Enhancement: Synonyms and Antonyms

UNIT-4: Reading and Vocabulary Building

- 4.1 Reading Comprehension: "Yesterday Was Beautiful" by Roald Dahl.
- 4.2 Barriers to Communication and Strategies to Overcome Them.
- 4.3 Vocabulary Enhancement: One-word Substitutes.

Learning resources

1. Technical communication - Principles and Practice (2nd Edition 2014) – Meenakshi Raman and Sangeeta Sharma- Oxford University Press.
2. Stages of Team Development by Bruce Tuckman-Excerpt.
3. Strengthen your Writing- New Edition- V.R. Narayanswami.
4. The Oxford Dictionary of Difficult Words.
5. A Practical English Grammar- A.J.Thompson and A.V. Martinet

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DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

English Language and Communication Skills Lab

SYLLABUS FOR B.E. IV - SEMESTER, **Bridge Course** for Lateral Entry Students

L:T:P (Hrs./week): 0:0:2	SEE Marks: 50	Course Code: UB25HS411EH
Credits : -	CIE Marks: -	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The Course will enable the learners to: 1. Converse in various situations. 2. Make paper and PowerPoint presentations. 3. Speak effectively using discourse markers.	At the end of the course the learners will be able to : 1. Participate effectively in group discussions, public speaking. Listen for gist and make inferences from various speeches. 2. Research and sift information to make presentations. 3. Use discourse markers and make transitions effectively while speaking.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1								2	3	3					
CO2								2	3	3					
CO3								2	3	3					

1.0 INTERACTIVE COMMUNICATION SKILLS LAB-TOPICS

1.1 Public speaking: Dos and don'ts of public speaking. Listening and analysing speeches of great personalities in history.

1.2 Presentation Skills: Dos and Don'ts of Power point presentations in groups (branch specific topics)

1.3 Group discussion: Objectives of GD, Types of GDs; Initiating, Continuing, and concluding a GD.

Texts for Reference

- Life skills by SR Doshi - Public Speaking and other topics.
- Presentation skills in English by Bob Dignen.
- Priyadarshini Patnaik: Group discussion and Interviews, Cambridge University Press India private limited 2011

Prescribed text book for laboratory:

Speak Well: Jayshree Mohanraj, Kandula Nirupa Rani and Indira Babbellapati-Orient Black Swan.

The break-up of marks for CIE & SEE:

- SEE : 50 Marks
- Duration : 180 Minutes

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Analog Electronics Circuits

SYLLABUS FOR B.E. (EEE) IV - SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: U25ES410EC
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Introduce the fundamental concepts and applications of non-linear wave-shaping circuits for signal conditioning and waveform modification. 2. Develop the ability to design and analyze multistage amplifier circuits to achieve desired performance in terms of gain, bandwidth, and stability. 3. Provide an understanding of feedback principles and their impact on the performance and stability of amplifier circuits. 4. Enable students to design and implement sinusoidal oscillator circuits capable of generating stable signals at required frequencies. 5. Familiarize students with the principles, design considerations, and performance characteristics of various types of power amplifiers used in practical electronic systems.	On completion of the course, students will be able to 1. Design and analyze various non-linear wave shaping Circuits. 2. Analyze and design various multistage amplifiers. 3. Analyze different types of feedback amplifiers. 4. Design sinusoidal oscillators for the required frequency. 5. Analyze different types of power amplifiers.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2											2	
CO2	3	2	3											2	
CO3	3	3	1											2	
CO4	3	3	1											2	
CO5	3	3	2											2	

UNIT – I:

Wave-Shaping Circuits: RC low pass and high pass circuit, response to Step, Pulse and Square wave inputs, clipping circuits for single level and two levels, clamping circuits.

UNIT - II:

Multi stage amplifiers using Mosfet: Cascading amplifier stages, classification of amplifiers, frequency responses of RC coupled amplifiers, Transformer coupled amplifiers, effect of cascading on bandwidth. Direct Coupled (DC) Amplifiers, drawbacks of DC amplifiers, Drift compensation techniques.

UNIT - III:

Feedback amplifiers: Concept of Feedback, General characteristics of negative feedback amplifier, Feedback topologies, Effect of negative feedback on input and output impedances, Voltage-series and Voltage-shunt feedbacks using mosfets.

UNIT - IV:

Oscillators: Barkhausen's criteria, RC type oscillators: RC phase shift oscillator, LC type oscillators: Hartley and Colpitt's oscillators, Crystal oscillators.

UNIT - V:

Power amplifiers: Classification of power amplifiers, Analysis of class A and class B power amplifiers, Harmonic distortion, Power dissipation, efficiency calculations, Pushpull amplifiers, Complementary symmetry Power amplifiers.

Learning Resources:

1. Jacob Millman and Christos C. Halkias, Satyabratajit "Electronics Devices and Circuits", Mc Graw hill, 3rd edition, 2010.
2. Jacob Millman and Christos C. Halkias, Chetan D Parikh, "Integrated Electronics" McGraw Hill, 2009.
3. Adel S. Sedra and Kenneth C. Smith "Micro Electronic Circuits theory and applications" 7th edition Oxford publications, 2017.
4. Robert L. Boylestad and Louis Nashel sky, "Electronic Devices and Circuit Theory", PHI, 11th edition 2015.
5. Jacob mill man and Taub: "Pulse, Digital and switching wave forms", McGraw hill, 2003.
6. <https://nptel.ac.in/courses/108102095/>
7. <https://nptel.ac.in/courses/117101106/>

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Test: 90 Minutes

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Analog Electronics Circuits Lab

SYLLABUS FOR B.E. (EEE) IV - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: U25ES411EC
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to: 1. Introduce the principles of RC low-pass and high-pass circuits and enable students to design such circuits for different time constants, along with various types of clipper and clamper circuits. 2. Develop practical skills in designing and constructing multistage amplifier circuits and analyzing their frequency response characteristics. 3. Provide an understanding of small-signal amplifier behavior and the role of feedback in modifying amplifier performance. 4. Enable students to design and experimentally verify the operation of various sinusoidal oscillator circuits.	On completion of the course, students will be able to: 1. Design & Analyze RC Low pass and High pass Circuits for different time constants and to design different types of clippers and clammers. 2. Build a multi stage amplifier and find the frequency response of amplifier. 3. Analyze the small signal amplifiers behavior with and without feedback. 4. Design and verify the functioning of various sinusoidal oscillators.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2					2	1	2				2	
CO2	3	2	2					2	1	2				2	
CO3	3	2	2					2	1	2				2	
CO4	3	2	2					2	1	2				2	

CYCLE - I Experiments

1. Linear wave shaping circuits-Integrator & Differentiator
2. Clipping circuits
3. Clamping Circuits
4. Frequency response of Two stage amplifier using MOSFET
5. Frequency response of Voltage series feedback amplifier using MOSFET
6. Frequency response of Voltage Shunt feedback amplifier using MOSFET

7. Frequency response of Current series feedback amplifier using MOSFET
8. Frequency response of Current Shunt feedback amplifier using MOSFET

CYCLE - II Experiments

9. Design of Hartley Oscillator
10. Design of Colpitt's Oscillator
11. Design of RC Phase Shift oscillator.
12. Transformer coupled Class A power amplifier
13. Class AB Power amplifier

New Experiments

1. OP-Amp Applications (Adder, Subtractor, Comparator)
2. OP-Amp Applications (Integrator & Differentiator)

Learning Resources:

1. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, A Text–Lab Manual", 7th Edition, TMH2001.
2. Paul B. Zbar, Industrial Electronics, A Text-Lab Manual, 3rd Edition, TMH 1990.
3. Paul R.Gray & Robert G.Meyer, Analysis and Design of Analog Integrated Circuits, John Wiley,3rd Edition.

The break-up of CIE:

1. No. of Internal Test	:	1
2. Marks earmarked for day to day lab class assessment	:	18
3. Marks earmarked for lab internal test	:	12

Duration of Internal Test: 3 Hours

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List of Open Elective-I Courses		
Department	Code	Title
Civil	U25OE310CE	Green Buildings
CSE	U25OE310CS	Introduction to Python Programming
CSE	U25OE320CS	Programming Essentials in Python (Stream Artificial Intelligence & Machine Learning)
EEE	U25OE310EE	Non Conventional Energy Sources
IT	U25OE310IT	Fundamentals of Python Programming
IT	U25OE320IT	Computing using Python (Stream based (AI&ML))
MECH	U25OE320ME	Fundamentals of Unmanned Aerial Vehicles
MECH	U25OE310ME	Introduction to Industrial Robotics (Stream: Robotics)
Chemistry	U26OE310CH	Corrosion Science and Technology
H&SS	U25OE370EH	Political Science
H&SS	U25OE350EH	Financial Services (stream: Banking, Finance, securities and Investments)
H&SS	U25OE310EH	Human Resources Management for Engineers (Stream: Management Courses for Engineers)
H&SS	U25OE320EH	Fundamentals of Entrepreneurship (Stream: Entrepreneurship)

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DEPARTMENT OF CIVIL ENGINEERING
GREEN BUILDINGS (OPEN ELECTIVE-I)
SYLLABUS FOR B.E. III-SEMESTER

L : T : P (Hrs./week):2:0:0	SEE Marks:60	Course Code:U25OE310CE
Credits: 2	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to: 1. Learn the principles of planning and orientation of buildings. 2. Environmental implications of natural and building materials along with green cover 3. Acquire knowledge on various aspects of green buildings	Upon the completion of this course the students will be expected to: 1. Explain the principles of building planning, its bylaws and provide facilities for rainwater harvesting. 2. Analyse the aspects of energy, water and waste management in buildings. 3. Understand the concepts of green building technologies. 4. Understand rating systems of GRIHA IGBC and LEED.

UNIT-I: Planning of buildings: Principles of planning, Relevant building bylaws, site selection for buildings, orientation of buildings, Provision of rain water harvesting

UNIT-II: Building-Energy-Implications: Environmental implications of buildings energy, carbon emissions, water use, waste disposal; Building materials: sources, methods of production and environmental Implications. Green building materials and recycling, Green cover and built environment

UNIT-III: Green Building Technologies: Introduction- Necessity - Concept of Green building. Principles of green building – Site selection criteria for Green Buildings – effective cooling and heating systems – effective electrical systems-Passive solar architecture - effective water conservation systems

UNIT-IV: Certification Systems: Certification systems- Green Rating for Integrated Habitat Assessment (GRIHA), Indian Green Building Council (IGBC) and Leadership in Energy and Environmental Design (LEED), case studies

Learning Resources:

1. Kumara Swamy N.Kameswara Rao A., Building Planning And Drawing, Charotar, Publications, 9th Edition, 2023.
2. Shahane, V. S, "Planning and Designing Building", Poona, Allies Book Stall, 2004.
3. Michael Bauer, Peter Mösele and Michael Schwarz "Green Building – Guidebook for Sustainable Architecture" Springer, 2nd Edition, 2013.
4. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison "Green Building Handbook" Volume I, Spon Press, 2001.
5. MiliMajumdar, "Energy-efficient buildings in India" Tata Energy Research Institute, 2002.
6. TERI "Sustainable Building Design Manual- Volume I & II" Tata Energy Research Institute, 2009.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING (Autonomous)
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Department of Computer Science & Engineering

INTRODUCTION TO PYTHON PROGRAMMING

(OPEN ELECTIVE-I)

SYLLABUS FOR B.E. III-SEMESTER (Common for CIVIL, ECE, EEE & MECH)

L:T:P (Hrs./week): 2:0:0	SEE Marks : 60	Course Code : U25OE310CS
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES		COURSE OUTCOMES
1	Acquire problem solving skills	On completion of the course, students will be able to 1 Design python programs using arithmetic expressions and decision making statements 2 Design modular python programs using functions 3 Develop programs using strings and list 4 Develop programs using tuples and dictionaries
2	Learn programming and solve problems using Python language	

CO-PO and CO-PSO mapping																
CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	1		1	1									1		2	
CO2	1	1	1	1	2								1		2	
CO3	1	1	1	1	2								2		2	
CO4	1	1	1	1	2								2		2	

UNIT-I: Introduction to Python: Variables, expressions and statements, order of operations

Conditionals: Modulus operators, Boolean expressions, logical operators, conditional execution, alternative executions, chained conditional, nested conditional

Iteration: while statement

UNIT-II: Functions: Function calls, type conversion and coercion, mathematical functions, User-defined functions, parameters and arguments.

Recursion

UNIT-III: Strings: string length, string traversal, string slices and string comparison with examples, strings are immutable, find function, string module

List: list values, accessing elements, list traversal, list length, list membership, list and for loop, list operations with examples

UNIT-IV: Tuples: Mutability, tuple assignment, tuple as return values

Dictionaries: dictionary operations, dictionary methods, aliasing and copying, counting letters using dictionaries

Learning Resources:

1. Downey A, How to think like a Computer Scientist :Learning with Python, 1st Edition(2015), John Wiley
2. Lambert K.A, Fundamentals of Python –First Programs, 1st Edition(2015), Cengage Learning India
3. Perkovic L, Introduction to Computing using Python,2/e, (2015), John Wiley
4. Stewart Venit and Elizabeth Drake, Prelude to Programming: Concepts and Design, 6th Edition(2015),Pearson India
5. Mark J Guzdial, Introduction to Computing and programming in Python, 3rdEdition(2013), Pearson India
6. Allen Downey, Think Python, 2nd Edition(2015),Shroff Publisher Orielly
7. <http://nptel.ac.in/courses/117106113/34>
8. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electrical-engineering-and-computer-science-i-spring-2011/python-tutorial/>
9. www.scipy-lectures.org/intro/language/python_language.html

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:	90 Minutes			

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Department of Computer Science & Engineering

PROGRAMMING ESSENTIALS IN PYTHON

Stream - Artificial Intelligence & Machine Learning (OPEN ELECTIVE-I)

(Common for CIVIL, ECE, EEE & MECH) SYLLABUS FOR B.E. III-SEMESTER

L:T:P (Hrs./week): 2:0:0	SEE Marks : 60	Course Code :U25OE320CS
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES <i>On completion of the course, students will be able to</i>
1 Acquire problem solving skills	1 Design python programs using arithmetic expressions and decision making statements
2 Learn programming and solve problems using Python language	2 Design modular python programs using functions
	3 Develop programs using strings and list
	4 Develop programs using tuples and dictionaries

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1		1	1									1		2
CO2	1	1	1	1	2								1		2
CO3	1	1	1	1	2								2		2
CO4	1	1	1	1	2								2		2

UNIT-I: Introduction to Python: Variables, expressions and statements, order of operations

Conditionals: Modulus operators, Boolean expressions, logical operators, conditional execution, chained conditional, nested conditional

Iteration: while statement

UNIT-II: Functions: Function calls, Type conversion and coercion, mathematical functions, User-defined functions, parameters and arguments.

Recursion

UNIT-III: Strings: string length, string traversal, string slices and string comparison with examples, strings are immutable, find function, string module

List: list values, accessing elements, list traversal, list length, list membership, list and for loop, list operations with examples

UNIT-IV: Tuples: Mutability, tuple assignment, tuple as return values

Dictionaries: dictionary operations, dictionary methods, aliasing and copying, counting letters using dictionaries

Learning Resources:

1. Downey A, How to think like a Computer Scientist :Learning with Python, 1st Edition(2015), John Wiley
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3. Perkovic L, Introduction to Computing using Python,2/e, (2015), John Wiley
4. Stewart Venit and Elizabeth Drake, Prelude to Programming: Concepts and Design, 6th Edition(2015),Pearson India
5. Mark J Guzdial, Introduction to Computing and programming in Python, 3rd Edition(2013), Pearson India
6. Allen Downey, Think Python, 2nd Edition(2015),Shroff Publisher Orielly
7. <http://nptel.ac.in/courses/117106113/34>
8. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electrical-engineering-and-computer-science-i-spring-2011/python-tutorial/>
9. www.scipy-lectures.org/intro/language/python_language.html

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Non Conventional Energy Sources (Open Elective-I)

SYLLABUS FOR B.E. III SEMESTER

L: T: P (Hrs/Week):2:0:0	SEE Marks: 60	Course Code:U25OE310EE
Credits:2	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to: To provide a survey of the most important renewable energy resources and the technologies for harnessing these resources within the framework of a broad range of simple to state-of-the-art energy systems.	On completion of the course, students will be able to 1. Demonstrate the generation of electricity from various Non-Conventional sources of energy and solar power generation 2. Illustrate the generation of energy from wind and generation of energy from waste 3. Demonstrate the generation of energy by biomass and fuel cells 4. Illustrate the ocean and geo thermal energy generation

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	1							1
CO2	3	3	2	1							1
CO3	3	3	2	1							1
CO4	3	3	2	1							1

UNIT-I: Introduction and Solar Energy:

Introduction: Need for Non-conventional energy sources, Types of Non-Conventional energy sources. Renewable energy across the Global and in India. Renewable energy for rural applications, Renewable energy for urban, industrial and commercial applications

Solar Energy: Solar cell fundamentals: Semiconductors, Photovoltaic effect, Solar PV cell, module, panel, array, Solar cell operating characteristics: Voltage-current characteristic, energy losses, maximising the performance. Applications of solar energy, Solar energy program in India, Case study

UNIT-II: Wind Energy and Waste to Energy:

Wind Energy: Nature of wind, Basic components of Wind Energy Conversion System(WECS), Power extraction from the wind, Applications of wind energy. Wind energy program in India, Case Study

Waste to Energy: Key issues, Waste recovery management, Case study

UNIT-III: Biomass Energy and Fuel Cells:

BiomassEnergy: Definition, Bio fuels, Biomass resources, Biomass conversion technologies: Incineration- Thermo chemical conversion- Bio- chemical conversion. Advantages and disadvantages of biomass energy, Case study

Fuel Cells: Definition-Classification of fuel cells, Principle of operation, Hydrogen-oxygen fuel cell, Alkaline fuel cell, Proton exchange membrane fuel cell, Molten carbonate fuel cell, Solid oxide electrolyte cells, Comparison of fuel cells- Advantages and Disadvantages of fuel cells-Applications of Fuel cells. Case study

UNIT-IV: Ocean Energy and Geothermal Energy:

Ocean Energy: Ocean thermal electric conversion (OTEC) methods: Open cycle and Closed cycle- Principles of tidal power generation-Advantages and limitations of tidal power generation, Case study

Geothermal Energy: Geothermal resources- Vapour dominated geothermal plant- Liquid dominated geothermal plant- Applications of Geothermal Energy, Case study

Learning Resources:

1. B H KHAN, Non-Conventional Energy Resources, McGraw Hill, 2nd Edition, 2009.
2. G. S. Sawhney, Non-Conventional Energy Resources, PHI Learning Pvt Ltd, 2012
3. ShobhNath Singh, Non-Conventional Energy Resources, Pearson, 2016
4. G.D. Rai, Non-Conventional Energy Sources ,Khanna Publishers, New Delhi, 2011.
5. Ashok Desai V, Non-Conventional Energy, Wiley Eastern Ltd, 1990.
6. Mittal K.M, Non-Conventional Energy Systems, Wheeler Publishing Co. Ltd, 1997.
7. Ramesh R, Kurnar K.U, Renewable Energy Technologies, Narosa Publishing House, New Delhi, 1997.

The break-up of CIE : Internal Tests + Assignments + Quizzes

1. No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2. No. of Assignments	: 2	Max. Marks for each Assignment	: 5
3. No. of Quizzes	: 2	Max. Marks for each Quiz Test	: 5

Duration of Internal Tests :90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERBAD-500031,
DEPARTMENT OF INFORMATION TECHNOLOGY

FUNDAMENTALS OF PYTHON PROGRAMMING

(GENERAL POOL STREAM: OPEN ELECTIVE-I)

(Common for CIVIL, ECE, EEE & MECH)

SYLLABUS FOR B.E. III SEMESTER

L:T:P(Hrs./week):2:0:0	SEE Marks :60	Course Code: U25OE310IT
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The Objectives of the course: Acquire problem solving skills for writing python scripts	<i>On completion of the course, students will be able to</i> 1. Understand the fundamentals of python and implement control structures. 2. Understand basic knowledge on strings, lists and tuples. 3. Implement programs using dictionaries, and sets. 4. Implement OOP concepts in python.

UNIT – I:

Basics of Python Programming: Features of Python, variables and identifiers, operators and expressions.

Decision control statements: Selection/Conditional branching statements, basic loop structures/iterative statements, nested loops, break, continue and pass statements.

Functions: Definition, function call, more on defining functions, recursive functions.

Unit – II:

Strings: Introduction, accessing strings, basic operations, string slice, String function and methods, Regular Expressions, introduction to lists.

Tuples: Introduction, operations on tuples, packing and unpacking, nested tuples, tuple methods and functions.

UNIT – III:

Set: Introduction, Set operations.

Dictionaries: Basic operations, sorting items, looping over dictionary, nested dictionaries, built-in dictionary functions.

UNIT – IV:

OOPS Concepts: Introduction, classes and object, class method and self-argument, the `__init__()` method, class variables and object variables, public and private data members, Inheritance, Operator Overloading.

Files: Reading and writing files.

Learning Resources:

- 1 Allen Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly publications, 2nd Edition.
2. Reema Thareja, "Python programming using problem solving approach", Oxford university press.
3. Mark J Guzdial, Introduction to Computing and programming in Python, 3rd Edition (2013), Pearson India
4. https://onlinecourses-archive.nptel.ac.in/noc19_cs09/
5. <http://nptel.ac.in/courses/117106113/34>
6. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electrical-engineering-and-computer-science-i-spring-2011/python-tutorial/>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max. Marks for each Internal Tests:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05
Duration of Internal Test: 90 Minutes				

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERBAD-500031,
DEPARTMENT OF INFORMATION TECHNOLOGY
COMPUTING USING PYTHON

(AI&ML TRACK: OPEN ELECTIVE-I)

(Common for CIVIL, ECE, EEE & MECH) SYLLABUS FOR B.E. III SEMESTER

L:T:P(Hrs./week):2:0:0	SEE Marks :60	Course Code: U25OE320IT
Credits : 2	CIE Marks :40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The Objectives of the course: Acquire problem solving skills for writing python scripts	<i>On completion of the course, students will be able to</i> 1. Understand the fundamentals of python and implement control structures. 2. Understand string, lists and tuples and perform the key operations on these data containers. 3. Implement dictionaries and set operations in python. 4. Implement OOP concepts in python.

UNIT – I:

Introduction to Python: Features of Python, variables and identifiers, operators and expressions.

Decision making and repetition: if, if else, nested if-else and else if, while loops and for loops, nested loops, break, continue, pass

Functions: Definition, function call, more on defining functions, recursive functions.

Unit – II:

Strings: Introduction, accessing strings, basic operations, string slice, String function and methods, Regular Expressions.

Lists: Introduction, Operations on lists, nested list, list methods, list comprehension.

Tuples: Introduction, operations on tuples, packing and unpacking, nested tuples, tuple methods and functions.

UNIT – III:

Set: Introduction, Set operations.

Dictionaries: Basic operations, sorting items, looping over dictionary, nested dictionaries, built-in dictionary functions.

UNIT – IV:

OOPS Concepts: Introduction, classes and object, class method and self-argument, the `__init__()` method, class variables and object variables, public and private data members, Inheritance, Operator Overloading.

Files: Reading and writing files, serialization using JSON and pickle

Learning Resources:

1. Allen Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly publications, 2nd Edition.
2. Reema Thareja, "Python programming using problem solving approach", Oxford university press.
3. Mark J Guzdial, Introduction to Computing and programming in Python, 3rd Edition (2013), Pearson India
4. https://onlinecourses-archive.nptel.ac.in/noc19_cs09/
5. <http://nptel.ac.in/courses/117106113/34>
6. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-01sc-introduction-to-electrical-engineering-and-computer-science-i-spring-2011/python-tutorial/>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max. Marks for each Internal Tests:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05
Duration of Internal Test: 90 Minutes				

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
Department of Mechanical Engineering

FUNDAMENTALS OF UNMANNED AERIAL VEHICLES

(General Pool)

(Open Elective-I) SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week) : 2:0:0	SEE Marks:60	Course Code: U25OE320ME
Credits :02	CIE Marks:40	Duration of SEE:03Hours

COURSE OBJECTIVE	COURSE OUTCOMES
	<i>On completion of the course, students will be able to</i>
The objective of this Course is to understand the features, basics of flight, manufacturing and analysis of UAV and Artificial Intelligence in UAV systems.	1 classify various types of UAVs, describe their characteristics, and analyze their applications. 2 illustrate, explain and interpret the fundamental concepts of aerodynamics relevant to flight vehicles. 3 fabricate, and analyse UAV components using appropriate tools and techniques. 4 identify, explain, and evaluate the role of Artificial Intelligence in UAV systems for autonomous operations.

CO-PO and CO-PSO mapping														
CO	PO mapping											PSO mapping		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	3	2				3	3				3	3	2	3
CO2	3	3				3	2				3	3	2	3
CO3	3	2				3	2				3	3	2	3
CO4	3	2				3	2				3	3	2	3

Unit-I: Introduction to UAV

UAV: Definition, History; Difference between aircraft and UAV; DGCA Classification of UAVs; Types and Characteristics of Drones: Fixed, Multi-rotor, and Flapping Wing; Applications: Defense, Civil, Environmental monitoring.

Unit-II: Basics of Flight

Different types of flight vehicles; Components and functions of an airplane; Forces acting on Airplane; Physical properties and structure of the atmosphere; Aerodynamics – aerofoil nomenclature, aerofoil characteristics, Angle of attack, Mach number, Lift and Drag, Propulsion and airplane structures.

Unit-III: Manufacturing and Analysis of UAV

Drone Manufacturing, Additive Manufacturing, Health Evaluation and Failsafe, Introduction to CAD; Design of UAV components; Structural Analysis using CAE; Aerodynamic Analysis using CFD; Manufacturing of the components of UAVs: 3D printing; Case studies;

Unit-IV: Artificial Intelligence in UAV Systems

Components: Arms, motors, propellers, electronic speed controller (ESC), flight controller; Propulsion; Data Link; Sensors and Payloads: GPS, IMU, Light Detection and Ranging (LiDAR), Imaging cameras, Classification of payload based on applications; Hyper-spectral sensors; Laser Detection and Range (LADAR); Synthetic Aperture Radar (SAR); Thermal cameras; ultra-sonic detectors; Case study on payloads. Introduction to navigation systems and types of guidance; Mission Planning and Control.

Learning Resources:

1. Andey Lennon, "Basics of R/C Model Aircraft Design" Model Airplane News Publication
2. John Baichtal, Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs.
3. K Valavanis, George J Vachtsevanos, Handbook of Unmanned Aerial Vehicles, New York, Springer, Boston, Massachusetts : Credo Reference, 2014. 2016.
4. DGCA RPAS Guidance Manual, Revision 3 – 2020

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05
Duration of Internal Test: 90 Minutes				

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
Department of Mechanical Engineering

INTRODUCTION TO INDUSTRIAL ROBOTICS

(Stream: Robotics)

(Open Elective-I) SYLLABUS FOR B.E.III-SEMESTER

L:T:P(Hrs/week):2:0:0	SEE Marks:60	Course Code: U25OE310ME
Credits :02	CIE Marks:40	Duration of SEE: 03Hours

COURSE OBJECTIVE	COURSE OUTCOMES
The objective of the course is to study industrial robot components, configuration, sensors, drives, applications and programming through experiential learning.	On completion of the course, students will be able to 1 explain configuration of industrial robots and summarize various applications. 2 interpret various elements of the industrial robots 3 Develop methodology to represent position and orientation of industrial robot links in spatial coordinate system. 4 classify various sensors used in industrial robots and interface between the human user and an industrial robot using various programming languages.

CO-PO and CO-PSO mapping														
CO	PO mapping											PSO mapping		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	3	2			1	2					2	3	1	2
CO2	3	2			1	2					2	3	1	2
CO3	3	2			1	2					2	3	1	2
CO4	3	2			1	2					2	3	1	2

UNIT-I

ROBOT BASICS

Robot-Basic concepts, Need, Law, History, Anatomy, specifications.

Robot configurations-cartesian, cylindrical, polar, articulated and SCARA.

Parallel robots

ROBOT APPLICATIONS

Application in industry – material handling, loading & unloading, processing, welding & painting, assembly and inspection

UNIT-II

ROBOT ELEMENTS

End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot joints types, Robot drive system types: Electrical, pneumatic and hydraulic.

UNIT-III

ROBOT COORDINATE SYSTEMS

Coordinate frames, Rotation matrix, Euler angles, Roll pitch and yaw angle representation, Composite rotations, Homogeneous Transformation matrix.

UNIT-IV

ROBOT SENSORS

Sensors in robots – Touch sensors-Tactile sensors – Proximity and range sensors. Force sensors

Robot programming

On line programming, teach pendant control, Lead through, Walk through, off line programming, Task programming.

Learning Resources:

1. Mikell P. Groover, Mitchell Weiss, Roger N Nagel and Nicholas G Odrey, "Industrial Robotics Technology, Programming and Applications", Tata Mc Graw-Hill Publishing Company Limited, 2008.
2. Deb.S.R and Sankha Deb, "Robotics Technology and Flexible Automation", Tata Mc Graw Hill Publishing Company Limited, 2010.
3. Klafter R.D, Chmielewski T.A, and Negin. M, "Robotic Engineering: An Integrated Approach", Prentice Hall of India Pvt. Ltd., 1994.
4. K.S. Fu, R.C. Gonzalez and C.S.G. Lee, "Robotics control, sensing, vision and intelligence", Tata Mc Graw-Hill Publishing Company Limited, 2008
5. R.K. Mittal and I. J. Nagrath "Robotics and Control", Tata Mc Graw-Hill Publishing Company Limited, 2003.

The break-up of CIE: Internal Tests+Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05
Duration of Internal Test: 90 Minutes				

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
ACCREDITED BY NAAC WITH A++ GRADE
DEPARTMENT OF CHEMISTRY

CORROSION SCIENCE AND TECHNOLOGY

Open Elective: B E III SEMESTER

Instruction: 2H/Week	SEE Marks : 60	Code : U26OE310CH
Credits : 2	CIE Marks : 40	Duration of SEE: 3 Hours

OBJECTIVES							OUTCOMES						
The course will enable the students : 1. To acquaint with the causes of corrosion and different types of corrosion. 2. To understand the factors influencing corrosion and Controlling Corrosion by Inhibitors and Organic Coatings. 3. To know different corrosion control coatings like electroplating and electrolessplating. 4. To familiarize with various preventive methods of corrosion such as cathodic protection and surface conversion.							At the end of the course students should be able to: 1. Explain different types of corrosion with suitable examples. 2. Discuss different factors that affect corrosion and protection by organic coatings and inhibitors. 3. Select a suitable metallic coating for corrosion control 4. Discuss the principles and application of cathodic protection and surface conversion coatings for corrosion control.						
CO-PO MAPPING FOR CORROSION SCIENCE AND TECHNOLOGY													
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	
1	2	1	-	-	-	-	1	-	-	-	-	1	
2	2	1	-	-	-	-	1	-	-	-	-	1	
3	2	1	-	-	-	-	1	-	-	-	-	1	
4	2	1	-	-	-	-	1	-	-	-	-	2	

UNIT-I: CHEMICAL AND ELECTROCHEMICAL CORROSION

Introduction - gravity, cause, Chemical and Electrochemical corrosion - Mechanism, Pilling – Bed worth rule, effect of nature of oxide layer on rate of chemical corrosion, electrochemical series and galvanic series. Formation of anodic and cathodic areas, Galvanic corrosion, Differential aeration corrosion -pitting, water line corrosion & crevice corrosion, stress corrosion, corrosion fatigue.

UNIT-II: CORROSION CONTROL METHODS INHIBITORS AND ORGANIC COATINGS

A. Factors influencing corrosion

Nature of metal: Relative position of metal in galvanic series, over voltage, relative areas of anode & cathode and nature of corrosion product.

Nature of environment: temperature, pH and humidity.

B. Corrosion Control by Inhibitors and Organic Coatings

Corrosion Inhibitors: Anodic, Cathodic and vapor phase inhibitors.

Organic Coatings: Paints – constituents and their functions, vitreous enamel coatings, varnishes and lacquers.

UNIT-III: METALLIC COATINGS

Passivation of metals, polarization curve of passivating metals, effect of pH and potential-pH diagram for iron (Pourbaix Diagram) and polarization curve of iron, application of Pourbaix diagram for corrosion mitigation.

Metallic coatings: Types - anodic & cathodic. Surface pre-treatment of base metal.

Methods of application of metallic coatings: Hot dipping- galvanization - applications of galvanized RCC steel bars. Cladding, electro plating & electroless plating- principle and their differences.

Electroplating of Cu coating on Fe, Electroless plating of Ni coating on Insulators, Preparation of PCB using Electroless plating.

UNIT-IV: CATHODIC PROTECTION AND SURFACE CONVERSION

Cathodic protection: Principle, sacrificial anodic protection (SAP), impressed current cathodic protection (ICCP). Application of cathodic protection for bridges, ship hulls and underground pipelines.

Surface conversion coatings: Carburizing, Nitriding, Cyaniding.

Books:

1. P.C.Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai Pub, Co., New Delhi (2002)
2. S.S. Dara "A text book of engineering chemistry" S.Chand&Co.Ltd., New Delhi (2006).
3. O.G. PALANNA, Engineering Chemistry, TMH Edition.
3. Chemistry of Engineering Materials by R.P Mani and K.N.Mishra, CENGAGE learning
4. Shashi Chawla, "Text Book of Engineering Chemistry", Dhanpat Rai Publishing Company, NewDelhi (2008).

Suggested Reading:

1. Principles and prevention of corrosion: Denny A Jones, Prentice Hall, 1996.
2. Derek Pletcher and Frank C. Walsh, "Industrial Electrochemistry", Chapman and Hall, New York, 1993
3. Fundamentals of Corrosion: Michael Henthorne, Chemical Engineering
4. Corrosion Engineering: Mars G Fontana, Mc Graw Hill, 1987

VASAVI COLLEGE OF ENGINEERING (A) HYDERABAD
DEPARTMENT: HUMANITIES & SOCIAL SCIENCES

POLITICAL SCIENCE

(SYLLABUS COMMON TO ALL BRANCHES) OPEN ELECTIVE III SEMESTER

Instruction: 2 Hours	SEE: 60	Course code: U25OE370EH
Credits: 2	CIE: 40	Duration of SEE: 3 Hours

Course Objectives	Course Outcomes
By the end of the course, learners will be able to: 1. To introduce students to the foundations of Political Science. 2. To understand Indian political ideas, institutions, and ideologies. 3. To familiarize students with political thinkers and constitutional values. 4. To develop analytical understanding of Indian politics and governance.	On completion of the course, learners will be able to: 1. Explain core political concepts such as state, sovereignty, rights, justice, liberty, and duties. 2. Describe contributions of key Western and Eastern political thinkers. 3. Compare political ideas across civilizations. 4. Understand major currents in modern Indian political philosophy. 5. Demonstrate basic analytical skills in interpreting political ideas.

UNIT-1: Introduction to Political Science- 8 Hours

- Meaning, scope, and relevance of Political Science
- Key concepts: state, sovereignty, power, authority, legitimacy
- Forms of government: monarchy, aristocracy, democracy

UNIT 2: Political Thought -12 Hours

- A. Classical and Medieval political Theory: Plato & Aristotle; St. Augustine & Thomas Aquinas; Machiavelli
- B. Modern Political Theory: Hobbes; Locke; Rousseau; JS Mill & Karl Marx

UNIT 3: Political Ideologies -11 Hours

Introduction: Role of ideas, Features of ideology, Left/Right divide

- A. Classical Ideologies: Liberalism/Capitalism, Socialism/Communism, Nationalism, Gandhism, Fascism
- B. New ideologies: Feminism, Ecologism, Religious Fundamentalism

UNIT 4: Indian Political Thought -11 Hours

- A. Classical Indian Political Thought: Dharmashastra, Arthashastra, and Buddhist traditions

B. Modern Indian Political Thought: Sir Syed Ahmed Khan, Swami Vivekananda, Bal Gangadhar Tilak, Sri Aurabindo, Dr. B.R. Ambedkar and M.S. Gowalkar

C. Comparative perspective: Western and Eastern

Learning Resources

Suggested Reference Books

- Andrew Heywood, *Political Theory: An Introduction*
- O.P. Gauba, *Introduction to Political Theory*
- Brian R.Nelson, *Western Political Thoughts*
- Andrew Heywood, *Political Ideologies, An introduction*
- V.R. Mehta, *Foundations of Indian Political Thought*

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal tests	:	2	Max.Marks	:	30
2	No. of assignments	:	2	Max. Marks	:	5
3	No. of Quizzes	:	2	Max. Marks	:	5

Duration of Internal Tests : 90 Minutes

Duration for SEE : 180 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

FINANCIAL SERVICES (BFSI)

SYLLABUS FOR B.E. III – SEMESTER (COMMON TO ALL BRANCHES)

L:T:P (Hrs./week) : 2:0:0	SEE Marks : 60	Course Code: U250E350EH
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
By the end of the course, learners will be able to: 1. To gain understanding of working of banks and insurance companies 2. To gain understanding of Risks in Banking and Insurance Companies 3. To understand the concepts and applications of Financial instruments 4. To gain understanding of Financial Markets infrastructure	On completion of the course, learners will be able to: 1. Comprehend working of Banking and Insurance companies 2. Understand the Risks involved in Banking and Insurance Business 3. Comprehend the different financial assets available in the market 4. Comprehend the working of financial markets

Unit I BANKING (8 hours)

Nature and Functions of commercial banks –Banking Assets and Liabilities
- distribution channels in Wholesale and Retail banking –KYC and its importance in Banking – Role of Banks in Anti Money Laundering – Automated processing of payments – NEFT, RTGS, IMPS, SWIFT- Risks in Banking – Credit Risk, Interest Rate Risk, Liquidity risk and Frauds.

Unit II INSURANCE (6 hours)

Concept- Principles – Functions of Insurance - Life Insurance – Products - Health and General Insurance - Products and Services - Eco system of Insurance– Insurance companies- Advisors- underwriters – TPAs - Actuaries - Reinsurance – Overview of IRDA

Unit III - Financial Markets (9 hours)

Capital Markets – Primary and Secondary Market –Money Market – Instruments in Capital and Money Market - Nature and concept of Equities – Common Shares – Preference equity - – Nature and Functions- Bonds – characteristics – Valuation – Hybrid Financial instruments

UNIT IV - DERIVATIVES AND MARKET INFRASTRUCTURE

Derivatives – Meaning - Uses – Types of Derivatives – Forwards – Futures- Options – Recent Trends in Derivative Trading. Financial Market Infrastructure Institutions – Nature and Functions of Stock Exchanges - Depositories - Clearing Houses – Role and Functions of Regulators in Financial Markets – RBI – SEBI – IRDAI.

References

M Y Khan, Financial Services, 10th Edition, Tata Mcgraw Hill

www.sebi.gov.in

www.rbi.org.in

The break-up of CIE : Internal Tests + Assignments + Quizzes

- | | | | | | |
|--------------------------|---|--------------------------------|------------------------------------|---|---------------------------------|
| 1. No. of Internal Tests | : | <input type="text" value="2"/> | Max. Marks for each Internal Tests | : | <input type="text" value="30"/> |
| 2. No. of Assignments | : | <input type="text" value="2"/> | Max. Marks for each Assignment | : | <input type="text" value="5"/> |
| 3. No. of Quizzes | : | <input type="text" value="2"/> | Max. Marks for each Quiz Test | : | <input type="text" value="5"/> |

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

HUMAN RESOURCES MANAGEMENT FOR ENGINEERS

SYLLABUS - COMMON TO ALL BRANCHES III SEMESTER

Instruction: 2Hrs/Week	SEE: 60	Course code: U25OE310EH
Credits: 2	CIE: 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. Understand the scope, evolution, and strategic importance of Human Resource Management. 2. Develop knowledge of human resource planning, job analysis techniques, recruitment and selection. 3. Explore training, development, and career growth practices in organizations. 4. Gain insights into performance management, compensation practices, and contemporary HR issues.	At the end of the course the learners will be able to: - 1. Explain the scope, evolution, and strategic importance of HRM in organizational effectiveness. 2. Apply HR planning, job analysis, recruitment, and selection methods in organizational contexts. 3. Design and evaluate training, development, and career planning initiatives to enhance employee growth. 4. Implement and assess performance appraisal and compensation practices while addressing contemporary HR issues.

Unit-I : Introduction to Human Resource Management

Introduction - Nature and Objectives of HRM - Scope of HRM - Evolution of HRM - Importance of HRM - Environment of HRM - External and Internal Forces Acting on HRM - Strategic HRM.

Unit-II : Human Resources Planning

Human Resource Planning - Nature and Importance of Human Resource Planning - Factors Affecting HR Planning - Requisites for Successful HR Planning - Nature of Job Analysis - Process of Job Analysis- Methods of Collecting Data for Job Analysis - Recruitment - Sources of Recruitment - Selection Process - Induction and Onboarding.

Unit-III : Training and Development

Nature and Importance of Training and Development- Inputs in Training and Development - Training Needs Assessment - Training Process - Impediments to Effective Training - Career Development.

Unit-IV : Performance Management and Contemporary Issues in HRM

Performance Management - Performance Appraisal Process - Methods and Challenges of Performance Appraisal - Compensation and Reward Management - Performance-Based Incentives - Ethical Issues in HRM -

Employee Privacy Issues and Surveillance - Workplace Harassment - Employer Branding - Green HRM - Managing Global Workforce.

Learning resources:-

1. Human Resource Management – Gary Dessler.
2. Human Resources Management, V Edition, K Ashwatappa, McGraw Hill Publication
3. P. Subba Rao, Human Resource Management, Himalaya Publishing House.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal tests	:	2	Max. Marks	:	30
2	No. of assignments	:	2	Max. Marks	:	5
3	No. of Quizzes	:	2	Max. Marks	:	5

Duration of Internal Tests : 90 Minutes

Duration for SEE : 180 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Fundamentals of Entrepreneurship

(Stream: Entrepreneurship) (Open Elective-I) SYLLABUS FOR B.E. III - SEM

L:T:P (Hrs./week) : 2:0:0	SEE Marks : 60	Course Code: U25OE320EH
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE The objective of the course is to	COURSE OUTCOMES On completion of the course, students will be able to
1. Cultivate an entrepreneurial mindset. 2. Identify and assess business opportunities. 3. Understand core business fundamentals. 4. Leverage AI for smart business planning.	1. Exhibit an entrepreneurial and innovative mindset. 2. Identify and evaluate market-driven opportunities. 3. Apply core business concepts in real-world scenarios. 4. Use AI tools for data-driven business planning.

CO-PO and CO-PSO mapping														
CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1									2			1		
CO2		1					2		2				1	
CO3							2				2		1	
CO4				1							1			1
AVG.		1		1			2		2		1.5	1	1	1

UNIT-I Introduction and Opportunity Recognition:

Definition and importance of entrepreneurship, Characteristics of successful entrepreneurs, Types of entrepreneurship (e.g., social, technological, corporate), Techniques for identifying business opportunities, Market research methods and trend analysis. AI Integration: Google Trends, ChatGPT, Exploding Topics

UNIT-II Business Models and Planning:

Understanding different business models, Introduction to business planning, Feasibility analysis, Basics of business laws and regulations, Ethical issues in entrepreneurship. AI Tools: LivePlan, Notion AI

UNIT-III Financing and Team Management:

Sources of funding: bootstrapping, angel investors, venture capital, Basics of financial planning and budgeting, Understanding financial statements, Team dynamics and leadership, Conflict resolution techniques

UNIT-IV Design Thinking and Product Development: Design thinking methodology, Innovation and problem-solving techniques, Creating prototypes and MVPs, Tools and technologies for prototyping. Customer validation techniques. Tools: Canva, Miro; AI Tools: Uizard, Framer AI

Learning Resources:

1. Entrepreneurship - Rajeev Roy, Oxford University Press
2. Entrepreneurship Development - S.S. Khanka, S. Chand Publishing
3. Business Model Generation - Alexander Osterwalder & Yves Pigneur, Wiley
4. The Lean Startup - Eric Ries, Crown Business (Penguin Random House)
5. Change by Design - Tim Brown, Harvard Business Review Press
6. Financial Management - I.M. Pandey, Vikas Publishing House

The break-up of CIE : Internal Tests + Assignments + Quizzes

- | | | | |
|--------------------------|-----|------------------------------------|------|
| 1. No. of Internal Tests | : 2 | Max. Marks for each Internal Tests | : 30 |
| 2. No. of Assignments | : 2 | Max. Marks for each Assignment | : 5 |
| 3. No. of Quizzes | : 2 | Max. Marks for each Quiz Test | : 5 |

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

List of Open Elective-II Courses		
Department	Code	Title
Civil	U25OE410CE	Solid Waste Management
CSE	U25OE410CS	Basics of Java Programming
CSE	U25OE420CS	Mathematical Computing For AI & ML With Python
EEE	U25OE410EE	Mathematical Programming for Numerical Computation
IT	U25OE410IT	Object Oriented Programming using Java
IT	U25OE420IT	Essentials of Mathematics for Machine learning using Python (Stream based (AI&ML))
MECH	U25OE420ME	Operations Research
MECH	U25OE410ME	Kinematics and Dynamics of Robotics (Stream: Robotics)
H&SS	U25OE420EH	Product Development and Validation
H&SS	U25OE350EH	Fintech (BFSI)
H&SS	U25OE410EH	Finance Management For Engineers

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

SOLID WASTE MANAGEMENT (Open Elective-II)

SYLLABUS FOR B.E.IV-SEMESTER

L:T:P(Hrs./week):3:0:0	SEE Marks:60	Course Code:U25OE410CE
Credits: 3	CIE Marks:40	Duration of SEE : 3Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
In this subject the students will 1. Understand characteristics of solid waste and legislation of solid waste management. 2. Understand processing, collection and transportation of solid wastes. 3. Gain insight into transformation, energy recovery and disposal of solid waste. 4. Grasp the fundamentals of hazardous waste and its management. 5. Understand the solid waste management practices adopted in actual practical scenarios.	Upon the completion of this course students will be able to 1. Understand types, characteristics, composition of solid waste and rules laid for its management as per legislation. 2. Apply gained knowledge of waste reduction methods, collection techniques, resource recovery/recycling, energy recovery, transport & transfer options for solid waste management. 3. Identify appropriate technologies for transformation and disposal of solid waste. 4. Categorize solid waste as hazardous or non-hazardous based on solid waste toxicology principles. 5. Analyze and apply solid waste management techniques in actual practice.

UNIT- I: Solid waste generation and material flow, sources and types of solid waste, characterization of solid waste, physical and chemical properties of solid waste, Hierarchy of solid waste management, solid waste management rules- 2016, Mathematical Modelling of Solid Waste.

UNIT- II: Storage of solid waste, Collection of Solid Waste: Primary and secondary collection, type of waste collection systems- Hauled and Stationary collection system, Waste handling and Processing: unit operations used for separation and processing, materials recovery, Transfer and Transport of solid waste, transfer station.

UNIT-III: Solid waste transformation :aerobic and anaerobic composting, combustion, Thermal conversion- Incineration and pyrolysis system, Gasification, RDF- recovery of energy from conversion products. Energy recovery systems, Solid waste disposal- Land farming, deep well injections, Landfills: Site selection, method, drainage and leachate collection systems, requirements and technical solutions.

UNIT–IV: Definition and identification of hazardous wastes, toxicology principles, sources and characteristics, hazardous wastes in Municipal Waste, Hazardous waste management, Introduction of Biomedical waste and E-waste, Hazardous waste regulations.

UNIT –V: Integrated solid waste management, Overview of solid waste management practices- National and International- Case studies, solid waste management practices adopted in industries- overview and case studies. Technological advancements in solid waste management.

Learning Resources:

1. ***Solid Waste Management: Foundations, Recycling Pathways, and Sustainable Practices Edition: 1st Edition, 2026 Editors: Zhao Youcai, Zhou Tao***
2. ***Solid Waste Management Challenges and Recent Solutions, 1st Edition, 2025 Editors: Rajeev Pratap Singh et al. CRC Press (Taylor & Francis)***
3. *Solid Waste Management – Recent Advances, New Trends and Applications*, 1st Edition, 2023 Intech Open (Open Access) Pengzhong Li Tongji University, China
4. *Solid Waste and Landfills Management – Recent Advances, 1st edition, 2023*, IntechOpen (Open Access), Subaiza Hanim Zailani, University of Malaya, Malaysia
5. P. A. Vesilind, Worrell W and Reinhart, "Solid Waste Engineering", Cengage Learning India Pvt. Ltd. 2nd Edition, 2016.
6. Tchobanoglous, "Integrated Solid Waste Management", Mc-Graw Hill International, 1st Edition, New York, 2014.
7. <https://archive.nptel.ac.in/courses/105/103/105103205/>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1 No. of Internal Tests	: 2	Max. Marks for each Internal Test	: 30
2 No. of Assignments	: 3	Max. Marks for each Assignment	: 5
3 No. of Quizzes	: 3	Max. Marks for each Quiz Test	: 5

Duration of Internal Tests

VASAVI COLLEGE OF ENGINEERING (Autonomous)
ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

BASICS OF JAVA PROGRAMMING

(OPEN ELECTIVE-II)

SYLLABUS FOR B.E. IV-SEMESTER (COMMON FOR CIVIL, ECE, EEE & MECH)

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : U25OE410CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES	
	<i>On completion of the course, students will be able to</i>	
1 Apply object oriented principles for developing an application using Java constructs.	1	Adopt the fundamentals of Object oriented system development for developing a application.
2 Design GUI using existing Java classes and interfaces.	2	Apply basic features of OOP to design an application.
	3	Employ runtime error handling, concurrent programming practices to develop a parallel processing application.
	4	Perform string handling operations
	5	Implement read and write operations using console and files IO streams.

CO-PO and CO-PSO mapping															
CO	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	3	2	3									3		
CO2	2	3	3	3									3		
CO3	2	3	3	3	1								3	1	
CO4	2	3	3	3	1								3	1	
CO5	2	3	2	3									3		

UNIT-I: Object Oriented System Development: Understanding Object Oriented Development, Understanding Object Concepts, Benefits of Object Oriented Development.

Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables and Arrays, Operators, Control Statements.

UNIT-II: Building blocks of OOP: Classes and Methods, Constructor,

Parameterized constructor, Garbage Collection, this, static, final keywords, Inheritance, types of inheritance, Method Overriding, Abstract class, Nested class, Interface, Package.

UNIT-III: Exception Handling: try, catch, throw, throws, finally, creating user defined exceptions

Multithreaded Programming: Types of Thread creation, multiple threads, isalive, join, thread priority, Thread Synchronization, Inter process communication.

UNIT-IV: String Handling: String constructors, operations, character extraction, comparison, search, modification. StringBuffer, methods, StringBuilder, StringTokenizer

Util: Date, Calendar, Random, Timer, Observable

UNIT-V: IO Streams: Files and Directories, I/O Classes and Interfaces, Byte Streams classes and Character Stream classes

Learning Resources:

1. Herbert Schildt, The Complete Reference Java, 7th Edition, Tata McGraw Hill 2005.
2. P. Radha Krishna, Object Oriented Programming through Java, Universities Press, 2007.
3. Sachin Malhotra, Saurabh Choudhary, Programming in Java, 2nd Edition, Oxford Press, 2014.
4. <https://docs.oracle.com/javase/tutorial/java>

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests : 1 Hour 30 Minutes						

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

MATHEMATICAL COMPUTING FOR AI & ML WITH PYTHON

Stream- Artificial Intelligence & Machine Learning

(OPEN ELECTIVE-II)

(COMMON for CIVIL, ECE, EEE & MECH) SYLLABUS FOR B.E IV SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code:U25OE420CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course objective	Course outcomes
Students should be able to 1. Implementation with Python for mathematical computation to deepen the knowledge.	At the end of the course, students will be able to 1. Develop a deep understanding of array usage with Numpy 2. Understanding and Analysing the Pandas Dataframe. 3. Basic concepts of data visualization and its importance in data analysis 4. Solve real life problem using the Linear Regression technique 5. Data representation using Scikit-learn library in Python

CO-PO and CO-PSO mapping																
CO	PO												PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2	1	2	1	1								2		2	
CO2	2	2	2	2	2								2		3	
CO3	3	2	3	2	2								2		3	
CO4	3	2	2	2	1								2		3	
CO5	3	2	2	2	2								2		3	

UNIT-I

Numpy Fundamentals: Creating arrays, array indexing, Basic Array Operations, one dimensional and n dimensional array, Creating Matrices using Numpy arrays, Matrix multiplication.

UNIT-II

Introduction to Pandas: Importing Pandas, Read CSV Files, Analysing Data, Cleaning Data, Pandas Data Structures- Series and Dataframe, Data Correlation.

UNIT-III

Data Visualization: Introduction to matplotlib, Data exploration with matplotlib- Loading the data, Pie chart, Scatter plot, Box Plot, Bar Chart, 3D plot.

UNIT-IV

Regression: Introduction to Regression, Linear Regression, Multiple Linear Regression, Polynomial Regression, Logistic Regression

UNIT-V

Scikit Learn – Introduction, Import packages and classes, Dataset Loading, Splitting the Dataset, Train the Model, Simple Linear Regression With scikit-learn, Multiple Linear Regression With scikit-learn.

Learning Resources:

1. Python Packages By Tomas Beuzen, Tiffany Timbers, 1st edition in 2022 by Chapman & Hall
2. Lambert K.A, Fundamentals of Python –First Programs, 1st Edition(2015), Cengage Learning India
3. Python for Data Analysis: Data Wrangling with pandas, NumPy, and Jupyter, Third Edition by Wes McKinney in 2022 published by Oreilly.
4. Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow 2 by by Sebastian Raschka (Author), Vahid Mirjalili by packt publication on December 2019.
5. <https://www.udemy.com/course/machine-learning-basics-building-regression-model-in-python/>
6. <https://www.geeksforgeeks.org/data-visualization-with-python/>

The break-up of CIE : Internal Tests + Assignments + Quizzes

- | | | | | |
|---|------------------------|---|------------------------------------|---|
| 1 | No. of Internal Tests: | <div style="border: 1px solid black; padding: 2px 10px;">02</div> | Max.Marks for each Internal Tests: | <div style="border: 1px solid black; padding: 2px 10px;">30</div> |
| 2 | No. of Assignments: | <div style="border: 1px solid black; padding: 2px 10px;">03</div> | Max. Marks for each Assignment: | <div style="border: 1px solid black; padding: 2px 10px;">5</div> |
| 3 | No. of Quizzes: | <div style="border: 1px solid black; padding: 2px 10px;">03</div> | Max. Marks for each Quiz Test: | <div style="border: 1px solid black; padding: 2px 10px;">5</div> |
- Duration of Internal Test: 1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Mathematical Programming for Numerical Computation

Open Elective-II SYLLABUS FOR B.E. IV SEMESTER

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U25OE410EE
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to: To provide fundamental knowledge of programming language for solving problems.	On completion of the course, students will be able to 1. Generate arrays and matrices for numerical problems solving. 2. Represent data and solution in graphical display. 3. Write scripts and functions to easily execute series of tasks in problem solving. 4. Use arrays, matrices and functions in Engineering applications 5. Design GUI for basic mathematical applications.

CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	2								1
CO2	3	2	2								1
CO3	3	2	2								1
CO4	3	2	2								1
CO5	3	2	2								1

UNIT - I : Introduction:

Basics of MATLAB, MATLAB windows, Advantages of MATLAB, on- line help, file types.

MATLAB Basics: Variables and Constants – Vectors and Matrices- Arrays - manipulation- Built-in MATLAB Functions. Creating and printing simple plots, Creating ,Saving and Executing a Script File, Creating and Executing a function file.

Programming Basics: Data types-Operators – Hierarchy of operations, Relational and logical operators, if-end structure, if- else-end structure, if-elseif-else-end structure, switch-case statement, for-end loop, while-end loop, break and continue commands.

UNIT - II : Scripts and Functions

Script Files, Function Files, Debugging methods in MATLAB. Graphics: Basic 2D plots: Printing labels- grid and axes box- Entering text in a box- Axis control-Style options-Multiple plots- subplots-specialized 2D plots: stem-,bar,

hist, pi, stairs, loglog , semi log ,polar ,comet 3D plots:
Mesh,Contour,Surf,Stem3,ezplot.

UNIT - III : Numerical Methods Using MATLAB

Numerical Differentiation, Numerical integration- Newton-Cotes integration formulae, Multi-step application of Trapezoidal rule, Simpson's 1/3 Rule for Numerical Integration. MATLAB functions for integration.

Linear Equations- Linear algebra in MATLAB, Solving a linear system, Gauss Elimination, Finding eigen values and eigen vectors, Matrix factorizations, Advanced topics.

UNIT - IV : Nonlinear Equations

System of Non-linear equations, Solving System of Equations Using MATLAB function fsolve, Interpolation-Lagrange Interpolation, Two dimensional Interpolation, Straight line fit using Least Square Method, Curve fitting using built-in functions polyval and polyfit , cubic fit using least square method. Finding roots of a polynomial - roots function, Newton-Raphson Method.

UNIT - V :

Solution of Ordinary differential Equations(ODEs)-The 4th order Runge-kutta Method, ODE Solvers in MATLAB, Solving First – order equations using ODE23 and ODE45.

Structures and Graphical user interface(GUI):Advanced data Objects, How a GUI works, Creating and displaying a GUI. GUI components, Dialog Boxes.

Learning Resources:

1. Getting started with MATLAB "A quick introduction for scientist and engineers by RudraPratap, Oxfordpublications.
2. Advanced Guide to MATLAB-Practical Examples in Science and Engineering by S.N.Alam, S.Islam, S.K. Patel-I.K. International Publishing House Pvt.Ltd.
3. Stephen J. Chapman-"MATLAB Programming for Engineers"- 5th Edition- Cengage Learning- 2015. Getting started with MATLAB (Version 9) The Mathworks.
4. An Introduction to MATLAB® Programming and Numerical Methods for Engineers 1st Edition by Timmy Siau Alexandre Bayen, Elsevier-18th April2014.
5. <https://nptel.ac.in/courses/103106118/2>

The break-up of CIE : Internal Tests+ Assignments + Quizzes

- | | | | |
|--------------------------|-----|-----------------------------------|------|
| 1. No. of Internal Tests | : 2 | Max. Marks for each Internal Test | : 30 |
| 2. No. of Assignments | : 3 | Max. Marks for each Assignment | : 5 |
| 3. No. of Quizzes | : 3 | Max. Marks for each Quiz Test | : 5 |

Duration of Internal Tests :90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF INFORMATION TECHNOLOGY

OBJECT ORIENTED PROGRAMMING USING JAVA

(GENERAL POOL : OPEN ELECTIVE-II)

(Common for CIVIL, ECE, EEE & MECH) SYLLABUS FOR B.E. IV SEMESTER

L:T:P (Hrs/week):3:0:0	SEE Marks: 60	Course Code: U25OE410IT
Credits: 3	CIE Marks: 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course: Explain the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, building simple GUI applications.	On completion of the course, students will be able to 1. Understand fundamental concepts in Object oriented approach. 2. Develop object-oriented programs using the concepts of exception handling. 3. Demonstrate the usage of Java I/O streams to handle user input and output. 4. Design and develop GUI programs. 5. Develop applets for web applications.

UNIT- I

Java Programming Fundamentals: Introduction, Overview of Java, Data types, Variables-scope and lifetime, Operators, Control statements, Structure of a Java class, Classes, Methods, Inheritance, and Command Line Arguments.

Arrays: One-dimensional arrays, creating an array, declaration of arrays, initialization of arrays, two-dimensional arrays.

Packages: Creation, importing a package and user defined package.

Interfaces: Defining interfaces, extending interfaces, implementing interfaces.

UNIT- II

Exception Handling: Introduction, types of exceptions, syntax of exception handling code, multiple catch statements, using finally statement, user-defined exceptions.

UNIT- III

Basic I/O Streams: Java I/O classes and interfaces, Files, Stream and Byte classes, Character Streams.

Exploring java.lang: Object, Wrapper classes, String, StringBuffer, System

UNIT- IV

Introducing Awt, Awt Controls:

Event Handling: The Delegation Event Model, Event Classes, Source of Events, Event Listener Interfaces.

Control Fundamentals, Labels, Using Buttons, Applying Check Boxes, Checkbox Group, Choice Controls, Using Lists, Managing Scroll Bars, Using Text Field, Using Text Area, Understanding Layout Managers, Menu bars and Menus, Dialog Boxes, File Dialog, Exploring the controls, Menus ,and Layout Managers.

UNIT-V

Applet Programming: Introduction, how applets differ from applications, building applet code, applet life cycle, HTML Applet tag, passing parameters to applets.

Learning Resources:

1. Herbert Schildt, The Complete Reference Java, 7th Edition, Tata McGraw Hill, 2006.
2. James M Slack, Programming and Problem solving with JAVA, Thomson Learning, 2002.
3. C Thomas Wu, An Introduction to Object Oriented Programming with Java 5th edition, McGraw Hill Publishing, 2010.
4. Y. Daniel Liang , An Introduction to JAVA Programming, Tata McGraw Hill, 2009.
5. Kathy Sierra, Head First Java, 2/e, Shroff Publishers, 2012.
6. <https://docs.oracle.com/javase/tutorial/>
7. <https://nptel.ac.in/courses/106105191/>

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Tests	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5
Duration of Internal Tests		:	90 Minutes			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031

DEPARTMENT OF INFORMATION TECHNOLOGY

Essentials of Mathematics for Machine learning using Python

(AI&ML Stream : Open Elective-II)

(Common for ECE, EEE, MECH & CIVIL) SYLLABUS FOR B.E IV-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: U25OE420IT
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

Course Objectives	Course Outcomes
The course will enable the students to: Introduce the essential maths principles of linear algebra, vector calculus, probability theory and statistical methods along with exposure to Python libraries for understanding and applying machine learning to real-world problems.	At the end of the course student will be able to: 1. Understand the fundamentals of linear algebra – vectors and matrices. 2. Understand and apply various matrix norms, Eigenvectors and PCA techniques. 3. Understand basics of derivatives, integrals and optimization. 4. Understand various data distributions and apply probabilistic techniques to handle uncertainty. 5. Define basic descriptive and inferential statistical measures.

Unit-1 Basics of Linear Algebra

- Scalars, Vectors, Matrices, Tensors for Data Representation and Analysis
- Matrix Analysis (Rank, Determinant, Trace, Orthogonal basis & Inverse)
- Operations: Addition, Subtraction, Scalar Multiplication, Matrix Multiplication, Dot Product, Cross Product Feature Interactions for Data Manipulation
- Python experiments

Unit-2 Matrix

- Matrix Norms: L0 Norm, L1 Norm, L2 Norm; Linear Regression & Regularization
- Eigenvalues and Eigenvectors, Principal Component Analysis
- Python experiments

Unit-3 Vector Calculus

- Derivatives and Gradients
- Differential Operators - Laplacian operator, Gradient operator: for Gradient Descent in Optimization
- Integrals for cumulative distribution function
- Python Experimentation

Unit 4 Probability Theory

- Define Random Variables, Probability Distributions – Gaussian, Bernoulli, Binomial, and Poisson distributions model specific types of events
- Bayes' theorem, uncertainty modelling - updating beliefs based on observed evidence
- Python Experiments

Unit -5 Statistical Methods

- Descriptive Statistics - Expectation, Variance and Covariance
- Central Limit Theorem – Sampling distribution
- Inferential Statistics - Hypothesis Testing – Chi square test, T-Test
- Python Experiments

Learning Resources:

1. Mathematics for Machine Learning, by Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong, Cambridge University Press, 2020.
2. Mathematical Foundation for Machine Learning and AI,
<https://www.udemy.com/course/mathematical-foundation-for-machine-learning-and-ai/>
3. Essential Mathematics for Machine Learning:
https://onlinecourses.nptel.ac.in/noc21_ma38/preview

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

OPERATIONS RESEARCH

(General Pool : Open Elective-II) SYLLABUS FOR B.E. IV-SEMESTER

Instruction : 3Hrs /week	SEE Marks : 60	Course Code : U25OE420ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course Objectives	Course Outcomes
The objectives of this course are to: understand the application of mathematics for real time problem solving to LPP, sensitivity analysis under set of constraints, applying mathematical techniques to solve transportation problem and assignment problems, applying time value money and ignoring the same to find the optimal replacement of machines, applying Johnsons rules to find the best sequence to minimize elapsed time and minimum no of servers to minimize waiting time of the customers and optimal utilisation of servers.	On completion of the course, the student will be able to: 1. Apply optimization in multidisciplinary areas through linear programming under different working conditions. 2. Analyze linear programming for a dynamic changes of a customer requirements to suit various Organizations. 3. Reduce total cost to apply for transportation techniques for the transshipment of Goods and products for a product based industry. 4. Estimate the time for replacement of a machine by considering or ignoring time value of money using individual/group replacement policy. 5. Estimate elapsed time for sequencing problem processed through different machines. Minimize waiting time of the customer and optimization of no. of servers.

CO-PO and CO-PSO mapping														
CO	PO mapping										PSO mapping			
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	1	3	2	1	2			1	2		2	1	2	1
CO2	1	3	2	1				1	2		2	1	2	1
CO3	1	3	2	2	1			1	2		2	1	2	1
CO4	1	3	2	1				1	2		2	1	2	1
CO5	1	3	2	2	1			1	2		2	1	2	1

UNIT – I

Introduction: Definition and scope of operations research.

Linear programming: Introduction, Formulation of linear programming problems, graphical method of solving LP problem, Simplex method, maximization and minimization, degeneracy in LPP, unbounded and infeasible solutions. Introduction of software to solve LPP.

UNIT – II

Duality: Definition, Relationship between optimal primal and dual solutions. Economic interpretation, Post optimal analysis (restricted to variation of resources i.e., RHS), Dual simplex method.

Transportation model: Finding an initial feasible solution– north west corner method, least cost method, Vogel's approximation method, finding the optimal solution, optimal solution by stepping stone and MODI method, special cases in transportation problems – Unbalanced transportation problem.

UNIT-III

Assignment Problem: Hungarian method of assignment problem, maximization in assignment problem, unbalanced problem, problems with restrictions, travelling salesman problem.

Replacement models: Introduction, Replacement of items that deteriorate ignoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly – individual replacement policy, group replacement policy.

UNIT-IV

Game theory: Introduction, 2 person zero sum games, maximin– minimax principle, principle of dominance, solution for mixed strategy problems graphical method for $2 \times n$ and $m \times 2$ games.

UNIT-V

Sequencing models: Introduction, General assumptions, processing n jobs through 2 machines, processing n jobs through m machines processing 2 jobs through n machines.

Queuing theory: Introduction, Single channel – Poisson arrivals – exponential service times with infinite population and finite population.

Learning Resources:

1. Hamady A. Taha, "Operations Research – An introduction", 6th Edition, PHI Pvt. Ltd., 1997.
2. S.D. Sharma, "Operations Research", Kedarnath, Ramnath & Co., Meerut, 2009.
3. Harvey M. Wagner, "Principles of Operations Research", 2nd Edition, PHI Pvt. Ltd., 1980.
4. V.K. Kapoor, "Operations Research", S. Chand Publishers, New Delhi, 2004.
5. S.S. Rao, "Engineering Optimization – Theory and Practice", 4th Edition, John Wiley & Sons Inc., 2009.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05
Duration of Internal Test: 90 Minutes				

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

Kinematics and Dynamics of Robotics (Open Elective-II)

(Stream: Robotics)

SYLLABUS FOR B.E. IV – SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U25OE420ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE	COURSE OUTCOMES
The objective of the course is to To develop the fundamental knowledge and skills required to analyze, design and control robotic systems	On completion of the course, students will be able to 1. Analyze the kinematics of robotic systems and apply them to solve real world problems 2. Apply differential kinematics and statics concepts to design and control robotic systems 3. Analyze the dynamics of serial manipulators using lagrangian method. 4. Analyze the dynamics of serial manipulators using lagrangian and Newton-Euler mechanics 5. Generate and analyze robot trajectories for various applications

CO-PO and CO-PSO mapping														
CO	PO mapping											PSO mapping		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	2	2	2			2		2	2		2	3	2	1
CO2	2	2	2			2		2	2		2	3	2	1
CO3	3	3	3			3		3	3		2	3	2	1
CO4	3	2	2		3	3	3	2	2	3	3	3	2	1
CO5	2	2	2		2	2	2	2	2	2	2	3	2	1

UNIT-I

Robot Kinematics

Forward Kinematics: Forward/direct kinematic analysis of serial manipulators.

Inverse Kinematics: General properties of inverse kinematic solution.

Inverse kinematics of serial manipulators.

UNIT-II

Differential Kinematics

Linear and angular velocity of links, Manipulator Jacobian for serial manipulators, Jacobian Singularities.

UNIT-III

Static Analysis: Force and moment balance.

Dynamics of serial manipulators

Lagrangian formulation for equations of motion for RP, RR serial manipulators,

Unit-IV

Dynamics of serial manipulators

Recursive dynamics using Newton-Euler formulation of RP and RR serial manipulator.

UNIT-V

Trajectory Generation

Joint-Space Techniques: Cubic Polynomial Trajectories, Linear Segments with Parabolic Blends-without and with via points

Cartesian-Space Techniques: Straight line path, Circular Path, Position Planning, Orientation Planning.

Learning Resources:

1. Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo, "Robotics: Modelling, Planning and Control", Springer Science & Business Media, 2010.
2. M.W.Spong and M.Vidyasagar, "Robot Dynamics and Control", 1st Edition, John Wiley and sons, 1990.
3. R.K.Mittal and I.J.Nagrath, "Robotics and Control", Tata McGraw-Hill, 2003.
4. Subir Kumar Saha, "Introduction to Robotics", Tata McGraw-Hill Education, 2014.
5. Howie M. Choset, Seth Hutchinson, Kevin M. Lynch, "Principles of Robot Motion: Theory, Algorithms, and Implementation", MIT Press, 2005.

The break-up of CIE: Internal Tests+ Assignments + Quizzes

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	05
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	05
Duration of Internal Test: 90 Minutes				

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Product Development and Validation

(Stream: Entrepreneurship) (Open Elective - II) SYLLABUS FOR B.E. IV SEM

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: U25OE410EH
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE	COURSE OUTCOMES
The objective of the course is to: 1. Apply design thinking to identify and solve real-world problems. 2. Build and refine prototypes and MVPs using iterative methods. 3. Validate ideas through customer feedback and market testing. 4. Understand legal, marketing, and strategic aspects of product launch.	On completion of the course, students will be able to: 1. Apply design thinking to frame problems and generate solutions. 2. Build and iterate MVPs using prototyping tools. 3. Validate ideas through user feedback and market insights. 4. Assess legal, marketing, and launch strategies for a product.

CO-PO and CO-PSO mapping														
CO	PO											PSO		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1	1	2	2	2				2		1			1	
CO2	1	2	2					2		1		1		1
CO3		1			1			2	1					
CO4													1	
AVG.	1	1.7	2	2	1			2	1	1		1	1	1

UNIT-I: Design Thinking and Innovation

Design Thinking Methodology: Empathize, Define, Ideate, Prototype, Test Techniques for Fostering Innovation Empathy Mapping, User Personas, and Problem Identification Creative Ideation and Brainstorming Techniques Case Studies of Innovation (e.g., IDEO, Airbnb, Apple)

UNIT-II: Prototyping and MVP Development Types of Prototypes: Low-fidelity vs. High-fidelity, Steps to Create a Minimum Viable Product (MVP), Prototyping Tools (Figma, Adobe XD, Balsamiq), Agile and Lean Methods in MVP Development, User-Centered and Iterative Design Processes, Wireframes, Usability Testing, and Mockups

UNIT-III: Customer Validation

Introduction to Customer Discovery and Validation, Conducting Effective Customer Interviews, Designing and Distributing Surveys (Google Forms, Typeform), Analyzing Feedback: Qualitative and Quantitative Methods, Iterative Product Refinement Based on Feedback, Tools for Customer Insight and Behavior Analysis

UNIT-IV: Market Testing and Product Launch

Early Market Entry Strategies, Beta Testing and Market Feedback Loops, Pivoting and Iteration Based on Market Response, Digital Marketing Techniques: SEO, SEM, Social Media, Product Launch Strategies and Go-to-Market Planning, Distribution Channels and Customer Acquisition, Basics of digital marketing and branding, Sales strategies and negotiation techniques, Operational challenges and logistics, Growth strategies and market expansion

UNIT-V: Legal and Strategic Considerations

Intellectual Property Rights: Patents, Copyrights, Trademarks, Regulatory Compliance and Industry Standards, Choosing the Right Legal Structure for Startups, Product Liability and Risk Management, Performance Monitoring and Key Metrics (NPS, Retention, Churn), Post-launch Support and Strategic Planning

Learning Resources:

1. *The Lean Startup* – Eric Ries, Crown Business (2011)
2. *Business Model Generation* – Alexander Osterwalder & Yves Pigneur, Wiley (2010)
3. *New Product Development* – P. Gopalkrishnan & V.E. Rama Moorthy, New Age International Publishers (1997)
4. *The Mom Test* – Rob Fitzpatrick, Robfitz Ltd. (2013)
5. *Sprint* – Jake Knapp with John Zeratsky & Braden Kowitz, Simon & Schuster (2016)
6. *Change by Design* – Tim Brown, HarperBusiness (2009)

The break-up of CIE: Internal Tests+Assignments + Quizzes

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	02	Max. Marks for each Assignment:	05
3	No. of Quizzes:	02	Max. Marks for each Quiz Test:	05
Duration of Internal Test: 90 Minutes				

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS) HYDERABAD
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

FINTECH (BFSI)

OPEN ELCTIVE SYLLABUS- COMMON TO ALL BRANCHES IV SEMESTER

Instruction: 2 Hours	SEE: 60	Course code: U25OE350EH
Credits: 2	CIE: 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
By the end of the course, learners will be able to: 1. To gain understanding of structure of financial markets 2. To gain understanding of Risks and Return in financial markets 3. To understand the concepts and applications of Fintech 4. To understand the Payments and Settlements system 5. To gain understanding of Crypto Currencies	On completion of the course, learners will be able to: 1. Differentiate between capital and money market. 2. Measure risk in financial markets. 3. Identify the interaction between banking services and Technology. 4. To understand the players Payments and Settlements. 5. Differentiate between various types of crypto currencies

UNIT 1 (8 HOURS) OVERVIEW OF FINTECH

Overview of Fintech: Concept – Meaning – Evolution of Fintech - Significance – Drivers of fintech – Areas of Fintech – Fintech Opportunities and Challenges – Keyplayers in the Fintech ecosystem - Recent Developments in Fintech

UNIT 2 (6 HOURS) FINTECH IN BANKS

Fintech in Banks – Traditional Vs Digital Banks- Neo Banks – Use of technology for banking operations like KYC, lending, real time access to bank accounts- fraud detection - Chatbots in Banking – Benefits of Fintech in Banking- RBI guidelines on Fintech in Banking.

UNIT 3 (7 HOURS) OPEN BANKING

Definition- Difference between Open banking and conventional banking – Evolution of Open Banking Technology – Driving forces of Open banking – Benefits of Open Banking – Challenges of Open Banking - Key players – Components – Role of APIs - Working framework of Open Banking – Standards in Open Banking - Use cases in Open Banking

UNIT 4 (10 HOURS) PAYMENT SYSTEMS

Payment systems- concept and importance – Technology adoption in payment systems- Settlement Systems – Concept – Technology in

Settlement systems – Players in Payments and Settlement Systems- Study of RBI's UPI and IMPS – Regtech Ecosystem.

UNIT 5 (5 HOURS) DIGITAL CURRENCIES

Digital Currencies – Concept of Crypto currency - Use of Blockchain and other technologies in Digital currency- Central Bank Digital Currencies – Concept – Use cases – Advantages and Disadvantages of CBDCs- Digital wallets Vs.Digital currencies. Use cases like AmazonPay, Whatsapp Pay etc
 Assignments Students to do a study on various players in the Fintech Ecosystem Student to take up one UPI platform and present a report linking Open banking and the eco system

LEARNING RESOURCES

Text Books: Rajiv Shrivastava and Anil Misra, 'Financial Management', Oxford Higher Education (Units 1&2) Sofie Blakstad, 'Fintech Revolution', Palgrave Macmillan.

The break-up of CIE: Internal Tests + Assignments + Quizzes

1	No. of Internal tests	:	2	Max.Marks	:	30
2	No. of assignments	:	3	Max. Marks	:	5
3	No. of Quizzes	:	3	Max. Marks	:	5

Duration of Internal Tests : 90 Minutes

Duration for SEE : 180 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

FINANCE MANAGEMENT FOR ENGINEERS

SYLLABUS – COMMON TO ALL BRANCHES IV SEMESTER

Instruction: 3 Hrs/Week	SEE Marks: 60	Course code: U25OE410EH
Credits: 3	CIE Marks: 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to 1. To introduce basic principles of finance and accounting relevant to engineering. 2. To develop the ability to interpret financial statements and assess financial performance. 3. To equip students with tools for cost estimation, budgeting, and financial planning in projects. 4. To familiarize students with concepts of investment analysis and capital budgeting. 5. To enable understanding of economic feasibility and risk analysis in engineering decisions.	At the end of the course the learners will be able to: - 1. Understand and apply basic financial terminology, concepts, and statements. 2. Analyze and interpret balance sheets, income statements, and cash flow reports. 3. Estimate project costs, prepare budgets, and conduct break-even analysis. 4. Evaluate investment options using NPV, IRR, and payback period methods. 5. Assess the financial viability and risks of engineering projects and make informed decisions.

Unit-I: Introduction

Why Finance – Difference between finance and accounts – Role of finance in contemporary business – Goals of financial management – Risk Return Trade off – Time Value of Money (Simple numerical problems on PV and FV) - BS, P&L, CF (Only structure) – Components and importance – diff between capex and opex.

Unit-II: Sources of Finance

Sources of fin Information – Company Annual Reports, Government (Budget highlights), Analysts and Regulators (RBI and SEBI only) - Debt Vs Equity – Effect of Leverage – Measurement of Cost of Debt and Equity-WACC- (Simple Numerical Problems on Cost of Debt)

Unit-III: Financial Performance Assessment (MS Excel Based)

Ratio Analysis – Activity, Liquidity and Profitability Ratios – Comparing with Industry average and interpret the results - Financial Modelling – Concept, Types. Creating Capital Structure Model Using MS Excel with given data.

Unit - IV: Project Finance

Importance of Project Finance - Project Cost and Means of Finance - Contents of a Project Report – Technical and Environmental Aspects – Commercial and Financial Viability - Projected Financials, Sensitivity Analysis – Replacement Projects.

Unit-V: International Finance (Only Theory)

Difference between Domestic and International Finance - Currency exchange Rates regimes- Factors affecting currency exchange rates-Spot and Forward Rates - Currency Forwards, Futures and Swaps - Components of Balance of Payments.

Prescribed Text Books :

Financial Management, I M Pandey, Pearson Ed, ISBN 9789390577255

Financial Management - Theory, Concepts and Problems, R P Rustagi, Taxmann Publications.

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2	No. of assignments	:	3	Max. Marks	:	5
3	No. of Quizzes	:	3	Max. Marks	:	5
Duration of Internal Tests		:	90 Minutes			
Duration for SEE		:	180 Minutes			

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Academic Activity Planner/Calendar for the Academic Year 2026-27

S.No.	Date	Activities planned
1	20-07-2026 to 29-07-2026	FDP on Artificial Intelligence and Its Applications in Electronics and Communication Engineering
2	01-08-2026	Inauguration of Vasavi ISNT Club
3	17-08-2026 to 21-08-2026	FDP on AI Tools for Teaching and Learning in association with NITTTR, Chandigarh.
4	19-08-2026	Guest lecture by industry expert - Dr. C. Sulakshana, IEEE, Hyd.
5	22-08-2026	Alumni Guest lecture – 1 on “Career Guidance” by Kalyan Vemuru, Director, Software Engineer at Optum.
6	29-08-2026	Awareness on Library Learning Resources, by Dr. Ravikumar, Librarian, VCE
7	05-09-2026	Online coding competition in the Hacker Rank platform in Association with IEEE CAS
8	08-09-2026	Industry Visit - INCOIS PRAGNA
9	11-09-2026	Guest Lecture on “PCB Layout design using Kicad” by Dr. M. Shyam Sundar, Associate Professor, ECE, OU.
10	11-09-2026	Guest lecture on “Satellite Communication” by P. Rangaswamy, former Director, DDH.
11	12.09.2026	Industry Visit to IRISIT
12	19-09-2026	Guest Lecture on “Introduction to Enterprise Agile Product Management” by Mr. G. Bhanu Chander, Vice President, M/s. Wells Fargo, Hyderabad.
13	23-09-2026	Workshop on EM Simulation tools – Swapnil Gaul, Tarang Software
14	26-09-2026	Alumni Guest lecture – 2 lecture on skills for career growth Manoj Kumar Infrastructure Engineer principal global services.
15	03-10-2026	Alumni Guest lecture – 3 on “Career Guidance” by Vinay Garu, Director, SRE Optum.
16	03-10-2026	Microwave Component & Antenna Design Competition
17	15-10-2026	Guest Lecture on “HAMRADIO using SDR platform” by Mr. R. Sharath, Mr. R. Anil, Hyderabad
18	17-10-2026	Code Clash – IEEE Day Celebrations 2027 IEEE in Association with IEEE
19	24-10-2026	Guest Lecture on “Financial Literacy” by Mr. Srinidhi Rao, Managing Director, Naviture Financial Services Pvt. Ltd., Hyderabad.

20	31-10-2026	Alumni Guest lecture – 4 on “Acoustic noise cancellation” by C. Vanitha, Research Scholar NIT-Warangal.
21	02-11-2026	AI Tools usage for RF Engineers
22	07-11-2026	Essay writing competition on usage of AI and professional ethics in association with IETE Students Forum (ISF)
23	07-11-2026	IEEE Project Expo
24	07.11.2026	Industry Visit to IRISSET
25	02-01-2027	Introduction and objectives of CCA activities, Introduction of Technical Proposal which mainly focuses on the development of technical skills in students through projects, workshops and technical talks in various domains
26	21-01-2027	Industry Visit to NRSC, Balanagar.
27	23-01-2027	Circuit IQ – Test Your Circuit Intelligence in Association with IEEE
28	30-01-2027	Alumni Guest lecture – 5 on “Latest Technologies in Core” by T. Pavan Kalyan Analog Design Engineer in MOSCHIP Technologies
29	06-02-2027	Guest lecture by industry expert by Dr. Srinivas Kuchipudi, ASL, Hyd.
30	06-02-2027	Industry Visit to IRISSET
31	12-02-2027	Industry Visit TO RGIA Hyd.
32	20-02-2027	Invited talk on Recent trends in industrial growth by Dr. K. Krishna Kishore, Director AI-Powered Business Expansion, Houses of Companies-T-hub, Hyd.
33	27-02-2027	Extempore Competition in association with IETE Students Forum (ISF)
34	10-03-2027	Hands on Workshop on “Antenna Design for HAMRADIO”
35	12-03-2027 13-03-2027	3rd Edition of International Conference on Advanced Technologies in Electronics, Communication Engineering and Signal Processing (ICATECS-2027)
36	20-03-2027	Alumni Guest lecture - 6 on “Career Guidance” by Mr. Neeraj, Alumni VCE.
37	27-03-2027	“Contest on Verilog Coding” in association with VLSI Club
38	31-03-2027	IEEE Project Expo
39	03-04-2027	Poster presentation on “AI in healthcare” in association with IETE Students Forum (ISF).
40	03-04-2027	Guest lecture by industry expert by Mr. Sandeep, Unistring Technologies
41	04-04-2027	Industry Visit to IRISSET