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) V and VI Semesters With effect from 2026-27 (For the batch admitted in 2024-25) (R-24)

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.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS) :: IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION **(R-24)** :: B.E. - ECE : FIFTH SEMESTER (2026 - 27)

B.E (ECE) V – SEMESTER								
Course Code	Name of the Course	Scheme of Instruction			Duration in Hrs	Scheme of Examination		
		Hours per Week				Maximum Marks		Credits
		L	T	P		SEE	CIE	
THEORY								
U24PC510EC	Microprocessors and Microcontrollers	2	1	-	3	60	40	**3**
U24PC520EC	Integrated Circuits and Applications	3	-	-	3	60	40	**3**
U24PC530EC	Analog and Digital Communication Systems	2	1	-	3	60	40	**3**
U24PC540EC	Antennas and Wave Propagation	2	1	-	3	60	40	**3**
U24OE5XXXX	Open Elective - III	3	-	-	3	60	40	**3**
U24HS510EH	Skill Development Course-V: Communication Skills in English-II	1	-	-	2	40	30	**1**
U24PE510EC	Skill Development Course-VI: Technical Skills - II	1	-	-	2	40	30	**1**
U24HS530EH	Design Thinking	1	-	-	2	40	30	**1**
PRACTICALS								
U24PC511EC	Microprocessors and Microcontrollers Lab	-	-	2	3	50	30	**1**
U24PC521EC	Integrated Circuits and Applications Lab	-	-	2	3	50	30	**1**
U24PC531EC	Analog and Digital Communication Systems Lab	-	-	2	3	50	30	**1**
U24PW519EC	Mini Project – II	-	-	2	-	50	30	**1**
	TOTAL	**15**	**3**	**8**		**620**	**410**	**22**
	GRAND TOTAL	**26**				**1030**		
Left over hours will be allocated for : **ECA-II** / Sports / Library / Mentor - Mentee Interaction / CC / RC / TC								
Note: Every Student shall complete one **NPTEL** course certification of 8 weeks duration (equivalent to 2 credits weightage) by the end of VI-Semester.								

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Microprocessors and Microcontrollers

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

L:T:P (Hrs./week): 2:1:0	SEE Marks : 60	Course Code: **U24PC510EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand the architecture, register organization, and memory segmentation of the 8086 microprocessor, including its operating modes and interrupt handling. 2. Learn the architecture and internal organization of the 8051 microcontroller and program its on-chip peripherals using Embedded C. 3. Develop skills to interface off-chip peripherals such as memory devices, sensors, displays, and motors with the 8051 microcontroller. 4. Gain knowledge of ARM processor architecture, including core data flow, processor modes, and exception/interrupt handling mechanisms. 5. Understand ARM memory management concepts, including virtual memory, MMU operation, memory management policies, and emerging AI applications in ARM SoCs.	On completion of the course, students will be able to 1. Explain the internal structure and operational features of the 8086 microprocessor and differentiate between minimum and maximum mode operations. 2. Write and debug Embedded C programs for the 8051 microcontroller to control timers, serial communication, and interrupts. 3. Design and implement hardware and software interfaces for off-chip peripherals like ADCs, DACs, LCDs, and motors with the 8051 microcontroller. 4. Analyze ARM processor architecture, including its modes of operation and interrupt handling for real-time embedded applications. 5. Demonstrate understanding of ARM memory management techniques and discuss the application of AI in optimizing ARM SoC performance.

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		2								3		
CO3	3	3	3		2								3	1	1
CO4	3	3		2									3	1	1
CO5	3	2		2									3	1	1

UNIT - I:

8086 Architecture: 8086 Architecture, Register Organization, Memory segmentation, Pin configuration, latching of address bus, Buffering of data bus. Minimum and Maximum mode operations; control signal interfacing for read and write operations; Organization of stack, Interrupt Vector Table

UNIT - II:

8051 Microcontroller and On chip Programming using embedded C: Architecture of 8051, Pin configuration, built-in ROM & RAM organization, Stack organization, Addressing modes Instruction set of 8051. 8051 Timers in different modes Programming in all modes, 8051 Serial data communication and Programming, Interrupt programming

UNIT - III:

8051 Microcontroller and OFF chip Programming using embedded C

Off-chip EPROM, SRAM, Sensor interface– ADC0804, ADC0808; DAC interface, Interfacing Seven-segment display, 2x16 LCD, 4x3 Matrix Keyboard, DC Motor, Stepper Motor. Interfacing and programming

UNIT - IV:

ARM Architecture, Exceptions and Interrupts: Evolution of ARM architecture, ARM's role in embedded systems and real-time applications, ARM Core Data flow model, Overview of ARM processor modes, General purpose registers and special registers, ARM Cortex-A vs Cortex-M. Exceptions and Interrupt Handling, Interaction between CPU and interrupt controller in ARM SoCs.

UNIT - V:

ARM Memory Management & Policies, Applications: Addressing modes (physical vs virtual addresses), Virtual memory concepts and paging basics, Memory Management Unit (MMU) role and configuration, Typical memory map layout on ARM Cortex-A SoCs. Memory Management Policies: Page replacement algorithms (LRU, FIFO, Clock), Memory allocation strategies (contiguous, paging, segmentation).

AI Relevance: AI-assisted branch prediction and pipeline scheduling, Machine learning for memory hierarchy optimization, Introduction to NPUs and neural accelerators in ARM SoCs, AI in hardware security and anomaly detection.

Learning Resources:

1. Learning Resources: 1. Ray A.K & Bhurchandhi K.M, "Advanced Microprocessor and Peripherals," 2/e, TMH, 2007.
2. Mazidi M.A, Mazidi J.G & Rolin D. Mckinlay, "The 8051 Microcontroller & Embedded Systems using Assembly and C," 2/e, Pearson Education, 2007.
3. Microcontrollers by Dr. Santhanu chatopadhya, IIT Kharagpur https://onlinecourses.nptel.ac.in/noc18_ec03/course
4. "ARM System Developer's Guide: Designing and Optimizing System Software" by Andrew N. Sloss, Dominic Symes, and Chris Wright

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 ELECTRONICS AND COMMUNICATION ENGINEERING

Integrated Circuits and Applications

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **U24PC520EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Student will : 1. Understanding basic IC amplifier concepts 2. Designing circuits with op-amps 3. Analysis and design of applications using IC regulators and 555 timer 4. Understanding analog-to-digital and digital-to-analog conversion 5. Analyze logic families and digital IC circuits	On completion of the course, students will be able to 1. Analyze IC based amplifiers 2. Illustrate the internal circuit, parameters and features of op-amp. 3. Design of linear and non-linear circuits using op-amp. 4. Design and analyze various applications using ICs, such as 555, 723. 5. Design and analyze applications using different combinational and Sequential circuits (IC's)

CO-PO/PSO Mapping

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

UNIT - I:

IC Amplifiers: Differential amplifier modes**,** basic current mirror, Wilson MOS mirror, Cascode amplifier (common source), Operational Transconductance amplifier.

UNIT - II:

Integrated Circuits and Op-Amp Applications: Chip Size and Circuit Complexity, Ideal and Practical Op-Amp, Op-Amp Characteristics - DC, AC-Slew Rate and Frequency Response, 741Op-Amp, Modes of Operation: Inverting, Non-Inverting and Differential.

Op-Amp Applications: Basic Applications of Op-Amp, Instrumentation Amplifier, Sample & Hold Circuits, Differentiators and Integrators, Comparators, Schmitt Trigger.

UNIT - III:

555 Timers: Functional Diagram, Monostable, Astable Operations and

Applications.
IC Regulators: Analysis and design of fixed voltage regulators & IC 723 voltage regulator

UNIT - IV:
Data convertors : Basic DAC Techniques – Weighted Resistor Type, R-2RLadder Type, Inverted R- 2R Type DAC's Different types of ADCs – Parallel Comparator Type, Successive Approximation Register Type and Dual Slope Type.

UNIT - V:
Logic Families: Classification of Digital Integrated Circuits, Standard TTL NAND Gate-Analysis, Tristate TTL, CMOS Tristate Outputs. Comparison of various Logic Families.
Digital IC Applications: TTL & CMOS 74XX Series ICs: BCD to 7-segment decoder/driver - 7447, IC Counters – 74163 & 7490, Shift Registers – 7495.

Learning Resources:

1. Op-amps and Linear Integrated Circuits, Ramakant A. Gayakwad, Prentice Hall, 2003.
2. Linear Integrated Circuits, D. Roy Chowdhury, 3rd Edition, New Age International (P) Ltd., 2008.
3. Ronald J. Tocci, Neal S. Widmer & Gregory L.Moss, "Digital Systems: Principles and Applications," PHI, 10/e, 2009.
4. Behzad Razavi "Design of Analog CMOS Integrated Circuits", Second Edition, Mc GRAW HILL,2001.
5. https://nptel.ac.in/courses/108108111/

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 ELECTRONICS AND COMMUNICATION ENGINEERING

Analog and Digital Communication Systems

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

L:T:P (Hrs./week): 2:1:0	SEE Marks : 60	Course Code: **U24PC530EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To provide a comprehensive understanding on analog modulation techniques. 2. To impart knowledge of the fundamental functions and architectures of transmitters and receivers. 3. To perform baseband modulation and demodulation 4. To modulate and demodulate digital signals. 5. To apply error control coding techniques on digital signals.	On completion of the course, students will be able to 1. Apply the principles of amplitude modulation to implement modulators and demodulators for AM, DSBSC, and SSBSC systems 2. Design frequency modulation transmitters for specified frequencies and evaluate the performance of superheterodyne receivers. 3. Apply source coding and pulse modulation techniques to convert analog signals into digital form. 4. Estimate the BER for various digital modulation schemes and implement encoding/decoding techniques for error control. 5. Model analog and digital communication systems and implement a course based project.

CO-PO/PSO Mapping

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

UNIT - I:

Amplitude modulation: Principle of modulation, Quantitative analysis of amplitude modulation: AM, DSBSC, SSBSC. Square law modulator, Switching Modulator, Square law detector, Envelope detector. Balanced modulator, Ring modulator, coherent detection of DSBSC. Generation of SSBSC and coherent detection of SSBSC, frequency division multiplexing. Figure of merit and Noise considerations in in AM, DSBSC, SSBSC, Costas loop.

UNIT - II:

Angle Modulation: Principle of angle modulation, Phase modulation, frequency modulation, Quantitative analysis of frequency modulation, NBFM, WBFM. Direct method of FM generation, Armstrong method of FM generation, Foster-Sealey detector, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Pre emphasis and De-emphasis, Threshold effect in angle modulation, amplitude limiter.

Transmitters and receivers:

Functions of a transmitter and receiver. TRF receiver, Super heterodyne receiver: Intermediate frequency, Image frequency, AGC.

UNIT - III:

Pulse Modulation: Principles of Pulse modulation- generation and detection of PAM, Aperture effect, Generation and detection of PWM and PPM signals. Quantization, Types of quantization, Companding, Pulse code modulation (PCM), Delta modulation, Adaptive delta modulation, Time Division multiplexing. Noise considerations in PCM and DM.

UNIT - IV:

Digital communication: Baseband Pulse Transmission- Inter symbol Interference, Eye diagram, Error vector magnitude, Pass band Digital Modulation schemes- ASK, PSK, FSK, M- ary signaling. Generation and detection of digital modulation techniques. Optimum detection of signals in noise, Coherent receiver, matched filter -Probability of Error evaluations.

UNIT - V:

Error Control Coding: Types of transmission errors, need for error control coding, Source coding, Shannon – Fano algorithm and Huffman coding. Coding efficiency, Linear Block Codes (LBC):, Encoder, Syndrome and error detection, Convolutional code: Encoder, Decoder. AI-Powered Advancements in Digital Communication, Channel estimation, Error detection and correction, Noise analysis.

Learning Resources:

1. Singh, R.P. and Sapre, S.D., "Communication Systems," TMH, 2017.
2. Simon Haykin, "Communication Systems," 5/e, Wiley India.
3. Sam Shanmugham.K., "Digital and Analog Communication Systems," Wiley, 2005.
4. Communication Systems (Analog and Digital) by Dr. Sanjay Sharma, 2013
5. Modern Digital And Analog Communication Systems: Fourth Editionby B.P. Lathi, Zhi Ding, et al. | 1 July 2017
6. https://nptel.ac.in/courses/117105143/
7. https://nptel.ac.in/courses/108104091/
8. https://nptel.ac.in/courses/117105144/
9. https://nptel.ac.in/courses/108104098

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 ELECTRONICS AND COMMUNICATION ENGINEERING

Antennas and Wave Propagation

SYLLABUS FOR B.E. (ECE) V – SEMESTER

L:T:P (Hrs./week): 2:1:0	SEE Marks : 60	Course Code: **U24PC540EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understanding the basic principles of antenna radiation and the importance of key antenna parameters. 2. Analysing the radiation characteristics of thin wire dipole antenna, monopole antenna and loop antenna. 3. Explore antenna array requirements and implement antennas through project-based approach 4. Characterization of UHF & VHF antennas and microstrip antenna. 5. Understand the phenomenon smart antennas and wave propagation	On completion of the course, students will be able to 1. Describe the basic principles of radiation and antenna parameters. 2. Analyze and design wire and loop antennas. 3. Apply the antenna fundamentals in antenna array analysis and implement course based project in antenna design. 4. Evaluate the behaviour and performance of various VHF, UHF and Microwave Antennas. 5. Compare modes of wave propagation for different applications and smart antennas for wireless communication.

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	3									2		3	
CO3	3	3	3		3			3	3	3	3	2		3	
CO4	2	3		2	2	2	3					2		3	
CO5	2	3		2	2	2	3				3	2		3	

UNIT-I:

Antenna Basics: Principles of radiation-single wire, two wire, current distribution on a thin wire antenna, retarded potential, isotropic radiator. Antenna parameters: Radiation pattern, Beam area, Beam efficiency, radiation intensity, Antenna temperature, Antenna field regions, Gain, directivity, Antenna Polarization, effective length, Antenna Impedance, effective aperture and aperture efficiency, Friis transmission equation.

UNIT-II:

Analysis of wire Antennas: Infinitesimal dipole, region separation, Half

wave dipole, quarter wave mono pole, Ground effects, small circular loop Antenna.
ADS tool flow to carryout course based project.

UNIT-III:
Antenna Arrays: Introduction, Point sources, Array of two isotropic point sources, Linear Arrays of N isotropic point sources of equal amplitude and spacing, principle of pattern multiplication, Broad Side Array, End Fire Array, Binomial Array, Optimization of antenna arrays using AI tools to avoid grating lobes

UNIT-IV:
VHF, UHF and Microwave Antennas: Helical Antenna-Geometry, Helix modes, Design considerations for Helical Antenna, Horn Antenna, Parabolic Reflector Antenna, Yagi-Uda Array. Micro strip Antenna- Basic characteristics of micro strip antenna, feeding methods, Advanced antennas for spacecraft applications. Introduction to Fractal antenna.

UNIT-V:
Smart Antennas and Wave Propagation: Basic Concepts of Smart Antennas, types of smart antennas Different modes of Radio Wave propagation: Ground wave propagation, Sky wave propagation and Space wave propagation. Introduction to EMI/EMC.

Predict antenna gain and bandwidth based on geometric parameters and optimization of antenna parameters using machine learning.

Learning Resources:

1. J.D. Kraus, "Antennas and Wave propagation", McGraw Hill, 5th edition, 2017.
2. C.A. Balanis, "Antenna Theory - Analysis and Design", John Wiley, 4th edition, 2015.
3. K.D. Prasad, "Antenna and Wave Propagation", Satya Prakashan Publishing Company, 2009.
4. I.J. Bahl and P. Bhartia, "Micro Strip Antennas", Artech House, 1980.
5. R.E. Crompton, Adaptive Antennas, John Wiley.
6. https://onlinecourses.nptel.ac.in/noc20_ee20/preview

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- 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:

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

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DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Skill Development Course - V:
Communication Skills in English - II

SYLLABUS FOR B.E. V - SEMESTER (Common to all branches)

L:T:P (Hrs./week): 1:0:0	SEE Marks : 40	Course Code: **U24HS510EH**
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. Get students proficient in both receptive and productive skills. 2. Enable students to build strategies for effective group interaction and help them in developing decisive awareness and personality while maintaining emotional balance. 3. To introduce students to an ideal structure for a presentation. 4. To develop and improve writing and study skills needed for college work.	At the end of the course the learners will be able to: - 1. Participate in group and forum discussions by providing factual information, possible solutions, and examples. 2. Present a topic by picking up the key points from the arguments placed. 3. Read between the lines and write informed opinions. 4. Prepare, present, and analyze reports

CO-PO/PSO Mapping

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

UNIT-I: Delightful Discussions

Equips participants with group discussion strategies using Six Thinking Hats, point generation, and summarization techniques, along with case study-based discussions to enhance analytical thinking.

1.1 Six Thinking Hats
1.2 Group Discussion Techniques (Initiation Techniques, Generating Points, Summarization techniques)
1.3 Case Study Based Group Discussions

UNIT-II: Powerful Presentations

Develops the ability to deliver clear, persuasive, and structured presentations using the Toulmin model, with practical exposure to JAM (Just A Minute) and extempore speaking exercises.

2.1 Concise Cogent Presentation
2.2 Persuasion skills
2.3 Toulmin Model
2.4 Biker B - JAM and Extempore

UNIT-III: Fact, Observation and Inference

Builds critical reading and thinking skills to differentiate facts from opinions, make accurate inferences, identify main ideas, and draw logical conclusions from various texts.

3.1 Discernment of fact and opinion
3.2 Note making and Inference
3.3 Main idea identification
3.4 Logical Conclusions

UNIT-IV: Effective Technical Writing

Trains learners in crafting technical reports, descriptive image-based writing, and composing insightful book and movie reviews with clarity and coherence.

4.1 Report writing
4.2 Image Writing
4.3 Book Reviews
4.4 Movie Reviews

Learning Resources:

1. How to Win Friends and Influence People by Dale Carnegie. ...
2. Crucial Conversations: Tools for Talking When Stakes Are High by Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler. ...
3. Difficult Conversations: How to Have Conversations that Matter the Most by Douglas Stone, Bruce Patton, Sheila Heen, and Roger Fisher.

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

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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 HUMANITIES & SOCIAL SCIENCES

Design Thinking

SYLLABUS FOR B.E. V - Semester

L:T:P (Hrs./week): 1:0:0	SEE Marks : 40	Course Code: **U24HS530EH**
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. Understand the stages of design thinking and the role of empathy in design. 2. Learn techniques to brainstorm and frame problem statements effectively. 3. Develop prototyping and feedback techniques for iterative improvements. 4. Apply design thinking to solve community challenges and real-world problems.	At the end of the course the learners will be able to: 1. Students will articulate the stages of design thinking and create empathy maps for user-centered solutions. 2. Students will use ideation tools and define clear, actionable problem statements. 3. Students will create low-fidelity prototypes and refine solutions based on feedback. 4. Students will demonstrate design thinking by creating innovative prototypes for specific challenges.

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			1				
CO3			2								1				
CO4			1					1			1				

OVERVIEW:

In a fast-changing world driven by innovation, AI, and user-centric solutions, Design Thinking equips engineering students with the mindset and tools to solve real-world problems creatively and collaboratively. This course introduces a structured, human-centered approach to innovation through empathy, ideation, prototyping, and iteration. Students will engage in hands-on activities that enhance creativity, adaptability, and practical problem-solving.

UNIT-I: Introduction to Design Thinking

Help build a strong foundation in user-centric innovation by understanding the design thinking process and developing empathy to uncover real user needs.

1.1 Stages of Design Thinking
1.2 Case Studies of Innovative Solutions
1.3 Empathy in Design

Learning Outcomes:

- Understand the five stages of the design thinking process
- Analyze real-world innovations using the design thinking lens
- Create empathy maps by observing and interpreting user needs

UNIT-II: Ideation and Problem Definition

Train to convert user insights into well-defined engineering problems and generate multiple solution ideas using structured creativity techniques.

2.1 Brainstorming Techniques
2.2 Framing the Right Problem Statement
2.3 Ideation Tools (Affinity Mapping)

Learning Outcomes:

- Generate multiple ideas using structured creativity techniques
- Frame user-centered problem statements from gathered insights
- Organize and cluster ideas using ideation tools

UNIT-III: Prototyping and Feedback

Develop practical skills to rapidly prototype engineering solutions and iteratively improve them based on user testing and feedback.

3.1 Creating Low-Fidelity Prototypes
3.2 Gathering and Implementing Feedback
3.3 Iterative Improvements

Learning Outcomes:

- Design simple prototypes that communicate core ideas
- Collect meaningful feedback through observation and interaction
- Refine prototypes through successive iterations for better user fit

UNIT-IV: Real-World Applications

Learn to apply the full design thinking process to real-life engineering, business, or social challenges, enhancing teamwork and innovation readiness.

4.1 Design Thinking in Business and Technology
4.2 Creating Solutions for Community Challenges
4.3 Group Project: Prototype a Solution

Learning Outcomes:

- Apply the complete design thinking cycle to real-world problems
- Collaborate in teams to design and test user-centered solutions
- Present working prototypes and justify design decisions with user insights

Suggested Books

1. Change by Design by Tim Brown (IDEO)
2. Creative Confidence by Tom Kelley & David Kelley
3. The Art of Innovation by Tom Kelley
4. The Design of Everyday Things by Don Norman

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

Microprocessors and Microcontrollers Lab

SYLLABUS FOR B.E. (ECE) V - Semester

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U24PC511EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To provide hands-on experience with 8086 microprocessor assembly language programming, including arithmetic, data transfer, string operations, and sorting. 2. To explore Embedded C programming for the 8051 microcontroller, including arithmetic/logical operations, timer programming, serial communication, and interrupt handling. 3. To develop practical skills in interfacing external devices (motors, LCD, keypad, DAC) with the 8051 microcontroller using Embedded C and simulation tools (Keil IDE & Proteus). 4. To enable students to understand and apply low-level programming concepts of the ARM architecture by developing and simulating assembly language programs focusing on arithmetic, logical operations, addressing modes, and control flow using QEMU, thereby laying a strong foundation for bare-metal and embedded system development. 5. To foster problem-solving skills by engaging students in course based projects, where they apply learned skills to interface sensors, actuators, and communication protocols on the ARM Development platforms.	On completion of the course, students will be able to 1. Write and execute assembly programs on the 8086 microprocessor for arithmetic operations, data transfer, and string manipulations. 2. Develop Embedded C programs for the 8051 microcontroller to implement arithmetic/logical operations, timers, UART serial communication, and interrupt handling. 3. Interface peripherals (stepper motor, DC motor, LCD, keypad, DAC) with the 8051 microcontroller using Keil IDE and Proteus simulation software. 4. Demonstrate the ability to develop, simulate, and debug ARM assembly language programs involving arithmetic, logical operations, addressing modes, and control flow using QEMU on a Linux/Windows environment. 5. Design and implement a course based project using ARM Based Development Boards to demonstrate IoT communication, actuator control, and sensor data processing.

CO-PO/PSO Mapping

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

Cycle – I:

Assembly language programming for 8086 µP using Assembler

1. Execution of basic programs on 8086 microprocessor (8 bit and 16 bit arithmetic operations).
2. Programs for data transfer, String searching and sorting

Embedded C programming for 8051 µC using Keil IDE

3. Programs related to arithmetic, logical and Shift Instructions.
4. Timer programming.
5. Serial communication using UART protocols
6. Interrupt Programming

Cycle-II

Embedded C programming with 8051 using Keil IDE & Proteus for off chip peripheral interface

7. Interfacing motors- DC and Stepper
8. LCD display interfacing.
9. Matrix Keypad interfacing.
10. DAC Interfacing with 8051µc

ARM Programming Using QEMU/ARM Simulator

11. Assembly language programs on arithmetic and logical operations
12. ARM Addressing modes and Branching Instructions

1. To create GUI based Database of data sheets and application Notes used in MPMC, Advanced Embedded Systems, IoT & Applications Labs
2. Students must go through the related data sheets/ Application Notes before conducting each experiment

Course-Based Project: Students need to Carryout Course Based project using ARM development board/ ARM Processor boards. Course based projects related to: LED and Button Interfacing/Sensor Interfacing/Actuator Control / IoT Data Upload.

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

Integrated Circuits and Applications Lab

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

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U24PC521EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Students will, 1. Simulate and compare different amplifiers 2. Implement and verify basic applications of op-amp 3. Design and implement applications using ic555 and ic723. 4. Analyse and simulate sample &hold circuit using opamp 5. Develop applications using digital IC's	On completion of the course, students will be able to 1. Design and simulate IC amplifiers using EDA tools. 2. Implementing and Testing Various Op- Amp based circuits. 3. Design and verify the combinational and sequential circuits. 4. Examine the performance of various 555 timer Applications. 5. Design & verify regulator using IC723 for given specifications.

CO-PO/PSO Mapping

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

CYCLE - I Experiments

1. Op-Amp Amplifiers: Inverting and Non-Inverting Amplifiers, Voltage Follower using Op-Amp.
2. Arithmetic Circuits: Summer, Integrator & Differentiator suing Op-Amp.
3. Triangle and Square wave Generators using Op-Amp.
4. IC Regulators and current boosting.
5. Applications of 555Timer.
6. Interfacing counters with 7-segment LED/LCD display units.

CYCLE - II Experiment

Simulation experiments using Cadence tool

1. Simulate two inputs CMOS NAND gate and plot its transfer characteristics.
2. Design and simulate Wilson Current mirror.
3. Design and simulate operational transconductance amplifier
4. Design and Simulate Schmitt trigger using Op-Amp
5. Simulate sample and hold circuit using Op-Amp.
6. Design and simulate R-2R ladder DAC

General Note:

1. Atleast 5 experiments from each part.
2. A total of not less than 10 experiments must be carried out during the semester.
3. Analysis and design of circuits, wherever possible, should be carried out using SPICE tools.

New / Additional experiments planned:

1. Simulation of internal blocks based OP-AMP and its performance evaluation
2. Simulate and analyze the behavior of a tristate CMOS inverter
3. Design and simulate flash type ADC

Mini Project(s):

Implementation/simulation of mini projects using linear and digital ICs.

Learning Resources / Tools :

1. http://www.ti.com/lit/an/sboa092b/sboa092b.pdf
2. https://www.electrical4u.com/applications-of-op-amp/

The break-up of CIE:

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

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Analog and Digital Communication Systems Lab

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

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U24PC531EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To familiarize students with the practical implementation of analog and digital modulation and demodulation techniques. 2. To provide hands-on experience in the and analysis of communication systems using standard hardware and simulation tools. 3. To enable students to understand and evaluate the performance of various modulation schemes 4. To develop skills for constructing and analyzing communication signals in time and frequency domains. 5. To build competency in using MATLAB/Simulink/ Communication toolbox for communication experiments.	On completion of the course, students will be able to 1. Estimate the transmitted power and bandwidth of analog modulation scheme. 2. Apply concepts of multiplexing to RF signals in time domain and frequency domain. 3. Generation and detection of digital modulated signals. 4. Model a digital communication system 5. Evaluate the performance of a digital receiver.

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	1			2	3	
CO2	3	2		2				2	3	1			2	3	
CO3	2				3			2	3	1				3	
CO4	2	2	3		3			2	3	1				3	
CO5	2	2		2	3			2	3	1				3	

Cycle-I

1. (i) Modulation and demodulation of DSB with full carrier.
   (ii) AM radio signal reception using Superheterodyne receiver
2. (i)Generation of DSBSC and SSBSC signals and demodulation.
   (ii) Frequency division multiplexing and demultiplexing
3. (i) Modulation and demodulation of FM Signal
   (ii) FM signal reception using Superheterodyne receiver
4. (i)Characteristics of Pre emphasis and deemphasis
   (ii) Spectrum analyzer and analysis of AM, FM signals
5. (i) Generation and detection of PAM signals

(ii)Time division multiplexing of PAM signals

6. (i)Generation and detection of PWM signals (ii)Generation and detection of PPM signals

Cycle- II:

Simulation using MATLAB/Communication Toolbox/Simulink

7. Modeling and Simulation of a PCM Communication System
8. Simulation of ASK/PSK/FSK Transceiver Systems in Simulink
9. Implementation of AGC for Dynamic Signal Conditioning in Receiver Systems
10. Estimate Symbol Rate/Bit error rate for QAM Modulation in AWGN Channel in MATLAB
11. End to end simulation of 8-PSK communication system in MATLAB
12. Modeling QPSK Modulation Scheme and evaluating its performance in noisy environments

General Note:

1. At least 5 experiments from each part.
2. A total of not less than 10 experiments must be carried out during the semester.

New / Additional experiments planned:

1. GUI based experimental Features/related parameters.
2. Introducing SystemVue tool for signal analysis.
3. Wireless transmission of signals using SDR platform.
4. Develop AI-assisted MIMO channel estimation using matrix decomposition techniques.

Learning Resources/ Tools:

Tools: MATLAB, Simulink, SystemVue

1. Communication systems by V. Chandra Sekar, SASTRA University, Oxford University Press, 2013, ISBN: 9780198078050
2. Digital Communication Systems Using MATLAB and Simulink, Second Editionby Dennis Silage
3. Communication Systems Modeling and Simulation using MATLAB and Simulink 1st Edition by K. C. Raveendranathan

The break-up of CIE :

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

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Mini Project - II

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

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U24PW519EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3

COURSE OBJECTIVES	COURSE OUTCOMES
1. To guide students in conducting a thorough literature survey to identify and define a relevant engineering problem. 2. To enable students to propose innovative and feasible solutions based on problem analysis. 3. To develop students' ability to design, implement, and validate solutions using appropriate engineering tools and methodologies. 4. To foster adaptability in students by encouraging the exploration and application of modern and emerging technologies. 5. To improve students' technical communication skills through structured presentations and comprehensive project documentation	On completion of the course, students will be able to 1. Identify the problem through the literature survey 2. Propose a solution to address the problem 3. Design/Develop/Implement /Solve the problem and test the solution 4. Adapt to contemporary technologies 5. 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		3			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, Microwave and Wireless Communications, Communication Systems, Signal, Image and Video Processing, VLSI, Networking.

Students are required to submit a report on the Mini Project.

- Batch size shall be 2 (or) 3 students per batch.
- Allocation by department.

- Two reviews – One during 6th week and another during 12th week and final evaluation shall be conducted at the end of the semester.
- Students are required to give Presentations / Demonstration of the work during the reviews.
- Students are required to submit the report.

Grades awarded to the Mini Project - II

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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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
SCHEME OF INSTRUCTION AND EXAMINATION **(R-24)** :: B.E. - ECE : SIXTH SEMESTER (2026 - 27)

B.E (ECE) VI - SEMESTER								
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								
U24PC610EC	VLSI Design	2	1	-	3	60	40	**3**
U24PC620EC	Digital Signal Processing	3	1	-	3	60	40	**4**
U24PC630EC	Computer Organization and Architecture	2	1	-	3	60	40	**3**
U24PE6XXEC	Professional Elective – I	3	-	-	3	60	40	**3**
U24OE6XXXX	Open Elective – IV	3	-	-	3	60	40	**3**
U24HS630EH	Skill Development Course - VII: Verbal Ability	1	-	-	2	40	30	**1**
U24PE660EC	Skill Development Course - VIII: Technical Skills - III	2	-	-	2	40	30	**1**
PRACTICALS								
U24PC611EC	VLSI Design Lab	-	-	2	3	50	30	**1**
U24PC621EC	Digital Signal Processing Lab	-	-	2	3	50	30	**1**
U24PC6XXEC	Professional Elective - I Lab	-	-	2	3	50	30	**1**
U24PW619EC	Theme Based Project	-	-	2	-	50	30	**1**
	TOTAL	**16**	**3**	**8**		**580**	**380**	**22**
	GRAND TOTAL	**27**				**960**		
Left over hours will be allocated for: **CCA-II** / Sports / Library / Mentor - Mentee Interaction / CC / RC / TC								
Note: Every Student shall complete one **NPTEL** course certification of 8 weeks duration (equivalent to 2 credits weightage) by the end of VI-Semester.								

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Professional Electives (R-24)

(Students can opt for all professional electives from single stream or several streams)

Professional Elective Stream	Embedded Systems and VLSI Stream		Communication Engineering Stream		Signal Processing Stream		Networking Stream	
Semester – VI - for the Academic Year 2026 – 2027								
Professional Elective – I (Theory courses)	U24PE610EC	Real Time Operating Systems	U24PE630EC	Wireless Communication	U24PE640EC	Artificial Neural Networks	U24PE650EC	Voice and Data Networks
	U24PE620EC	Advanced CMOS Microfabrication						
Professional Elective – I (Lab courses)	U24PE611EC	Real Time Operating Systems Lab	U24PE631EC	Wireless Communication Lab	U24PE641EC	Artificial Neural Networks Lab	U24PE651EC	Voice and Data Networks Lab
	U24PE621EC	Advanced CMOS Microfabrication Lab						
Semester – VII for the Academic Year 2027 – 2028								
Professional Elective – II (Theory courses)	U24PE710EC	Advanced Embedded Systems	U24PE720EC	Software Defined Radio and its Applications	U24PE730EC	Digital Image and Video Processing	U24PE740EC	Cryptography and Network Security
Professional Elective – II (Lab courses)	U24PE711EC	Advanced Embedded Systems Lab	U24PE721EC	Software Defined Radio and its Applications Lab	U24PE731EC	Digital Image and Video Processing Lab	U24PE741EC	Cryptography and Network Security Lab
Semester – VIII for the Academic Year 2027 – 2028								
Professional Elective – III	U24PE810EC	IoT Architectures and Protocols	U24PE820EC	Satellite Communication	U24PE830EC	Image and Video processing using Machine Learning	U24PE840EC	Wireless Sensor Networks
	U24PE811EC	Industrial IoT and Applications	U24PE821EC	Optical Fiber Communication				
	U24PE812EC	Low Power VLSI Design	U24PE822EC	Coding Theory and Techniques	U24PE831EC	Speech and Audio Signal Processing	U24PE841EC	Optical Networks
Professional Elective – IV	U24PE850EC	FPGA Architectures and Applications	U24PE860EC	Radar and Navigation Systems	U24PE870EC	Adaptive Signal Processing	U24PE880EC	Blockchain Technology and its Applications
			U24PE861EC	Global Positioning System	U24PE871EC	Biomedical Signal Processing		
	U24PE851EC	Electric and Hybrid Vehicle Systems: Design Approach and Applications	U24PE862EC	Quantum Communication Technologies and Applications	U24PE872EC	Language Models and Applications	U24PE881EC	Network Management

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VLSI Design

SYLLABUS FOR B.E. (ECE) VI – SEMESTER

L:T:P (Hrs./week) : 2:1:0	SEE Marks : 60	Course Code: **U24PC610EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand different Inverter configurations. 2. Identify different CMOS fabrication process. 3. Evaluate the performance pf CMOS sub system Design. 4. Analyze the design of Basic Memory Cells. 5. Understand the importance of Testing in VLSI Design.	On completion of the course, students will be able to 1. Explain the performance characteristics of Inverters. 2. Analyze MOS layers for CMOS fabrication. 3. Compare different performance characteristics of High speed Adders. 4. Illustrate the need of memory cells and their applications. 5. Apply various tests for VLSI Circuits at different levels.

CO-PO/PSO Mapping

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

UNIT-I :

Review of electrical characteristics of MOSFET: CMOS inverter: VTC, switching threshold, noise margin, robustness, propagation delay, static and dynamic power dissipation. Static CMOS design: complementary CMOS, Ratioed logic, pass transistor logic.
Dynamic CMOS design: Dynamic logic, domino logic.

UNIT-II:

Introduction to CMOS fabrication process: Twin tub Process, latch up in CMOS circuits. CMOS circuit physical design process: MOS Layers, Stick diagrams, Euler Path in stick diagram, Design rules, types of design rules, Layout diagrams of Basic CMOS Logic gates.

UNIT-III:

CMOS Subsystem design: Architectural issues, Carry select adder, carry save adder and Carry Skip adder, Multiplication: array multiplication, Wallace tree multiplication. Multiplexer and D Flip-Flop using Transmission gates.

UNIT-IV:

Design of Basic Memory Cells: Classifications of Memories, one and three transistor dynamic RAM cells, six transistor Static RAM, static noise margin. Read only memory: Basic ROM architecture, EPROM, EEPROM, NOR and NAND based ROM Memory Design.

UNIT-V:

CMOS testing: Role of testing, types of testing, functionality tests, manufacturing tests, stuck-at faults, short circuit and open circuit faults, controllability , observability, delay fault testing, level sensitive scan design, Boundary scan architecture.

Learning Resources:

1. Digital Integrated Circuits: A Design Perspective – Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolić. 2nd edition.
2. CMOS Digital Integrated Circuits: Analysis and Design, Sung-Mo (Steve) Kang and Yusuf Leblebici Edition: 4th Edition.
3. CMOS VLSI Design: A Circuits and Systems Perspective – Neil H. E. Weste, David Harris.
4. https://onlinecourses.nptel.ac.in/noc17_cs35.

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 ELECTRONICS AND COMMUNICATION ENGINEERING

Digital Signal Processing

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

L:T:P (Hrs./week): 3:1:0	SEE Marks : 60	Course Code: **U24PC620EC**
Credits : 4	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Interpret the concept of Discrete Fourier Transform (DFT) and explore its applications in signal analysis. 2. Develop the ability to compute FFT using efficient algorithms like Radix-2 DIT and DIF, and apply them to real-time signal processing problems. 3. Outline various FIR and IIR filter design techniques and analyze their characteristics and applications. 4. Implement digital IIR filters using transformations such as impulse invariant and bilinear methods, and evaluate their performance. 5. Construct and apply multirate signal processing systems including decimators and interpolators, and introduce machine learning techniques for signal classification tasks.	On completion of the course, students will be able to 1. Interpret the concept of Discrete Fourier transform and its applications. 2. Compute FFT algorithm for various applications 3. Outline the process of FIR and IIR filter design using various techniques. 4. Construct sampling rate convertor by using decimation and interpolation rate converters and apply ML on signals. 5. Implement course based project.

CO-PO/PSO Mapping

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

UNIT-I: Discrete Fourier Transform

Overview of Discrete time Fourier Transform (DTFT), Discrete Fourier transform (DFT), -Efficient computation of DFT- Properties of DFT. FFT algorithms - Radix-2 FFT algorithms - Decimation in Time, Decimation in Frequency algorithms - in place computation- bit reversal- Use of FFT algorithms in Linear Filtering and Correlation.

UNIT-II: Digital filters(FIR)Design

Amplitude and phase responses of FIR filters – Linear phase filters – Windowing techniques for design of Linear phase FIR filters – Rectangular, Bartlett, Hamming, Blackman, Kaiser FIR filter design, realization and finite word length effects.

UNIT-III: Digital filters(IIR)Design

Butterworth and Chebyshev approximation- IIR digital filter design techniques-Impulse Invariant transformation –Bilinear transform techniques-Digital Butterworth-Chebyshev filters,-comparisons between FIR and IIR filters. Digital filters structures.

UNIT-IV : Multirate Digital Signal Processing

Introduction-Decimation by a Factor D- Interpolation by a Factor I-Sampling Rate Conversion by a Rational Factor I/D-Implementation of Sampling Rate Conversion-Multistage implementation of Sampling Rate Conversion.

UNIT-V: Applications of Multirate Signal Processing & Introduction to ML.

Sampling Rate Conversion by an Arbitrary factor-Application of Multirate Signal Processing.

Introduction to machine learning-Supervised vs Unsupervised Learning, Signal Classification using Support Vector Machines.

Learning Resources:

1. John G. Proakis & Dimtris G. Manolakis, "Digital Signal Processing Principles, Algorithms and Application," PHI, 4/e, 2012.
2. Sanji K Mitra Digital signal processing: a computer-based approach
3. Alan V. Oppenheim & Ronald W. Schafer, "Digital Signal Processing," PHI, 2/e, 2014.
4. Ashok Ambardar, "Digital Signal Processing: A Modern Introduction, "Cengage Learning, 2009.
5. LiTan, "Digital Signal Processing: Fundamentals and Applications," Elsevier, 2012.
6. Max A. Little "Machine Learning for Signal Processing, Data Science, Algorithms, and Computational Statistics", Oxford, 2019.
7. https://nptel.ac.in/courses/117102060/
8. https://nptel.ac.in/courses/117104070/

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 ELECTRONICS AND COMMUNICATION ENGINEERING

Computer Organization and Architecture

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

L:T:P (Hrs./week): 2:1:0	SEE Marks : 60	Course Code: **U24PC630EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Understand data representation and perform arithmetic operations at the digital hardware level. 2. Analyze the internal architecture and organization of processors and control units. 3. Evaluate pipelining and parallelism concepts for improving CPU performance. 4. Understand I/O systems and data transfer techniques in computer architecture. 5. Explore memory hierarchy, organization, and management including cache and virtual memory.	On completion of the course, students will be able to 1. Explain number systems and perform fixed/floating point arithmetic and digital algorithms. 2. Describe the structure and organization of the processor and control units. 3. Analyze pipelining performance and parallel processing techniques in processor design. 4. Illustrate I/O organization and data transfer mechanisms including DMA and interrupt handling. 5. Understand memory organization, cache mapping techniques, and virtual memory systems.

CO-PO/PSO Mapping

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

UNIT-I:

Data Representation and Computer Arithmetic:

Introduction to Computer Organization and architecture, Digital arithmetic algorithms for Addition, Subtraction, Multiplication using Booth's algorithm and Division using restoring and non restoring algorithms. Floating point representation with IEEE standards and its arithmetic operations. General Register Organization, Stored Program Organization, Instruction formats-Zero, One, Two and Three-Address instructions

UNIT-II:

Introduction to GPU and Basic Processor Organization:

Introduction to GPU Architecture: Evolution of GPUs, GPU Memory model, Memory Hierarchy, GPU Processing Vs CPU Processing

Instruction cycle: Fetch and Decode, Register reference instructions; Memory reference instructions and Input-output instructions. Hardwired control unit, Micro programmed Control organization, address sequencing and micro program sequencer.

UNIT-III:

Pipelining and Parallelism:

Features of CISC and RISC and their comparison, Amdhal's law, Concept of Pipelining, Data path and control path pipelining, Design of Arithmetic pipeline, Instruction Pipeline, performance issues in pipelining, Pipeline hazards, and techniques of Reducing pipeline branch penalties. Concept of parallelism, vector processors, Array processors. Advanced superscalar computers and vector computers.

UNIT-IV :

Input-Output Organization:

I/O Bus and interface modules, I/O versus Memory Bus, Asynchronous data transfer: Strobe control, Handshaking, Asynchronous serial transfer. Modes of Transfer: Programmed I/O, Interrupt driven I/O, Priority interrupt; Daisy chaining, Parallel Priority interrupt. Direct memory Access, DMA controller and transfer. Input output Processor, CPU-IOP communication.

UNIT-V:

Memory Organization:

Memory hierarchy, Mapping of memory with CPU, Primary memory, Concept of memory interleaving, Associative memory, Cache memory organization and performance measures, cache mapping functions, Virtual memory organization, paging mechanism, address mapping using pages, Memory management hardware, Introduction to Multilevel Memories, Concept of cache Coherence

Learning Resources:

1. Morris Mano, M., "Computer System Architecture," 3/e, Pearson Education, 2005.
2. John Hennessy and David Patterson, Computer Architecture : A Quantitative Approach, 5th Edition, Elsevier.
3. Hamacher, Vranesic, Zaky, "Computer Organization," 5/e, McGraw Hill, 2007.
4. William Stallings, "Computer Organization and Architecture: Designing for

performance," 7/e, Pearson Education, 2006.
5. Govindarajulu, B., "Computer Architecture and Organization," 2/e, TMH, 2010.
6. Computer Organization and Architecture by IIT Delhi https://nptel.ac.in/courses/106102062/
7. Computer Organization and Architecture by Prof.V. kamkoti, IIT Madras https://onlinecourses.nptel.ac.in/noc17_cs35.

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.
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- Students are required to submit project report.

Assessment and Evaluation of Course Based Project:

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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 ELECTRONICS AND COMMUNICATION ENGINEERING

Real Time Operating Systems

(Professional Elective-I)
SYLLABUS FOR B.E. (ECE) VI - SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **U24PE610EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To impart foundational understanding of Real-Time Operating Systems (RTOS), emphasizing QNX Neutrino's microkernel architecture and its suitability for time-critical embedded applications. 2. To familiarize students with POSIX standards and real-time task management in QNX, enabling the development of portable and deterministic software systems. 3. To equip students with the ability to design and implement efficient inter-process communication and synchronization mechanisms using QNX messaging and POSIX IPC. 4. To develop competence in managing memory and file systems in QNX, including dynamic allocation, virtual memory mapping, and real-time file I/O operations. 5. To enable students to interface hardware and external devices with QNX, analyse system behaviour using profiling tools, and deploy QNX-based solutions on embedded ARM platforms.	On completion of the course, students will be able to 1. Describe the features and architecture of real-time operating systems and analyse the advantages of QNX microkernel design. 2. Apply POSIX APIs to create and manage threads and implement real-time scheduling policies in QNX. 3. Implement inter-process communication and synchronization using QNX message passing and POSIX IPC mechanisms. 4. Analyse and manage memory and file systems for real-time applications using QNX memory management and POSIX file I/O. 5. Design, deploy, and debug QNX-based embedded systems with device interfacing and system profiling tools.

CO-PO/PSO Mapping

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

UNIT-I: Introduction to RTOS and QNX Neutrino Architecture:
Real-Time System Requirements: Determinism, Latency, Throughput, RTOS vs General-Purpose OS; QNX Overview: Features, Architecture, Microkernel Design; QNX Software Development Platform (SDP) and Momentics IDE, System Boot

Process and Image Filesystem (IFS), Comparison with other RTOS: FreeRTOS, VxWorks, RT-Linux.

UNIT-II: POSIX Compliance and Task Management in QNX
POSIX Standards for RTOS: Threads, Scheduling, IPC, File I/O
QNX POSIX Conformance Levels, POSIX Thread Management (pthreads), Thread Creation, Attributes, Priorities, Scheduling Policies: FIFO, Round Robin, Sporadic etc.
Real-Time Clocks and Timers, Thread Affinity and Real-Time Determinism.

UNIT-III: Interprocess Communication and Synchronization
POSIX IPC Mechanisms: Semaphores, Shared Memory, Message Queues, QNX Message Passing APIs: MsgSend, MsgReceive, MsgReply, Pulses and Signals in QNX, Synchronization Tools: Mutexes, Condition Variables, Race Conditions and Deadlock Prevention, IPC Performance Considerations for Real-Time Systems.

UNIT-IV: Memory Management and File Systems in QNX
Virtual Memory and Address Space in QNX, Memory Mapping (mmap), Allocation (malloc), and Locking, Memory Partitioning and Protection, Filesystems in QNX: QNX4, QNX6, FAT, DevFS, File I/O APIs and POSIX Conformant File Operations, Debugging Memory Leaks and Performance Bottlenecks

UNIT-V: Device Management, Embedded Deployment & Case Studies
Resource Managers: Concept, Implementation, and Custom Devices
Device I/O using devctl, io_* APIs, Interrupt Handling in QNX: ISR and Threaded Interrupts.
Deploying QNX on ARM Cortex-A SoCs like Raspberry Pi,BSP (Board Support Package) and Boot Configuration, Performance Monitoring Tools: pidin, System Profiler, slogger.
Industrial Applications: Automotive (ADAS), Industrial Automation, Medical

Learning Resources:

1. NX Neutrino RTOS System Architecture Guide
   https://www.qnx.com/developers/docs/
2. QNX Filesystem Overview
   https://www.qnx.com/developers/docs/7.1/#com.qnx.doc.neutrino.user_guide/topic/qnx_filesystems.html
   "Real-Time Concepts for Embedded Systems" – Qing Li, Caroline Yao

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 ELECTRONICS AND COMMUNICATION ENGINEERING

Real Time Operating Systems Lab

(Professional Elective-I)
SYLLABUS FOR B.E. (ECE) VI - SEMESTER

L:T:P (Hrs./week) : 0:0:2	SEE Marks : 50	Course Code: **U24PE611EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To enable students to understand the RTOS development workflow using QNX SDP and Momentics IDE for ARM-based embedded systems 2. To train students in implementing real-time applications using QNX POSIX APIs for thread management, priority scheduling, and synchronization 3. To equip students with the skills to design and implement IPC mechanisms such as message passing, pulses, and signals for real-time coordination 4. To provide students with hands-on experience in memory-mapped communication and developing custom virtual devices using QNX resource managers 5. To develop students' abilities in interfacing physical devices, managing GPIOs, and using Momentics IDE tools for debugging and system analysis in real-time environments	On completion of the course, students will be able to 1. Develop and deploy real-time applications using QNX Neutrino RTOS and Momentics IDE on VM Ware and embedded ARM platforms. 2. Create and manage real-time threads with scheduling priorities and synchronization mechanisms in QNX. 3. Implement inter-process communication techniques such as message passing, pulses, and signals to coordinate real-time processes. 4. Design shared memory-based communication and develop custom virtual devices using QNX resource managers. 5. Integrate hardware sensors and GPIO control in real-time applications, and analyze system behavior using debugging tools by doing course based project.

CO-PO/PSO Mapping

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

Cycle – I:

1. Write and deploy RTOS applications on QNX
2. Create and manage real-time threads with priorities
3. Implement inter-process communication using message passing
4. Use pulses and signals to trigger thread actions
5. Shared memory communication between processes
6. Develop a resource manager for a virtual device

Cycle-II

1. GPIO control from user space using QNX on Raspberry Pi or ARM SoC
2. Real-time scheduling: compare FIFO and RR through example
3. Interface a sensor (e.g., temperature/ultrasonic) and log data
4. Debugging with Momentics IDE: setting breakpoints and analyzing thread behavior

1. To create GUI based Database of data sheets and application Notes used in MPMC, Advanced Embedded Systems, IoT & Applications Labs
2. Students must go through the related data sheets/ Application Notes before conducting each experiment

Course-based Project: Students are required to carry out a Mini Project using the Raspberry Pi development board, which involves designing and implementing a Real-Time Operating System (RTOS) application that effectively combines multithreading, inter-process communication (IPC), and hardware control.

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:

The total marks should be a maximum of five (05) for Course-based project and are to be taken from the total CIE marks of the concerned lab course and accordingly, the new break-up for the award of lab CIE marks is as follows:

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

Duration of Internal Test: 3 Hours

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Advanced CMOS Microfabrication

(Professional Elective-I)
SYLLABUS FOR B.E. (ECE) VI - SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **U24PE620EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce the fundamental concepts of semiconductor physics and materials essential for IC fabrication. 2. To familiarize with thermal oxidation and thin-film deposition processes used in CMOS technology. 3. To understand key microfabrication steps such as diffusion, ion implantation, photolithography, and etching. 4. To explore the complete CMOS and FinFET fabrication processes and address associated technological challenges. 5. To impart knowledge of characterization methods used to analyze semiconductor material and device properties.	On completion of the course, students will be able to 1. Understand fundamental semiconductor properties, carrier dynamics, and materials relevant to microfabrication. 2. Apply oxidation and thin-film deposition techniques used in CMOS process technology. 3. Demonstrate knowledge of diffusion, ion implantation, photolithography, and etching in microfabrication. 4. Analyze CMOS and FinFET fabrication flows, including advanced techniques like salicidation and damascene processing. 5. Utilize electrical and physical characterization tools for evaluating semiconductor devices and materials.

CO-PO/PSO Mapping

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

UNIT-I :

Fundamentals of Semiconductors: Crystal lattices, Bulk crystal Growth, Epitaxial Growth, Bonding forces and energy bands in solids, Charge carriers in semiconductors, Carrier concentrations, Drift of carriers in Electric and Magnetic Fields, Hall effect, Fermi level at equilibrium, Intrinsic vs Extrinsic semiconductors, Excess carriers in semiconductors, Diffusion and recombination, Diffusion length, Properties of Silicon and compounds, Gallium Arsenide, Metals used in IC fabrication.

UNIT-II:

Fabrication Techniques I: Top-Down and Bottom-Up Approach, Wafer Cleaning, Silicon Oxidation Techniques: Thermal Oxidation process, Deal-Groove model of oxidation, types of oxidation techniques, growth mechanism, factors affecting the growth mechanisms, dry & wet oxidation. Film deposition: Chemical Vapour deposition, Physical Vapour deposition, Polysilicon deposition, Dielectric deposition.

UNIT-III:

Fabrication Techniques II: Diffusion: Basic diffusion process, Extrinsic diffusion, Lateral diffusion, Ion Implantation: Range of Implanted Ions, Implant damage and Annealing, Tilt- Angle Ion Implantation. Photolithography: Optical lithography, Photoresists, Masks, Pattern Transfer. Etching: Wet Chemical Etching, Dry Etching, Isotropic and Anisotropic etching.

UNIT-IV:

CMOS FinFET: Basic MOS Capacitor, MOSFET fabrication process, CMOS Technology, Challenges of STI versus LOCOS, FinFET architecture, Gate first versus gate last, contact resistance issues of simple metal-silicon contact, metal silicides, salicidation, evolution from Ti to Co to Ni silicide, Damascene and dual-Damascene process.

UNIT-V:

Characterization Techniques: Resistivity: Two-Point versus Four-Point Probe, Carrier and doping density: Capacitance-Voltage (C-V) characterization, Current-Voltage characterization, Optical characterization: Introduction to Ellipsometry, Scanning probe microscopy: SEM, TEM and AFM.

Learning Resources:

1. Ben Streetman, Sanjay Banerjee - Solid State Electronic Devices-Prentice Hall (2006)
2. Jan M. Rabaey, Anantha Chandrakasan, Digital Integrated Circuits: A Design Perspective, Prentice Hall of India, 2016.
3. Tai-Ran Hsu - MEMS & Microsystems Design and Manufacture-Tata McGraw-Hill Education (2002).
4. Weste, Neil H E_Harris, David Money - CMOS VLSI Design_ A Circuits and Systems Perspective-Addison-Wesley (2010).
5. Stephen D. Senturia, Microsystem design, Springer (India), 2006.

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 ELECTRONICS AND COMMUNICATION ENGINEERING

Advanced CMOS Microfabrication Lab

(Professional Elective-I)
SYLLABUS FOR B.E. (ECE) VI - SEMESTER

L:T:P (Hrs./week) : 0:0:2	SEE Marks : 50	Course Code: **U24PE621EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To design layouts of basic CMOS components like NMOS, PMOS, and inverters. 2. To understand and simulate various oxidation processes used in isolation techniques. 3. To simulate CMOS fabrication flows using gate-first, gate-last, and spacer dielectric methods. 4. To analyze doping profiles through ion implantation techniques. 5. To design and simulate advanced device structures such as FinFET using TCAD tools.	On completion of the course, students will be able to 1. Design and draw layouts of NMOS, PMOS, and CMOS inverter using layout editor tools. 2. Simulate and analyze thermal oxidation processes using STI and LOCOS techniques. 3. Simulate fabrication steps of MOSFET using various processing techniques like gate-first, gate-last, and spacers. 4. Perform doping process simulations using ion implantation. 5. Design and simulate advanced transistors like FinFET and damascene-processed MOSFETs using TCAD.

CO-PO/PSO Mapping

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Perform the Experiments using SEMulator3D

1. Design a layout of NMOS transistor.
2. Design a layout of PMOS transistor.
3. Design a layout of Inverter.
4. Simulation of thermal oxidation using STI LOCOS
5. Simulation of thermal oxidation using LOCOS

6. Simulation of MOSFET using Gate First Process
7. Simulation of MOSFET using Gate last Process
8. Simulation of MOSFET using spacer dielectrics
9. Simulation of ion implantation and Silicidation
10. Design of MOSFET using Damascene
11. Design of MOSFET using Dual Damascene
12. Design of FinFET.

Additional New Experiment:

GUI Based device modelling and Simulation Experiments

The break-up of CIE: Internal Tests + Day to day Assignments

1.	No. of Internal Tests	:	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

Wireless Communications

(Professional Elective - I)
SYLLABUS FOR B.E. (ECE) VI - SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U24PE630EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1 To introduce the fundamental concepts of wireless communication systems 2 To analyze radio wave propagation and channel modelling. 3 To understand cellular system design concept. 4 To explore the architecture and functioning of modern wireless systems. 5 To analyze and evaluate the performance of wireless systems under various channel conditions	On completion of the course, students will be able to 1 Summarize the progression of from 1G to 5G and analyse the 2G systems. 2 Apply mobile radio wave propagation models to evaluate channel characteristics. 3 Analyze 3G communication technologies and evaluate Bit Error Rate performance for various wireless system configurations. 4 Analyse 4G systems using OFDM, MIMO techniques and Massive MIMO and beamforming in 5G networks. 5 Model wireless communication system and Implement course based project

CO-PO/PSO Mapping

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CO2	2	3		3			3							3	3
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CO4	2	2		3								3		3	3
CO5	2	2	2	2	3	3		3	3	3	3			3	

UNIT - I : Introduction to wireless communication

Evolution of Wireless Communication Systems: A Brief History from 1G to 5G, classification of wireless communication systems

2G systems:

Fundamental architecture of cellular system, its operation, frequency reuse, channel assignment strategies, Handoff process, GSM architecture, GSM Channels, Channel access mechanisms (FDD, TDD),

UNIT - II: Mobile Radio Wave propagation

Large scale propagation models- Free space propagation model, three basic propagation mechanisms, practical link budget design using path loss models, Impulse response of the wireless channel, small scale fading and multipath propagation, Mathematical modelling of fading channel coefficient, Parameters of mobile multipath channels, types of small-scale fading.

UNIT - III:3G systems

3G Technologies Overview, 3G Network Architecture, 3G Data services-3G W-CDMA(UMTS), 3G CDMA, 3G TD-SCDMA

Multi antenna systems: BER Analysis

BER analysis of wired communication system, SISO wireless system, Diversity, BER analysis of multiple antenna system: Maximal ratio combining, Diversity order, BER analysis of MISO wireless system

UNIT - IV: 4G systems

Introduction to OFDM, Multicarrier transmission, cyclic prefix in OFDM, Schematic representation of OFDM transmitter and receiver, BER analysis of OFDM system, LTE

Introduction to MIMO wireless communication systems, MIMO system model, MIMO ZF receiver, MIMO MMSE receiver

UNIT-V: 5G systems

5G Network Architecture, 5G Radio Access Technologies, Massive MIMO and Beamforming

Use Reinforcement Learning to determine the optimal routing path in wireless sensor networks.

Learning Resources:

1. Theodore.S. Rappaport, "Wireless Communications: Principles and Practice", 2/e, Pearson Education, 2010
2. Aditya K. Jagannatham, "Principles of Modern Wireless Communication Systems Theory and Practice", McGraw Hill Education (India) Private Limited, 2017.
3. Principles of modern CDMA/MIMO/OFDM Wireless Communications – by Prof. Aditya. K. Jagannatham, IIT Kanpur. (NPTEL Course)
4. Introduction to cellular and wireless communications - by Dr. David. Koil pillai, IITM. https://nptel.ac.in/courses/106106167/
5. https://www.coursera.org/learn/wireless-communications
6. https://www.udemy.com/introduction-to-wireless-communications

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

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

Wireless Communications Lab

(Professional Elective-I)
SYLLABUS FOR B.E. (ECE) VI – SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U24PE631EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To enable students to model and simulate wireless communication systems and channel characteristics 2. To impart practical skills in analyzing system performance parameters under varying wireless conditions. 3. To demonstrate equalization and noise mitigation techniques for improving communication reliability. 4. To introduce students to software tools such as GNU Radio and SystemVue 5. To provide hands-on experience with advanced wireless technologies using SDR and 5G simulation environments.	On completion of the course, students will be able to 1. Modeling of Wireless communication channel using MATLAB, Simulink. 2. Implement Wireless channel equalizers. 3. Testing and verification of channel parameters like SNR, BER using ATLA and 5G tool box 4. Establishing wireless connection using SDR 5. Demonstrating the effects of various types of noise on quality of reception

CO-PO/PSO Mapping

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

List of Experiments:

Cycle -1

1 Modelling and analysis of a Cellular Layout with Frequency Reuse Patterns in MATLAB
2 Modelling of two ray channel wireless communication systems using MATLAB
3 Modelling and simulation of Multipath fading channel using MATLAB
4 Analyse a wireless channel and evaluate the performance measurements such as BER, throughput, capacity, EVM using MATLAB

5 Wireless Channel equalization: Zero-Forcing Equalizer (ZFE), MMSE Equalizer (MMSEE) using MATLAB
6 Analysing the effects of phase noise, channel noise in higher order modulation using GNU radio.

Cycle -2

7 Wireless Path loss Computations - Study of Propagation Path loss Models: Indoor & Outdoor (Using MATLAB Programming)
8 Introduction to SystemVue – OFDM modulation and Demodulation
9 Noise Scaling for Frequency-Domain Channel Modelling and time domain channel modelling using 5G tool box
10 SNR Verification for Frequency-Domain Channel Modelling and time domain channel modelling using 5G tool box
11 Implementation of baseband modulation using System Vue
12 Implementation of RF simulation using System Vue

General Note:

1. At least 5 experiments from each part.
2. A total of not less than 10 experiments must be carried out during the semester.

New / Additional experiments planned:

1 GUI based experimental Features/related parameters
2 Estimate wireless channel coefficients using AI and compare with MMSE and Least Squares estimators.
3 Establishing wireless communication with 2X2 MIMO using SDR
4 Model 5G NR Communication Links using 5G tool box

Learning Resources / Tools:

1. Communication Systems Modeling and Simulation Using MATLAB and Simulink, K C Raveendranathan, Government Engineering College, Universities Press (India) Private Ltd, 2011. ISBN: 978-81-7371-722-2; Language: English.
2. Software-Defined Radio for Engineers By Alexander M. Wyglinski, Travis F. Collins, Robin Getz, Di Pu · 2018
3. Digital Communication Systems Using SystemVue (DaVinci Engineering) Hardcover

The break-up of CIE:

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

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Artificial Neural Networks

(Professional Elective-I)
SYLLABUS FOR B.E. (ECE) VI – SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U24PE640EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Develop a solid foundation in Neural Networks 2. Provide technical details on Activation and Pattern recognition 3. Emphasize concepts on Feed Forward Neural Networks 4. Cover Feedback Neural Networks 5. Train with real-world applications	On completion of the course, students will be able to 1. Interpret basics of Neural Networks. 2. Apply activation functions. 3. Apply Feed forward neural networks. 4. Apply Feedback Neural Networks. 5. Design Neural Network Models for various applications.

CO-PO/PSO Mapping

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

UNIT-I:
Basics of Neural Networks: Characteristics of Neural Networks, Artificial Neural Networks Terminology, Models of Neuron, Topology, Basic Learning Laws

UNIT-II:
Activation and Synaptic Dynamics: Introduction, Activation Dynamics Models, Synaptic Dynamics Models, Learning Methods.
Pattern Recognition: Pattern Recognition Problem, Basic Functional Units

UNIT-III:
Feedforward Neural Network: Introduction, Analysis of Pattern Association Networks, Analysis of Pattern Classification Networks

UNIT-IV:

Feedback Neural Networks: Introduction, Analysis of Linear Auto associative FF Networks, Analysis of Pattern Storage Networks.
Recurrent Neural Networks: Introduction, Architecture of RNN,
Convolutional Neural Networks: Introduction, Basic Structure of Convolutional Network.

UNIT-V:

Applications of ANN: Neural networks for binary and multi classification tasks, neural networks for regression tasks, Handwritten digit recognition using Neural Network

Learning Resources:

1. B. Yegnanarayana - Artificial neural network, PHI Publication.2012.
2. Charu C. Aggarwal-Neural Networks and Deep Learning, Springer 2018.
3. Kevin L. Priddy, Paul E. Keller – Artificial neural networks: An Introduction - SPIE Press, 2005.
4. Mohammad H. Hassoun – Fundamentals of artificial neural networks - MIT Press, 1995.
5. https://nptel.ac.in/courses/117105084

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 ELECTRONICS AND COMMUNICATION ENGINEERING

Artificial Neural Networks Lab

(Professional Elective-I)
SYLLABUS FOR B.E. (ECE) VI - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U24PE641EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. Cover practical implementation of Neuron concepts 2. Expose on Perceptron Learning and Hop field networks 3. Hands on exposure on Feed forward Neural Networks 4. Provide insights on classification and regression 5. Train in real time applications	On completion of the course, students will be able to 1. Implement fundamental Neuron concept. 2. Apply Perceptron Learning Techniques. 3. Implement Hopfield Neural Network. 4. Design and implement Neural Networks for classification and regression tasks. 5. Design and implement Neural Networks for real time applications

CO-PO/PSO Mapping

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

List of Experiments

Cycle-I

1. Weight and Bias effect on Neuron
2. Activation function effect on Neuron
3. Perceptron Learning rule for computing new weights
4. Perceptron Learning by changing number of epochs
5. Hopfield Neural Network
6. Generate Feedforward Neural Network

Cycle-II

1. Feedforward Neural Network with gradient descent and variable learning rate gradient descent.
2. Neural Network for Binary Classification
3. Neural Network for Multi Classification
4. Neural Network for Regression problem
5. Handwritten digit recognition using Neural Network
6. Image classification using Convolutional Neural Network

New/ Additional experiments planned:

1. Machine Learning using Neural Networks.
2. Deep Learning using Neural Networks.
3. Optimize transmission power in wireless systems using gradient-based AI algorithms.

Learning Resources/Tools

1. MATLAB 2023a.
2. B. Yegnanarayana - Artificial neural network PHI Publication.2012.
3. Kevin L. Priddy, Paul E. Keller – Artificial neural networks: An Introduction - SPIE Press, 2005
4. Mohammad H. Hassoun – Fundamentals of artificial neural networks - MIT Press ,1995

The break-up of CIE :

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

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Voice and Data Networks

(Professional Elective-I)
SYLLABUS FOR B.E. (ECE) VI - SEMESTER

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U24PE650EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand fundamental network design principles, performance issues, and terminology associated with voice and data communication. 2. To explore network architectures including layered models, cross-layer designs, and switching mechanisms in voice and data networks. 3. To analyze the role of data and control planes in the network layer and examine routing protocols and SDN fundamentals. 4. To apply queuing and traffic models for analyzing network performance, and understand medium access control in local area networks. 5. To provide a comprehensive understanding of VoIP systems, including their architecture, protocols, echo management, performance metrics, and Quality of Service (QoS) techniques.	On completion of the course, students will be able to 1 Identify and describe key network design and performance issues relevant to centralized and distributed systems. 2 Apply switching techniques and layered architectures used in wired and wireless voice/data communication. 3 Demonstrate the ability to configure routing protocols and explain the fundamentals of software-defined networking. 4 Apply queuing theory and Markov models to evaluate the performance of traffic in various network scenarios. 5 Analyze and evaluate VoIP technologies and protocols, and apply QoS mechanisms to ensure efficient and reliable voice communication over IP networks.

CO-PO/PSO Mapping

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

UNIT – I

Network requirements, Network Performance parameters, Network Terminology, Voice and data networks, Issues in design of voice and data networks. Network architecture, Network software.

UNIT – II

Switching, Three Stage Space Division Switch, Blocking and Non-blocking switching, Introduction to Signaling System Number 7 (SS7), Circuit Switching and Packet Switching, Multiplexing.

UNIT – III

Network layer-date plane: Input and output processing, input and output queuing, packet scheduling. Control plane: Routing in Internet. OSPF, BGP,RIP,NAT, Software defined networking (SDN) fundamentals

UNIT – IV

Queuing Models of Networks, Traffic Models, Little's Theorem, Markov chains, M/M/1 and other Markov systems, Examples of LAN, Types of VLAN, Trunking, Advantages.

UNIT-V

Introduction to VOIP, VOIP architecture and components, VOIP protocols-SIP,H.23,RTP,RTCP, Echo cancellation, metrics: latency, jitter, packet loss, QoS techniques: DiffServ, IntServ, RSVP, security in VOIP

Learning Resources:

1. J. F. Kurose and K. W. Ross, Computer Networking: A Top-Down Approach, 8th ed., Boston, MA, USA: Pearson, 2020.
2. D. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, Prentice Hall, 1992.
3. L. Peterson and B. S. Davie, "Computer Networks: A Systems Approach", 5th Edition, Morgan Kaufman, 2011.
4. Kumar, D. Manjunath and J. Kuri, "Communication Networking: An analytical approach", 1st Edition, Morgan Kaufman, 2004.
5. Walrand, "Communications Network: A First Course", 2nd Edition, McGraw Hill, 2002.
6. Leonard Kleinrock, "Queueing Systems, Volume I: Theory", 1st Edition, John Wiley and Sons, 1975.
7. https://nptel.ac.in/courses/106105082
8. "Understanding Voice over IP Technology "Author: Nicholas Wittenberg Publisher: Delmar Cengage Learning

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 ELECTRONICS AND COMMUNICATION ENGINEERING

Voice and Data Networks Lab

(Professional Elective-I)
SYLLABUS FOR B.E. (ECE) VI - SEMESTER

L:T:P (Hrs./week) : 0:0:2	SEE Marks : 50	Course Code: **U24PE651EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce the functions and roles of Layer 2 and Layer 3 devices in data communication networks. 2. To provide hands-on experience in configuring and troubleshooting fundamental network protocols such as RIP, DHCP, and NAT. 3. To familiarize students with wireless security mechanisms and enable configuration of basic wireless network protection schemes like WEP. 4. To develop an understanding of voice communication technologies and protocols including VoIP and SIP through MATLAB simulations. 5. To enable learners to analyze and implement network segmentation using VLANs and compare routing strategies for network efficiency.	On completion of the course, students will be able to 1. Demonstrate understanding of Layer 2 and Layer 3 devices and their roles in network architecture. 2. Configure and troubleshoot basic networking protocols such as RIP, DHCP, NAT 3. Illustrate secure wireless networking practices through configuration of WEP and observation of wireless behavior. 4. Apply the voice communication concepts. 5. To analyze network segmentation using VLAN concepts and evaluate the effectiveness of static and dynamic routing.

CO-PO/PSO Mapping

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

LIST OF EXPERIMENTS:

Cycle-I

1 Interpreting Layer 2 and Layer 3 devices

2 Demonstrating Distribution Layer Functions

3 Configuring routing information protocol.

4 Configuring WEP on a Wireless Router

5 Exploring Different layer 2 devices Options

6 Implementing classless inter domain routing.

Cycle-II

7 Examining Network Address Translation

8 Observing Static and Dynamic Routing

9 Configuring a Cisco Router as a DHCP Server

10 Implement VOIP using MATLAB

11 Implement SIP using MATLAB

12 Implement VLAN in MATLAB

Additional Experiments

1 Voice quality analysis (using MATLAB or Wireshark)
2 Implement RTP, RTCP protocols

List of Equipment :

Software: Packet tracer & MATLAB
Equivalent Hardware: Standalone desktops

The break-up of CIE:

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

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

Skill Development Course - VII: Verbal Ability

SYLLABUS FOR B.E. VI SEMESTER (Common to all branches)

L:T:P (Hrs./week) : 1:0:0	SEE Marks : 40	Course Code: **U24HS630EH**
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. Introduce students to higher order thinking and problem solving via vocabulary and its various components 2. Train students to understand context & theme and use it to complete sentences. 3. Train students to identify the structure of sentences & paragraphs 4. Train students to analyze text, e.g., simple outlining and note taking, summarize, draw conclusions, and apply information to personal experiences 5. Train students to improve the quality of sentences by fixing errors	At the end of the course the learners will be able to: - 1. Use vocabulary as a tool to solve questions in verbal ability 2. Identify meanings of words using theme and context 3. Solve questions based on jumbles- sentences and paragraphs 4. Develop skills to critically analyze texts and then the ability to identify its theme 5. Improve the quality of their writing by being aware of the common errors

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			
CO3		2								3		2			
CO4		3								3		2			
CO5										3		2			

UNIT-1: Vocabulary- Reading for Content and Context

Overview: This course is designed for students to not just understand the importance of vocabulary but also to build on it by using the appropriate tools and methods. After which they will be able to solve vocabulary based questions and also use vocabulary as a tool to solve problems.

1.1 Concepts & Context Rules: Collocations & Phrasal Verbs
1.2 Prefixes/ Suffixes & Root Words
1.3 Phrases & Idioms; Questions based on it
1.4 One Word Substitution; Questions based on it
1.5 Antonyms, Synonyms & Incorrect Word Usage

UNIT-2: Fill in the Blanks- Applying Content and Context

Overview: This course is designed for students to identify the clue/ theme words in sentences, then understand the context in which the words are used and finally apply concepts like collocation, antonyms, and synonyms to solve questions.

2.1 Concepts & Rules: Single Fill in the Blanks
2.2 Double/ Triple Fill in the Blanks
2.3 Cloze Test

UNIT-3: Jumbles

Overview: This course is designed to develop and improve reading and study skills needed for college work. Topics include identifying main idea and supporting details, determining author's purpose and tone, distinguishing between fact and opinion, identifying patterns of organization in a sentence or passage and the transition words associated with each pattern, recognizing the relationships between words and sentences, identifying and using context clues to determine the meanings of words, identifying logical inferences and conclusions.

3.1 Concepts- Purpose, Tone, Point of view
3.2 Para jumbles
3.3 Jumbled Sentences

UNIT-4: Critical Reading Skills

Overview: Research shows that good reading skills can lead to well written assignments. In this unit, students will learn, develop and improve reading and study skills needed for college work. Building on these basic strategies, students will develop skills to critically analyze texts and then the ability to identify its theme.

4.1 Concepts- Basic Introduction & Short Passages
4.2 Article & Article Based Passages
4.3 Theme Detection

UNIT-5: Spotting the Errors

Overview: In this unit students will focus on identifying errors in sentences, rectifying them and improving the quality of sentences. Building on these skills will also have an impact on the written and spoken skills of students since they will be aware of the common and often made errors and therefore be able to avoid them while using language.

5.1 Concepts- Basic Introduction & Sentence Fillers
5.2 Spot the Errors
5.3 Sentence Improvement

METHODOLOGY	**ASSESSMENTS**
- Demonstration	- Online assignments
- Presentations	- Individual and Group

- Expert lectures
- Writing and Audio-visual lessons

Learning Resources:
learn.talentsprint.com

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

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VLSI Design Lab

SYLLABUS FOR B.E. (ECE) VI – SEMESTER

L:T:P (Hrs./week) : 0:0:2	SEE Marks : 50	Course Code: **U24PC611EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To design and verify CMOS static and dynamic Inverter 2. To convert schematic design into layout 3. To design and simulate various adders 4. To Design and simulate different memories 5. To test the given CMOS circuit	On completion of the course, students will be able to 1. Demonstrate the knowledge of digital circuit design flow. 2. Develop and analyze the process of simulation of combinational circuits. 3. Analyze the process of simulation of sequential circuits. 4. Evaluate the flow of schematic to layout of combinational and sequential circuits. 5. Validate and demonstrate the results of digital circuits.

CO-PO/PSO Mapping

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

1. Design and simulate pseudo NMOS Inverter
2. Design and simulate CMOS inverter.
3. Design and simulate two input CMOS NAND/NOR gate.
4. Design and simulate CMOS Full adder
5. Design and simulate the D-Flip Flop.
6. Simulate the dynamic memory 1Transistor and 3 Transistor cells.
7. Simulate the static memory 6 Transistor cell.
8. Layout of CMOS inverter
9. Perform DRC and LVS of CMOS inverter

10. Perform parasitic extraction of CMOS inverter
11. Perform Post layout level simulation of CMOS inverter
12. Perform CMOS circuit testing for stuck at 1 and stuck at 0 faults.

New / Additional experiments planned:

1. Implementation of FSM based Applications on FPGA
2. Design and simulate 4-bit carry select adder.
3. Simulate the static memory 4 transistor SRAM memory cell.
4. Predict power consumption and propagation delay of CMOS circuits using machine learning.

Note:

Minimum of twelve experiments are to be conducted.

The break-up of CIE : Internal Tests + Day to day Assignments

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

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

Digital Signal Processing Lab

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

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U24PC621EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To introduce students to fundamental operations on discrete-time signals and systems. 2. To develop the ability to design and implement digital filters for signal processing applications. 3. To enable students to understand and apply the Fast Fourier Transform (FFT) for frequency domain analysis. 4. To provide insights into sampling rate conversion techniques and their comparative analysis. 5. To equip students with skills for acquiring and processing real-time signals for practical engineering applications.	On completion of the course, students will be able to 1. Execute Various Mathematical operations on discrete sequences Verification of system response. 2. Implement various digital filters for a given sequences 3. Compute FFT algorithm for various application 4. Compare different sampling rate convertors. 5. Compute real time signals for various applications using hardware and machine learning algorithm.

CO-PO/PSO Mapping

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

List of Experiments

1. Basic matrix operations and Generation of test signals.
2. Design and Develop a Matlab Based Front-End Application for Performing Linear Convolution of Signals.
3. Design and Develop a Matlab -Based Front-End Application for Performing Circular convolution of Signals.
4. Discrete Fourier Transform (DFT) and frequency analysis.
5. Fast Fourier Transform (FFT) and frequency analysis.
6. Design of FIR filter design using different windows for noise removal in audio signals.
7. IIR filter design: Butterworth & Chebyshev (LPF,HPF, BPF& BSF filter) and noise removal

8. Interpolation and Decimation.

Experiments on TMS Processor

9. Sine wave generation.
10. Audio Loop Back
11. Linear Convolution.
12. Circular Convolution.
13. Discrete Fourier Transform (DFT) and frequency analysis
14. Fast Fourier Transform (FFT) and frequency analysis
15. Implementation of FIR filters.
16. Implementation of IIR filters.
17. Filtering noise or random frequencies in audio using digital filtering.
18. Decimation and Interpolation.
19. Case Study: Signal Classification Using Support Vector Machines (SVM)

New/ Additional experiments planned:

1. GUI Based Application on Image Processing Application
2. Sine wave generation using DSP development kit.
3. Video Processing using DSP development kit.
4. Audio Signal processing using Matlab
5. Design an AI-based adaptive filter to remove noise from ECG or communication signals.

Mini Project(s)

Develop various programs for designing signal processing applications.

Learning Resources/Tools

1. MATLAB 2018a and TMS320C6748OMAP Processor with CCS version 7.
2. Paul B. Zbar, Albert P. Malvino, Michael A. Miller, "Basic Electronics, AText-Lab Manual", Vinay K. Ingleand John G. Proakis, "Digital Signal Processing using MATLAB", 4/e, Cengage learning, 2012.
3. Digital signal processing using MATLAB for students and researchers, John W. Leis, A John Wiley & Sons, Inc., Publication, 1966.
4. B. Venkataramani and M. Bhaskar, "Digital Signal Processor architecture, programming and application", 6/e, TMH, 2013.
5. Rulph Chassaing, "Digital Signal Processing and Applications with the C6713 and C6416DSK", John wiley &sons, 2005.

The break-up of CIE:

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

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Theme Based Project

SYLLABUS FOR B.E. (ECE) VI – SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U24PW619EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3

COURSE OBJECTIVES	COURSE OUTCOMES
1. To explore domain-specific themes and conduct a literature review to identify real-world problems, leading to the development of a project addressing a specific application. 2. To analyze identified problems and formulate appropriate solutions tailored to meet specific functional or technical requirements. 3. To design, develop, and implement effective solutions using appropriate tools and technologies, culminating in a functional project prototype. 4. To promote the use of contemporary technologies and interdisciplinary knowledge in solving targeted problems, resulting in a practical project for a defined requirement 5. To document and present the developed project professionally, showcasing the methodology, outcomes, and relevance to the chosen application.	On completion of the course, students will be able to 1. Identify the domain based problem through the literature survey 2. Propose a solution to address the problem 3. Design/Develop/Implement /Solve the problem and test the solution 4. Adapt to contemporary technologies 5. 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	2					2			
CO2	3	2	3	3	3	2	2		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.

Guidelines for theme based projects

- Batch size shall be 2 (or) 3 students per batch.
- Allocation by department based on their academic performance.

- Themes shall be different for each batch i.e., sometimes main theme may be same, but sub topic shall be independent as for as possible. In case of big size theme, part of the theme can be allotted to different groups for final integration.
- Output of the theme based project should be demonstrable / measurable / outcome based.
- Two overall coordinators for each section for theme based project supervision and faculty supervisors for different batches should be assigned.
- Two reviews – one after six weeks and another one after twelve weeks and final evaluation shall be conducted at the end of the semester.

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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List of Open Elective-III Courses		
Department	**Code**	**Title**
Civil	U24OE510CE	Geo Spatial Information Technology
CSE	U24OE510CS	Introduction to Operating Systems
CSE	U24OE520CS	Fundamentals of Artificial Intelligence (Stream: AIML)
ECE	U24OE530PH	Signal Engineering
EEE	U24OE510EE	Modelling and Simulation of Basic Photovoltaic Systems
IT	U24OE510IT	Introduction to Database Management System
IT	U24OE520IT	Introduction to Artificial Intelligence (Stream: AI&ML)
MECH	U24OE510ME	Drives and Control Systems for Robotics (Stream: Robotics)
H&SS	U24OE540EH	Basics of Entrepreneurship
H&SS	U24OE530EH	Philosophy
H&SS	U24OE520EH	Financial Analytics (Stream: Banking Finance Securities and Investments)
H&SS	U24OE510EH	Marketing Management for Engineers (Stream: Management Courses for Engineers)

VASAVI COLLEGE OF ENGINEERING (Autonomous)
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DEPARTMENT OF CIVIL ENGINEERING

GEO SPATIAL INFORMATION TECHNOLOGY

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

L : T : P (Hrs./week):3:0: 0	SEE Marks:60	Course Code:U24OE510CE
Credits : 3	CIE Marks:40	Duration of SEE:3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to 1. To provide fundamental knowledge on geo spatial technology such as Remote sensing GPS and GIS.	Upon the completion of the course, students are expected to 1. Explain the fundamental principles of remote sensing, including EMR spectrum, radiation interactions, and spectral reflectance characteristics, and identify their applications in observing and analyzing earth surface features. 2. Identify and differentiate various remote sensing systems, satellite characteristics, image types, and digital data formats used in visual interpretation, and understand their applications in fields such as agriculture, water resources, urban planning, and disaster management. 3. Describe the structure and operational principles of GPS and other GNSS systems, and recognize their practical applications . 4. Analyze sources of GPS errors, evaluate position accuracy using DOP/UERE, apply differential and carrier phase positioning methods. 5. Explain the core concepts of GIS, spatial and non-spatial data types, map projections, and demonstrate methods of data input and editing, along with their applications in spatial analysis, infrastructure planning, and environmental monitoring.

UNIT-I: Introduction and Basic Concepts of Remote Sensing : Introduction, Basic concepts of remote sensing, Airborne and space born sensors, Passive and active remote sensing, EMR Spectrum, Energy sources and radiation principles, Energy interactions in the atmosphere, Energy interactions with earth surface features, Atmospheric windows, Spectral reflectance curves

UNIT-II: Remote Sensing Systems: Satellites and orbits, Polar orbiting satellites, Image characteristics and different resolutions in Remote Sensing, Multispectral, thermal and hyperspectral remote sensing. Some remote sensing satellites and their features, Map and Image, color composites, introduction to digital data, elements of visual interpretation techniques. Applications of Remote sensing in various fields.

UNIT-III: Global positioning Systems (GPS): Overview of GNSS and Introduction to GPS, GLONASS, GALILEO, COMPASS, IRNSS systems , Applications of GPS.
GPS: Basic concepts, Functional system of GPS – Space segment, control segment and user segment, Working principle of GPS, Signal structure and code modulation, Pseudo-range measurements and navigation message

UNIT-IV: Errors and Positioning methods of GPS: Errors and biases in GPS measurements, Accuracy of navigation position: UERE and DOP, Intentional degradation of GPS signals: Selective availability (SA) and Anti-spoofing (AS) Differential GPS: Space based augmentation systems (e.g., SBAS, GAGAN) and Ground based augmentation systems (e.g., WASS, EGNOS). GPS Carrier Phase measurements: Single Differencing, Double Differencing and Triple Differencing in GPS measurements.

UNIT-V: Basic Concepts of GIS: Introduction to GIS, Areas of GIS application, Components of GIS, Overview of GIS Software packages, Current issues and Trends in GIS. Variables-Point, line, polygon, Map projections, Map Analysis.
GIS Data: Data types – spatial, non-spatial (attribute data) – data structure, data format – point line vector – Raster – Polygon
Data Input: Keyboard entry, Manual Digitizing, Scanner, Remotely sensed data, Existing Digital data Cartographic database, Digital elevation data
Data Editing: Detection and correction of errors, data reduction, edge matching

Learning Resources:

1. James B. Campbell & Randolph H. Wynne., Introduction to Remote Sensing, The Guilford Press, 2011
2. Lillesand, Kiefer, Chipman., Remote Sensing and Image Interpretation, Seventh Edition, 2022
3. Leick, A., GPS Satellite Survey, John Wiley: NJ, 2015
4. Hofmann, B., Lichtenegger H. and Collins J., Global Positioning System: Theory and Practice, Springer: Berlin, 2011.

5. Basudeb Bhatta, Remote Sensing and GIS, Oxford University Press, 2011.
6. Hofmann-Wellenh of, Bernhard, Lichtenegger, Herbert, Wasle, Elmar, GNSS – GPS, GLONASS, Galileo and more, 2013
7. Thanappan Subash., Geographical Information System, Lambert Academic Publishing, 2011.
8. Paul Longley., Geographic Information systems and Science, John Wiley & Sons, 2015
9. John E. Harmon & Steven J. Anderson., The design and implementation of Geographic Information Systems, John Wiley & Sons, 2003
10. Kang Tsung Chang., Introduction to Geographic Information Systems, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2021.
11. Burrough, P.A., Mc. Donnel and Christopher, D. Lloyd, Principles of GIS, Oxford Publications, 2015.
12. C.P.Lo & Albert K. W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice Hall India Pvt.Ltd, 2016.

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)
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Department of Computer Science & Engineering

INTRODUCTION TO OPERATING SYSTEMS

(OPEN ELECTIVE-III)

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : U24OE510CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES *On completion of the course, students will be able to*
1 Understand different Operating system Structures and Services.	1 Explain Operating system structures and internal structure of a process 2 Compare CPU scheduling algorithms. Analyze Disk scheduling algorithms 3 Apply different techniques for Main memory management. 4 Describe file management techniques. 5 Describe deadlock handling methods.

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	3	2											3	2	
CO2	3	3		2									3	2	
CO3	3		2										2	3	
CO4	2				3					2			2	3	
CO5	3	2		2									3	2	

UNIT-I:
Introduction to operating systems: Definition, User view and System view of the Operating system, Operating system structure, Operating system services.
Process: Process concept, Process Control block, Context switching.

UNIT-II:
CPU Scheduling: Scheduling Criteria, Scheduling Algorithms: FCFS, SJF, Round Robin
Device Management: Disk Scheduling algorithms: FCFS, SSTF, SCAN.

UNIT –III:

Memory Management: Swapping, Contiguous memory allocation: Fixed Partitioning, Variable Partitioning. Non-Contiguous memory allocation: Paging.
Virtual memory: Demand paging, Page replacement Algorithms: FIFO, Optimal, LRU.

UNIT –IV:
File System Interface: File Concept, Access Methods: Sequential, Indexed, and Direct
File System Implementation: File-System Structure, Allocation Methods: Contiguous, Linked and Indexed.

UNIT-V:
Deadlocks: System model, deadlock characterization: Mutual Exclusion, Hold and Wait, Non pre-emption, Circular wait. Deadlock Prevention, Deadlock Avoidance: Banker's algorithm.

Learning Resources:

1. Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts, 9th Edition (2016), Wiley India.
2. Andrew S. Tanenbaum, Modern Operating Systems, 2nd Edition (2001), Pearson Education, Asia.
3. Dhananjay, Dhamdhere.M, Operating System-concept based approach, 3rd edition (2009), Tata McGraw Hill, Asia
4. Robet Love: Linux Kernel Development, (2004)Pearson Education
5. Richard Stevens, Stephen Rago, Advanced Programming in the UNIX Environment, 3rd Edition(2013), Pearson Education
6. http://web.stanford.edu/~ouster/cgi-bin/cs140-spring19/index.php
7. https://nptel.ac.in/courses/106106144/

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)
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Department of Computer Science & Engineering

FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE

Stream- Artificial Intelligence & Machine Learning
(OPEN ELECTIVE-III)
(COMMON for CIVIL, ECE, EEE & MECH) SYLLABUS FOR B.E V SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code:U24OE520CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE	COURSE OUTCOMES *On completion of the course, students will be able to*	
Understand issues and techniques involved in the creation of intelligent systems.	1	Solve searching problems using A*.
	2	Develop an algorithm for playing games.
	3	Represent the knowledge using propositional logic and predicate logic
	4	Understand the Expert Systems
	5	Construct Neural Network to solve problems

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	3	2	2	1										2	
CO2	3	2	2	2										2	
CO3	3	2	2	1										2	
CO4	2	1	2	1										2	
CO5	2	1	2	2										2	

UNIT I:

Introduction: Intelligent Systems, Foundation of AI, Sub areas of AI, Applications.

Problem Solving – State – Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of problem, Exhaustive Searches, Heuristic Search Techniques, Iterative – Deepening A*.

UNIT II:

Problem Reduction & Game Playing: Game Playing, Bounded Look – Ahead Strategy and use of Evaluation Function, MINIMAX procedure, Alpha-Beta Pruning.

UNIT III:

Logic Concepts : Introduction, Propositional Calculus, Propositional Logic, Natural Deduction System, Axiomatic System, Semantic Tableau System in Propositional Logic, resolution Refutation in Propositional Logic, Predicate Logic.

UNIT IV:

Expert System and Applications: Introduction, Phases in Building Expert Systems, Expert System Architecture, Expert System versus Traditional Systems, Truth Maintenance Systems, Application of Expert Systems.

UNIT V:

Artificial Neural Networks: Introduction Artificial Neural Networks, Single – Layer Feed Forward Networks, Multi – Layer Feed Forward Networks.

Learning Resources:

1. Saroj Kaushik, "Artificial Intelligence", Cengage Learning, 2011.
2. Russell, Norvig," Artificial Intelligence, A Modern Approach ", Pearson Education, Second Edition, 2004.
3. Elaine Rich, Kevin Knight, Shivshankar B. Nair, "Artificial Intelligence", Tata McGraw Hill, Third Edition 2009.Stuart Russell, Peter Norvig, Artificial Intelligence – A Modern Approach, Third Edition (2019), Pearson
4. Nils J. Nilsson, Artificial Intelligence: A New Synthesis, (1998),Elsevier

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 : 1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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Signal Engineering

(Open Elective - III)

SYLLABUS FOR B.E. V – SEMESTER (CSE, CSE (AI&ML), ECE, EEE, IT & Mechanical)

L:T:P (Hrs./week) : 2:0:1	SEE Marks : 60	Course Code:**U24OE530PH**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To provide fundamental knowledge of railway signaling systems and their role in ensuring safe and efficient train operations. 2. To develop understanding of signaling components such as signals, relays, track circuits, axle counters, and point machines. 3. To familiarize students with station layouts, train working systems, and block signaling methods. 4. To impart knowledge on interlocking principles, safety mechanisms, and modern electronic interlocking systems. 5. To enable practical exposure to signaling equipment, testing procedures, and real-time railway signaling operations.	On completion of the course, students will be able to 1. Explain the principles and concepts of railway signaling and train working systems. 2. Analyze the functioning of various signaling components and their safety features. 3. Apply interlocking principles to ensure safe train movement in different station layouts. 4. Evaluate the performance and operation of signaling equipment such as relays, track circuits, axle counters, and block instruments. 5. Demonstrate practical skills in handling, testing, and analyzing railway signaling systems and associated subsystems.

CO-PO/PSO Mapping

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

UNIT – I: Introduction to General Signaling (8 Hours)

Opening of Railways: Duties of Commissioners, Sanction to Open Railway for Public Carriage of Passengers, Requirements & Recommendations for Signaling and Interlocking Installations, Catechism for Signaling and Interlocking Installations, for 25KV AC, Spl layouts: Isolation, Ruling gradients, Slip, Catch sidings

Schedule of Dimensions: General, Station Yards, Electric Traction 25KV AC 50 Cycles, Clearances required for 25KV single phase AC Electric Traction.

General Rules: Definitions, Type of Signals; Adequate Distance, System of Working, Absolute Block system, Automatic Block System, Block Working, Level Crossings, Station Working Rules.

UNIT – II: Railway Signaling (6 Hours)

Station Layouts: MACLS, Signal Aspects, Location of Signals; Station Layouts: Single Line, Double Line, 2-Road, 3-Road, 4-Road.

Signaling Elements: Track Circuits & Axle Counters, Block Instruments, point machines, Relays, Relay Interlocking and Electronic Interlocking, Requirement of Signaling in 25KV AC Electrified Area.

Signaling Interlocking Plan: Essentials of Interlocking, Train Detection, Point Switching, Signal, Block Control, Aspect Control Chart.

UNIT – III: Signaling Equipment – I (8 Hours)

Details of Relays, Signal Cables. Signals, Control Panel & Operation – Safety features, Working.

Details of Point Machines – Components, Working, Circuit Progression, Testing, Safety features,

Level Crossing Gates – Working, Circuit Progression, Safety features

Details of Track Circuits, Axle Counters - Single section, Multi-section, Subsystems; Working and Application.

UNIT – IV: Signaling Equipment – II (8 Hours)

Details about Block Instruments – Types, Working, Circuit Progression, safety features Data Acquisition System – Interfaces, Fault Logic.

Details of Integrated Power Supply, CLS Panel, Lightning and Surge Protection.

Practicals at IRISET Laboratory (12 Hours)

1. Relays, Signal Cables. Signals, Control Panel & Operation.
2. Point Machines - Components, Working, Circuit Progression, Testing.
3. Level Crossing Gates - Working, Circuit Progression.
4. Track Circuits, Axle Counters - Single section, Multi-section, Subsystems; Working and Application.
5. Block Instruments - Types, Working, Circuit Progression.
6. Data Acquisition System - Interfaces, Fault Logic.
7. Integrated Power Supply, CLS Panel, Lightning and Surge Protection.

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, HYDERABAD – 500 031

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Modelling and Simulation of Basic Photovoltaic Systems

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

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: U24OE510EE
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to: 1. Understand photovoltaic systems concepts, design criteria and conclusions, 2. Verify model of photovoltaic systems using PSpice.	On completion of the course, students will be able to 1. Understand basics of solar radiation and PSpice software. 2. Use a simplified analytical model of solar cell which can be implemented in PSpice. 3. Examine basic equations of a solar cell and develop PSpice models 4. Describe the association of solar cells to form PV arrays and PV modules. 5. Interface PV systems to supply either DC or AC loads.

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

Unit-1 Introduction to Photovoltaic Systems and PSpice

Photovoltaic system: Introduction, Important definitions: irradiance and solar radiation, Learning some of PSpice basics, Using PSpice subcircuits to simplify portability, PSpice piecewise linear (PWL) sources and controlled voltage sources, Energy input to the PV system: solar radiation availability, Problems

Unit-2 Spectral Response and Short-Circuit Current

Introduction: Absorption coefficient and Reflectance, Analytical solar cell model, PSpice model for the short-circuit spectral current density, Short-circuit current, Effects of solar cell material, DC sweep plots and I(V) solar cell characteristics, Ideal circuit model: series and shunt resistances and recombination terms, Problems

Unit-3 Electrical Characteristics of the Solar Cell

Ideal equivalent circuit, PSpice model of the ideal solar cell, Open circuit voltage, Maximum power point, Fill factor (FF) and power conversion efficiency, Generalized model of a solar cell, Effects of the series resistance on the short-circuit current and the open-circuit voltage, Effects of the shunt resistance, Effects of the recombination diode, Temperature effects, Problems

Unit-4 Solar Cell Arrays, PV Modules and PV Generators
Introduction, Series connection of solar cells, Identical solar cells in series, Bypass diode in series strings of solar cells, Shunt connection of solar cells, Shadow effects, The terrestrial PV module, Photovoltaic arrays, Photovoltaic generators and PV plants, Problems

Unit-5 Interfacing PV Modules to Loads and Battery Modelling
DC loads directly connected to PV modules, Photovoltaic pump systems, DC series motor PSpice circuit, Centrifugal pump PSpice model, PSpice simulation of a PV array-series DC motor-centrifugal pump system, PV modules connected to a battery and load, Lead–Acid battery PSpice model, PSpice model to commercial batteries, Simplified PSpice battery model, Problems

Learning Resources:

1. Luis Castaner and Santiago Silvestre, Modelling Photovoltaic Systems using PSpice, John Wiley & Sons Ltd, 2002
2. Paul Tobin, PSpice for Circuit Theory and Electronic Devices, Morgan & Claypool Publishers, 2007.
3. Muhammad H. Rashid, Introduction to Pspice Using Orcad for Circuits and Electronics, Prentice-Hall of India Pvt.Ltd, 2004.
4. Orcad Capture User's Guide, Cadence Design Systems, Second edition 2000.

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

INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS

(General Pool Stream: Open Elective-III)
(Common for CIVIL, ECE, EEE & MECH) SYLLABUS FOR B.E. V-SEMESTER

L : T : P (Hrs./week): 3:0:0	SEE Marks :60	Course Code :U24OE510IT
Credits :3	CIE Marks: 40	Duration of SEE :3 Hours

Course Objectives	Course Outcomes
The course will enable the students to: Apply the concepts of database management systems and design relational databases.	At the end of the course student will be able to: 1. Understand functional components of the DBMS and develop ER model for a given problem and map ER it to Relational model 2. Understand Relational model and basic relational algebra operations. 3. Devise queries using SQL. 4. Design a normalized database schema using different normal forms. 5. Understand transaction processing and concurrency control techniques.

UNIT – I

Introduction: Database System Applications, Purpose of Database Systems, View of Data, Database Languages, Relational Databases, Database Architecture, Database Users and Administrators.
DatabaseDesign and the E-R Model: Overview of the Design Process, The E-R Model, Constraints, E-R Diagrams

UNIT – II

Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Fundamental Relational-Algebra Operations.

UNIT – III

Structured Query Language: Introduction, Data Definition, Basic Structure of SQL Queries, Modification of the Database, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Subqueries, Join Expressions, Views.

UNIT – IV

Relational Database Design: Features of Good Relational Design, Normalization-Decomposition Using Functional Dependencies, Functional-Dependency Theory.

UNIT – V

Transactions: Transaction Concepts, Transaction State, Concurrent Executions, Serializability

Concurrency Control: Lock-Based Protocols, Timestamp-Based Protocols.

Learning Resources:

1. Abraham Silberschatz, Henry F Korth, S. Sudarshan, Database System Concepts, 6th Edition, McGraw-Hill International Edition, 2011.
2. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, Third Edition, McGraw-Hill International Edition, 2003.
3. Elmasri, Navathe, Somayajulu and Gupta, Fundamentals of Database System, 6th Edition, Pearson Education, 2011.
4. Patric O'Neil, Elizabeth O'Neil, Database-principles, programming, and performance,Morgan Kaufmann Publishers, 2001.
5. Peter Rob, Carlos coronel, Database Systems, (2007), Thomoson.
6. https://nptel.ac.in/courses/106105175/

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, HYDERABAD – 500 031

DEPARTMENT OF INFORMATION TECHNOLOGY

Introduction to Artificial Intelligence

(AI&ML TRACK : OPEN ELECTIVE-III)
(Common for CIVIL, ECE, EEE & MECH) SYLLABUS OF B.E V- SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: U24OE520IT
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The objective of this course is to provide the necessary fundamentals, approaches in Artificial intelligence for problem solving for a goal-based single or multi agents with or without constraints and formalise soft computing techniques for better optimization for intelligent systems.	On completion of the course, students will be able to 1. Investigate applications of AI techniques in intelligent agents. 2. Apply various search algorithms for demonstrating agents, searching and inferencing 3. Analyse searching beyond classical search and adversarial Techniques. 4. Identify problem types which might have constraints and evolutionary computation. 5. Define the fuzzy systems, ethics and risks of AI.

UNIT-I:

Introduction to AI: What is AI, Foundations of AI, History of AI, State of the Art, Applications of AI.

Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

UNIT-II:

Solving Problems by Search: Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies: Breadth first search, Depth-first search, Depth limited search, Iterative deepening depth first search

Informed (Heuristic) Search Strategies: Greedy best first search, A* Search, Optimality of A*, Heuristic Functions.

UNIT-III:

Beyond Classical Search: Local search and optimization problems, Local search in continuous spaces, Searching with non-deterministic actions and partial observations.

Adversarial Search: Games, Optimal decisions in games, Alpha-Beta Pruning, Imperfect real time decisions.

UNIT-IV:

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

Introduction to Evolutionary Computation: Representation – The Chromosome, Initial Population, Fitness Function, Selection, Reproduction Operators, Stopping Conditions, Evolutionary Computation versus Classical Optimization.

UNIT-V:

FUZZY Systems, Logic and Reasoning: Fuzzy Sets- Formal Definitions, Membership Functions, Fuzzy Operators, Fuzzy Set Characteristics, Fuzziness and Probability, Fuzzy Inferencing.

Philosophical foundations: Weak AI, Strong AI, Ethics of AI and Risks of AI.

Learning Resources:

1. Artificial Intelligence A Modern Approach Third Edition – Russell & Norvig
2. Computational Intelligence: An Introduction, 2nd Edition - Andries P. Engelbrecht
3. https://online.stanford.edu/courses/cs221-artificial-intelligence-principles-and-techniques
4. https://nptel.ac.in/courses/106105077
5. https://ocw.mit.edu/courses/6-034-artificial-intelligence-spring-2005/

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 Test: 90 Minutes

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

DEPARTMENT OF MECHANICAL ENGINEERING

DRIVES AND CONTROL SYSTEMS FOR ROBOTICS

(Stream: Robotics) (Open Elective-III) SYLLABUS FOR B.E. V-SEM

Instruction : 3Hours	SEE Marks : 60	Course Code : U24OE510ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: To provide students with a fundamental understanding of control systems and their applications in robotics.	On completion of the course, the student will be able to: 1. Understand basic control system types and analyze block diagrams using transfer functions. 2. Interpret transient and steady-state responses and understand system stability concepts. 3. Represent control systems using state-space models and convert between state-space and transfer functions. 4. Understand control techniques to achieve precise and stable joint control in robotic systems. 5. Implement advanced control strategies to enhance the performance and interaction of robotic systems.

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	2		2				2		2	2	2	
CO2	3	3	2		2						2	2	2	
CO3	3	3	2		2				2		2	2	2	
CO4	3	3	3	2	3				2		2	2	2	2
CO5	3	3	3	2	3				2		2	2	2	2

UNIT-I

Introduction to Control Systems: Examples of control systems, Transfer function of spring-mass-damper system, Transfer function of simple RLC circuit. Block diagrams, Block diagram reduction.

UNIT-II

Steady-State and Transient Response: Transient Response of first order and second order system to step input. Concept of steady-state error. Stability: Introduction to the concept of stability using Routh-Hurwicz criterion.

UNIT-III

State–space representation of linear control systems: Basic concepts. State–space representation of spring-mass-damper system, State–space representation of simple RLC circuit. Conversion of Transfer function into State Space, Conversion of State-Space in to Transfer Function.

UNIT-IV

Independent Joint Control: Transfer function of Armature Controlled DC Motor, Proportional (P) Control, Proportional-Integral (PI) Control, Proportional-Derivative (PD) Control, Proportional-Integral-Derivative (PID) Control.

UNIT-V

Computed Torque Feed-forward Control, Force Control: Compliance Control, Impedance Control, Hybrid Force/Motion Control.

Learning Resources:

1. Norman S. Nise, "Control Systems Engineering", John Wiley & Sons, Inc., 2001.
2. Ogata, K. "Modern Control Engineering", Prentice Hall, 2004
3. Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe Oriolo, Robotics: Modelling, Planning and Control, Springer Science & Business Media, 2008
4. Spong, Mark W., and M. Vidyasagar, Robot dynamics and control. John Wiley & Sons, 2008.

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 ENGINEEING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

BASICS OF ENTREPRENEURSHIP

(Open Elective-III) SYLLABUS FOR B.E V Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : U24OE540EH
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: 1. Take entrepreneurship as a career choice 2. Understand the method of preparing a business model 3. Develop costing and pricing strategy 4. Understand team building and it importance. 5. Create marketing and sales strategies for business and understand business regulations.	On completion of the course the student will be able to: 1. Explain the role of entrepreneurship and assess its potential as a career path. 2. Develop and validate a business model using structured tools. 3. Apply basic costing and pricing strategies for a startup. 4. Demonstrate effective team building and leadership instartups. 5. Design marketing strategies and understand key business regulations.

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	2	1		
CO2		2						2	2	1				
CO3										3				
CO4			2				1		2	1	1			1
Avg.		2	2				1	2.5	2	2	1.5	1	0	1

UNIT-I

Introduction to Entrepreneurship: Definition of Entrepreneurship, Entrepreneurship as a career choice, Benefits and Myths of Entrepreneurship. Characteristics, Qualities and Skills of an Entrepreneur. Impact of entrepreneurship on the Economy and Society.

Opportunity and Customer Analysis: Identify your Entrepreneurial Style, Identify Business Opportunities, Methods of finding and understanding Customer Problems, Process of Design Thinking, Identify Potential Problems, Customer Segmentation and Targeting, Crafting your Value Proportions, Customer-Driven Innovation.

UNIT-II

Business Model and its Validation: Types of Business Models, Lean Approach, the Problem-Solution Fit Test, Solution Interview Method, Difference between Start-up Venture and small Business, Identify Minimum Viable Product (MVP), Build-Measure-Lean Feedback Loop, Product-market fit test.

UNIT-III

Economics and Financial Analysis: Revenue streams and pricing, Income analysis and Cost Analysis. Product Cost and Operation Cost, Basics of Unit Costing, Profit Analysis, Customer Value Analysis, Different Pricing Strategies, Investors' Expectations, Pitching to Investors and Corporate.

UNIT-IV

Team Building and Project Management: Leadership Styles, Team Building in Venture, Role of good team in Venture, Roles and Responsibilities, Explore Collaboration Tools and Techniques. Brainstorming, Mind Mapping. Importance of Project Management, Time Management, Work Flow.

UNIT-V

Marketing & Business Regulations: Positioning, Positioning Strategies, Building Digital Presence and Leveraging Social Media, Measuring effectiveness of Channels, Customer Decision-making Process, Sales plans and Targets, Unique Sales Proposition (USP), Follow-up and Close Sales. Business Regulations of starting and operating a Business, Start-up Ecosystem.

Learning Resources:

1. Robert D. Hisrich, Michael P Peters, "Entrepreneurship", Sixth edition, McGraw-Hill Education.
2. Thomas W. Zimmerer, Norman M. Scarborough, "Essentials of Entrepreneurship and small businessManagement", Fourth edition, Pearson, New Delhi, 2006.
3. Alfred E. Osborne, "Entrepreneurs Toolkit", Harvard Business Essentials, HBS Press, USA, 2005
4. MadhurimaLall and ShikhaSahai, "Entrepreneurship", Excel Books, First Edition, New Delhi,2006

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 ENGNEERING (AUTONOMOUS)
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

PHILOSOPHY

OPEN ELECTIVE- COMMON TO ALL BRANCHES B.E-V SEMESTER

Instruction: 3 Hrs/week	SEE Marks: 60	Course Code: U24OE530EH
Credits: 3	CIE Marks:40	SEE: 3 hrs.

Course Objectives	Course Outcomes
By the end of the course, learners will be able to: 1. To introduce students to the major branches, questions, and methods of philosophy. 2. To develop critical and logical thinking through philosophical analysis. 3. To explore key philosophical texts and thinkers from various traditions. 4. To encourage reflection on ethical, metaphysical, and epistemological issues. 5. To cultivate the ability to construct and evaluate arguments.	On completion of the course, learners will be able to: 1. Define and explain foundational philosophical concepts and theories. 2. Analyze and critique philosophical arguments using logical reasoning. 3. Compare perspectives from different philosophical traditions and historical periods. 4. Apply philosophical thinking to contemporary ethical and social issues. 5. Formulate clear, coherent arguments in both oral and written form.

Unit 1: What Is Philosophy?
Definition and scope of philosophy
Branches of philosophy: metaphysics, epistemology, ethics, logic, aesthetics
Philosophical methods and the role of reasoning

Unit 2: Knowledge and Reality (Epistemology and Metaphysics)
What can we know? (Skepticism, rationalism, empiricism)
Appearance vs. reality
The mind-body problem

Unit 3: Ethics and Moral Philosophy
What is the good life?
Major ethical theories: utilitarianism, deontology, virtue ethics
Moral dilemmas and applied ethics

Unit 4: Political Philosophy

The state, justice and authority
Liberty, rights and duties

Unit 5: Social Philosophy
Social contract theory and
Civil disobedience

LEARNING RESOURCES:-

1. An Introduction to Philosophy – S.E. Panta (Indian Author) A clear, concise textbook introducing Indian and Western philosophical concepts.
2. Introduction to Indian Philosophy – Dutta & Chatterjee (Indian Authors) A classic and easy-to-follow overview of schools like Nyaya, Vedanta, Samkhya, etc.
3. Indian Philosophy (Vol. 1 & 2) – Dr. S. Radhakrishnan A standard reference covering all the major schools of Indian thought. More advanced, but essential.
4. Contemporary Indian Philosophy – Basant Kumar Lal Covers modern thinkers like Gandhi, Aurobindo, Vivekananda, Tagore, Krishnamurti, and Ambedkar.

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)
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Financial Analytics

(BFSI)-OPEN ELCETIVE SYLLABUS- COMMON TO ALL BRANCHES V SEM

Instruction: 3Hrs/week	SEE Marks: 60	Course Code: U24OE520EH
Credits: 3	CIE Marks:40	SEE: 3 hrs.

COURSE OBJECTIVES	COURSE OUTCOMES
1. To gain knowledge of tools of financial Analysis 2. To understand valuation methodologies of Financial Debt Instruments 3. To understand corporate valuation methodologies	1. Provides insights into working of financial markets 2. Blend of Theory and numerical problems 3. Domain knowledge important in view of focus by Fintech companies

Unit 1 (5 hours) Introduction to Financial Management

Introduction to Financial Management - Meaning - Financial Decisions- Interrelation between Financial decisions - Time Value of Money - Concept of Present Value and Future value - Effective Vs Nominal rates of interest. Risk Return Tradeoff- (Simple numerical problems on Risk)

Unit 2 (10 hours) Financial Statement Analysis-MS-Excel based

Financial Statement Analysis - Financial Statements- Components of financial statements- Profit and Loss - Balance Sheet - Cashflow Statement - building blocks of financial statements- Sensitivity of various components on the profitability - Inter and Intra Company comparision - Ratio Analysis, Common Size statements.(Including numericals on Inter and Intra company comparison)

Unit 3 (8 hours) Debt Securities-MS-Excel based

Debt Securities - Types of Bonds - Bond Indenture - Valuation of Bonds - Bonds with Annual and Semi Annual Interest payments - Current Yield - Yield to Maturity and Yield to Call - Bond Duration – importance and Computation - Bond Portfolio management

Unit 4 (5 hours) Capital Structure

Capital Structure- Concept - Sources of Finance - Determinants of Capital Structure - EBIT - EPS Analysis - Effect of Taxation - Consideration of Management Control.

Unit 5 (15 hours) Business Valuation

Business Valuation - Concept - Purpose and Hindrances - Projected Financials - Methods of Valuation - Discounted Free Cash Flow Method - Net Assets Based - Comparable Company- Market multiples - Business Valuation in Mergers- Real life Examples

LEARNING RESOURCES:-

Textbooks

Units 1,2,3,4 –Financial Management by M Y Khan

Unit 5 – Institute of Company Secretaries Study book

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

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

Marketing Management for Engineers

Stream Based -Open Elective

W.E.F ACADEMIC YEAR 2026-27 V-SEMESTER

Instruction: 3 Hrs/Week	SEE: 60	Course code: U24OE510EH
Credits: 3	CIE: 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. To introduce fundamental concepts and principles of marketing relevant to engineering fields. 2. To help students understand market needs and consumer behavior in technical markets. 3. To develop skills in product development, pricing strategies, and promotion techniques for engineering solutions. 4. To explore the role of marketing in innovation, technology, and B2B (business-to-business) sectors. 5. To enable engineers to communicate the value of technical products to diverse stakeholders.	At the end of the course the learners will be able to: - 1. Define and explain core marketing concepts such as segmentation, targeting, and positioning. 2. Analyze consumer and industrial buyer behavior using data and market research. 3. Design basic marketing plans including product, price, place, and promotion strategies for technical products. 4. Apply marketing principles to launch and promote innovations or engineering solutions. 5. Communicate complex technical features in a customer-centric, value-driven language.

Unit-1: Introduction

Concept and importance of Marketing - Market Vs Marketing – Interface with Finance and Production - Marketing Mix – Marketing Environment – Internal and External

Unit-2: Market Segmentation and Positioning

Concept - Levels and Bases for Segmentation - Segmenting Consumer Markets and Business Markets - Evaluation of Market Segments - Selecting Market Segments - Product Positioning, Positioning Strategies

Unit-3: Buyer Behaviour

Introduction to buyer behaviour - Contemporary dimensions of buyer behaviour - Motivation and buyer behavior, Consumer decision making and buyer attitude: Information search, evaluation of alternatives. Steps

between evaluation of alternatives and purchase decision, Post-purchase behaviour.

Unit-4: Advertisement and Promotion

Promotion Decision - Promotion mix - Advertising Decision, Advertising objectives - Advertising and Sales Promotion – Developing Advertising Programme – Role of Media in Advertising - Advertisement effectiveness

Unit-5: Digital Marketing

Importance of digital marketing - Difference between traditional marketing and digital marketing - Trends and scenario of the industry. Importance of Search Engine Optimization (SEO), Digital Campaign (creation, Site targeting, Keyword targeting, Demographic targeting/ bidding) - Blogging, Social networking, Video creation & Sharing, Use of different social media platforms, Web analytics.

Learning resources:-

Prescribed Text Books

Marketing Management – A South Asian Perspective, 13th Edition, by Philip Kotler ISBN 978-0-12-600998-6

Fundamentals of Digital Marketing, Puneet Bhatia, Pearson Ed , ISBN – 978-9352861415

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)
ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

List of Open Elective-IV Courses		
Department	**Code**	**Title**
Civil	U24OE610CE	Project Management
CSE	U24OE610CS	Fundamentals of Database Management System
CSE	U24OE620CS	Fundamentals of Machine Learning
ECE	U24OE630PH	Automatic Train Protection System – Kavach
EEE	U24OE610EE	Introduction to Batteries and Battery management System
IT	U24OE610IT	Web application development & Security
IT	U24OE620IT	Introduction to Machine Learning
MECH	U24OE610ME	Autonomous Mobile Robots (Stream: Robotics)
MECH	U24OE620ME	Additive Manufacturing And Its Applications
H&SS	U24OE630EH	Advanced Course in Entrepreneurship
H&SS	U24OE611EH	Logistics and Supply Chain Management
H&SS	U24OE610EH	Strategic Management for Engineers

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

DEPARTMENT OF CIVIL ENGINEERING

PROJECT MANAGEMENT

(OPEN ELECTIVE-IV) SYLLABUSFORB.E.VI-SEMESTER

L:T:P(Hrs/Week):3:0:0	SEE Marks:60	CourseCode:U24OE610CE
Credits: 3	CIEMarks:40	DurationofSEE:3Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to: 1. Learn the concept of project management along with function and objectives. 2. Understand various techniques used for project planning such as bar charts, CPM, PERT and crashing of networks. 3. Acquire knowledge on various types of contracts, tenders.	Upon the completion of this course the students will be expected to: 1. Understand the objectives, functions and principles of management in projects. 2. Practice the network techniques like CPM and PERT for better planning and scheduling of engineering works. 3. Analyse the importance of cost and time in network analysis and planning the work accordingly. 4. Knowledge on Contracts, Tenders, and Work orders related to the projects. 5. Interpret the concept of Linear Programming and solve problems by Graphical and Simplex methods.

UNIT-I: Significance of Project Management: Importance of Project Management, Types of projects, Project Management Cycle, Objectives and functions ofproject management, management team, principles of organization and types of organization.

UNIT-II: Planning: Project Planning, bar charts, network techniques in project management – CPM Expected likely, pessimistic and optimistic time, normal distribution curve and network problems of PERT.

UNIT-III: Time Cost Analysis: Cost time analysis in network planning, updating

UNIT-IV: Contracts: Introduction, types of contracts and their advantages and disadvantages, conditions of contracts, Introduction to Indian contract act.
Tender: Tenderform, Tender Documents, Tender Notice, Work Order

UNIT-V: Linear Programming and Optimization Techniques: Introduction to optimization-Linear programming, Importance of optimization, Simple problems on formulation of LP. Graphical method, Simplex method-software based approach.

Learning Resources:

1. Punmia B.C., and Khandelwal, PERT and CPM, Laxmi Publications, 2023.
2. Srinath L.S., PERT and CPM: Principles and Application, Vision IAS, 2020.
3. Kumar NeerajJha., Construction Project Management: Theory and Practice, Pearson Education, India, reprint 2020.
4. Peret, F, Construction Project Management an Integrated approach, Taylor and Francis, Taylor and Francis Group, London & New York, 2019.
5. Gahloj. P.S. and Dhiv. B.M., Construction Planning and Management, Wiley Eastern Ltd., 2018.
6. Seetharaman S., Construction Engineering and Management, Umesh Publications, 2017.

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)
ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

FUNDAMENTALS OF DATABASE MANAGEMENT SYSTEM

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

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code :**U24OE610CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Identify different issues involved in the design and implementation of a database system. 2 Understand transaction processing.	1 Identify the functional components of database management system. Create conceptual data model using Entity Relationship Diagram 2 Transform a conceptual data model into a relational model 3 Design database using normalization techniques 4 Apply indexing and hashing techniques for effective data retrieval 5 Explain transaction processing.

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		2									1	1		2
CO2	2	1	2										1		2
CO3	2	1	2		2							2	2		2
CO4	2	1	2		2							1	2		2
CO5	2	1	1									1	2		2

UNIT-I

Introduction: Database System Application, Purpose of Database Systems, View of Data, Database Languages, Relational Database, Database Architecture, Database Users and Administrators.

Database Design and E-R Model: Overview of the Design Process, the E-R Model, Constraints, E-R Diagrams.

UNIT-II

Relational Model: Structure of Relation Database, Relational Algebra Operations, Modification of the Database.

Structured Query Language: Introduction, Basic Structure of SQL Queries, Set Operations, Aggregate Functions, Null Values, Nested Sub queries, Views.

UNIT-III

Relational Database Design: Features of Good Relational Designs, Atomic Domains and first Normal form, Decomposition Using Functional Dependencies.

UNIT-IV

Indexing and Hashing: Basic Concepts, Ordered Indices, B+ Tree Index Files, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing.

UNIT-V

Transaction Management: Transaction concept, Storage Structure, Transaction Atomicity and Durability, Transaction Isolation and Atomicity, Serializability, Recoverability.

Learning Resources:

1. Abraham Silberschatz, Henry F Korth, Sudharshan S, Database System Concepts, 6th Edition(2011), McGraw-Hill International Edition.
2. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System , 8th Edition(2006) Pearson Education.
3. Raghu Ramakrishna, and Johannes Gehrke, Database Management Systems, 3rd Edition(2003), McGraw Hill.
4. RamezElmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, 4th Edition(2006), Pearson Education.
5. Peter rob, Carlos coronel, Database Systems, (2007), Thomoson.
6. http://nptel.ac.in/courses/106106093/

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)
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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

FUNDAMENTALS OF MACHINE LEARNING

Stream- Artificial Intelligence & Machine Learning
(OPEN ELECTIVE-IV)
(COMMON for CIVIL, ECE, EEE & MECH) SYLLABUS FOR B.E VI SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code:U24OE620CS
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE	COURSE OUTCOMES On completion of the course, students will be able to
To formulate machine learning problems corresponding to an application.	1. Explain the basics machine learning. 2. Prepare the data for learning 3. Select the feature and transform it . 4. Classify the data using classification models 5. Solve problems using Unsupervised learning models

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		2	1									1		2
CO2	2	2	2	2	2								1		3
CO3	3	2	3	2	2								2		3
CO4	3	2	2	2	1								2		3
CO5	3	2			2								2		3

UNIT I:
Introduction to Machine Learning: Introduction, types of Human learning, types of learning, Problems not to be solved by Machine learning , applications of machine learning , Issues in machine learning,
UNIT II:
Preparing to Model : Introduction, Machine Learning Activities, Basic Data types in machine learning , Exploring Structures of Data.

UNIT III:
Basics of Feature Engineering: Introduction, feature transformation: feature Construction.

UNIT IV:
Supervised Learning – Classification: Introduction, Example of supervised learning, classification model, classification learning steps, common classification algorithms: KNN and Decision Tree, Regression: Introduction, Simple Linear regression.

UNIT V:
Unsupervised Learning – Introduction, Unsupervised vs supervised learning, Application of Unsupervised Learning, types of Clustering techniques, Partitioning methods, k-medoids.

Learning Resources:

1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, -Machine Learning, Pearson Education
2. Tom Mitchell, —Machine Learning||, McGraw-Hill Science, First edition.
3. Christopher Bishop, —Pattern Recognition and Machine learning||, Springer (2006).
4. Stephen Marsland,||Machine Learning –an algorithmic perspective||, CRC Press.
5. Daniela witten, Trevor Hastie Robert Tibshirani and Gareth James, —An introduction to statistical Learning with applications in R, Springer 2013
6. https://onlinecourses.nptel.ac.in/noc18_cs26/preview
7. https://www.coursera.org/learn/machine-learning

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 : 1 Hour 30 Minutes

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

Automatic Train Protection System - Kavach

SYLLABUS FOR B.E. VI – SEMESTER
(CSE, CSE (AI&ML), ECE, EEE, IT & Mechanical)

L:T:P (Hrs./week) : 2:0:1	SEE Marks : 60	Course Code:**U24OE630PH**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To provide comprehensive knowledge of automatic train protection systems with emphasis on the Kavach architecture and working. 2. To develop understanding of onboard and wayside subsystems, communication protocols, and signaling interfaces in Kavach. 3. To familiarize students with design aspects including station layouts, survey, estimation, and implementation strategies for Kavach deployment. 4. To impart knowledge on operational concepts such as braking curves, speed profiles, movement authority, and communication mechanisms. 5. To enable students to simulate, test, and validate Kavach system configurations ensuring safety, reliability, and compliance.	On completion of the course, students will be able to 1. Explain the concepts of train protection systems and the working principles of the Kavach system. 2. Analyze the components and subsystems of Kavach including onboard and wayside equipment. 3. Apply design principles to develop layout plans and implementation strategies for Kavach deployment. 4. Evaluate operational parameters such as speed profiles, braking curves, and communication protocols in Kavach. 5. Demonstrate the ability to simulate, test, and validate Kavach configurations using testbench environments.

CO-PO/PSO Mapping

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

UNIT – I: Introduction to Train Protection Systems (8 Hours)

Train Protection Systems: Auxiliary Warning Systems, European Train Control Systems Communication Based Interlocking System, Spot and Continuous Relay of Information

Working of Train Protection System – Kavach: Overview of Kavach and

its Working, Features, Subsystems, Communication Interfaces, Signalling Interfaces

Subsystem: Onboard Kavach: Driver Machine Interlocking, Braking Interface, Radio Equipment, Onboard Computer, Transponder Receiver, Odometry, GNSS, GPRS, GSM

Subsystem: Stationary Kavach Station Kavach, Track Side Equipment, Signalling Interface, Radio & Tower, GNSS, Transponders, Network Monitoring System

UNIT – II: (6 Hours)

Concepts : Location Referencing - Train position, Modes of Onboard subsystem, Train Characteristics, Mode Transitions, Braking Curves, Speed Profiles, Speed Limits, Speed Monitoring, Target Speed, Target Distance, Movement Authority, Communication Protocols, Key Management System (KMS), Messages & Language

UNIT – III: Design –Kavach: (8 Hours)

Survey, Assessment & Estimation: Station Layout, Radio Signal Strength, Tower Location, Power Requirement, Cable Survey, Loco Fitment Survey

Station Design: Kavach Scheme Plan, Kavach Control Table, Signalling Interface Diagram, Connectivity Plans for Remote Interface Units (RIUs), Power Supply Plan

Tower Design: Soil Testing, Foundation design, Super Structure Design

UNIT – IV: Installation, Deployment & Testing (8 Hours)

Stationary Kavach: Interlocking Interface, RFID Tags, Station Master Operation Console Indication Panel (SM_OCIP), GPS/GSM Antennas, Pre-commissioning Checklist, Testing

Onboard Kavach: DMI, Speed Sensors, RFID Reader, Onboard Computer, Brake Interface Unit, Pre-commissioning Checklist, Testing

Practicals at IRISET Laboratory (12 Hours)

1. Testbench, Preparation and deployment of Stationary Kavach Data : Configuration involving Topographical Information - Arrangement of Signals/Markers, Transponders, Inter signal Distances, Signal Routes, Gradients, Speed Restrictions
2. Verification and Validation of Onboard Data – Ceiling

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, HYDERABAD – 500 031

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Introduction to Batteries and Battery management System

(Open Elective-IV) SYLLABUS FOR B.E. VI SEMESTER

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code:U24OE610EE
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to: The objective of this course is to introduce learner to batteries, its parameters, modelling and charging requirements. The course will help learner to develop battery management algorithms for batteries.	On completion of the course, students will be able to 1. Interpret the role of battery management system. 2. Identify the requirements of Battery Management System. 3. Interpret the concept associated with battery charging / discharging process. 4. Calculate the various parameters of battery and battery pack. 5. Design the model of battery pack

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

UNIT -I: Introduction to Battery Management System:
Cells & Batteries, Nominal voltageand capacity, C rate, Energy and power, Cells connected in series, Cells connected in parallel, Electrochemical and lithium-ion cells, Rechargeable cell, Charging and Discharging Process, Overcharge and Undercharge, Modes of Charging.

UNIT -II: Battery Management System Requirement:
Introduction and BMS functionality, Battery pack topology, BMS Functionality, Voltage Sensing, Temperature Sensing, Current Sensing, High-voltage contactor control, Isolation sensing, Thermal control, Protection, Communication Interface, Range estimation, State-of-charge estimation, Cell total energy and cell total power.

UNIT –III: Battery State of Charge and State of Health Estimation, Cell Balancing:

Battery state of charge estimation (SOC), voltage-based methods to estimate SOC, Model-based state estimation, Battery Health Estimation, Lithium-ion aging: Negative electrode, Lithium-ion aging: Positive electrode, Cell Balancing, Causes of imbalance, Circuits for balancing.

UNIT –IV: Modelling and Simulation:

Equivalent-circuit models (ECMs), Physics-based models (PBMs), Empirical modelling approach, Physics-based modelling approach, simulating an electric vehicle, Vehicle range calculations, simulating constant power and voltage, Simulating battery packs.

UNIT -V: Design of battery BMS:

Design principles of battery BMS, Effect of distance, load, and force on battery life and BMS, energy balancing with multi-battery system.

Learning Resources:

1. Plett, Gregory L. Battery management systems, Volume I: Battery modeling. ArtechHouse, 2015.
2. Plett, Gregory L. Battery management systems, Volume II: Equivalent-circuit methods. Artech House, 2015.
3. Bergveld, H.J., Kruijt, W.S., Notten, P.H.L "Battery Management Systems - Design byModelling" Philips Research Book Series 2002.
4. Davide Andrea," Battery Management Systems for Large Lithium-ion Battery Packs"Artech House, 2010.

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)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF INFORMATION TECHNOLOGY

WEB APPLICATION DEVELOPMENT AND SECURITY

(GENERAL TRACK: OPEN ELECTIVE-IV)
(Common for CIVIL, ECE, EEE & MECH) SYLLABUS FOR B.E VI- SEM

L:T:P(Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U24OE610IT**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
1) Acquire basic skills for designing static and dynamic Web Applications using HTML, CSS, Java Script, Bootstrap and XML. 2) Acquire fundamental knowledge of Web Security concepts	On completion of the course, students will be able to 1. Design a static web pages using HTML, CSS. 2. Create dynamic web pages and client side validation using JavaScript. 3. Develop responsive web applications using Bootstrap. 4. Build an application using an MVC Framework and XML 5. Analyze and evaluate web security attacks.

UNIT-I: Introduction

Introduction: World Wide Web, Web Browsers, Web Servers, URL, HTTP, TCP Port. HTML: Standard HTML document structure, Basic Tags, Images, Hypertext Links, Lists, Tables, Frames. CSS: In-line style sheets, Internal Style sheets and External Style sheets.

UNIT-II: Basics of JavaScript

JavaScript: Introduction, Basics of JavaScript-variables, data types and operators, Control Structures, Arrays, Functions, HTML Forms, Events and event handling.

UNIT-III: Bootstrap

Bootstrap: The Grid system, Layout components: Tables, Images, alerts, buttons, badges, progress bars, cards, drop downs, pagination, Collapse, Navbar, Carousel.

UNIT-IV: XML

XML- The Syntax of XML, XML Document Structure, Document Type Definitions.

Introduction to MVC - Introduction to Model View Controller Architecture

UNIT-V: Web Security Fundamentals

Web Hacking Basics, HTTP & HTTPS URL, Evolution of Web Applications - Web Application Security - Core Defence Mechanisms - Handling User Access - Handling User Input- Handling Attackers - Managing the Application, Introduction to Web 2.0

Learning Resources:

1. Robert W. Sebesta, Programming the World Wide Web, 7th Edition (2014), Pearson Education.
2. "Web Technologies", 7th Edition, Uttam K.Roy,2012.
3. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, Internet & World Wide Web How to Program, 5th Edition, Pearson Education.
4. http://getbootstrap.com/

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, HYDERABAD – 500 031

DEPARTMENT OF INFORMATION TECHNOLOGY

INTRODUCTION TO MACHINE LEARNING

(AI&ML TRACK : OPEN ELECTIVE-IV)
(Common for ECE, EEE, MECH & CIVIL) SYLLABUS FOR B.E VI- SEM.

L:T:P (Hrs./week): 3:0:0	SEE Marks :60	Course Code: **U24OE620IT**
Credits: 3	CIE Marks: 40	Duration of SEE :3Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Introduce the fundamental concepts, techniques and modern tools in Artificial intelligence and Machine Learning field to effectively apply it to the real-world problems.	On completion of the course, students will be able to 1. Demonstrate knowledge of the Artificial intelligence and machine learning literature. 2. Understand and apply latest Python libraries for Machine learning models. 3. Apply an appropriate algorithm for a given problem. 4. Apply machine learning techniques in the design of computer systems. 5. Explain the relative strengths and weaknesses of different machine learning methods and approaches.

UNIT-I:

Introduction to AIML: Foundations of AI, Sub areas of AI, Applications. Introduction to learning, Types of Learning: Supervised Learning, Unsupervised Learning, Reinforcement Learning.

Introduction to Python and ML libraries: intro to python data types, control flow, loops, functions, modules & packages. Intro to NumPy & Scikit-learn.

UNIT-II:

Supervised learning: ML Task, ML Experience or Data, ML Performance metric, Linear Regression, Linear regression Simulator, Logistic Regression.

Supervised Non-parametric learning: Introduction to Decision Trees, K-Nearest Neighbor, Feature Selection.

UNIT-III:

Supervised Parametric learning (Neural networks): Perceptron, Multilayer Neural Network, Playground Simulator, Backpropagation.

UNIT-IV:

Supervised Parametric learning: Support Vector Machine, Kernel function and Kernel SVM.

Supervised Parametric Bayesian learning: Introduction, Naive Bayes Classification, Bayesian Network.

UNIT-V:

Unsupervised leaning: Clustering, K-means Clustering, DBSCAN

Learning Resources:

1. Tom Mitchell, Machine Learning,First Edition, McGraw-Hill, 1997
2. Christopher Bishop. Pattern Recognition and Machine Learning. Second Edition.
3. EthemAlpaydin , Introduction to Machine Learning, Second Edition
4. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e, 2008.
5. http://nptel.ac.in/courses/106106139/
6. https://www.w3schools.com/python/
7. https://www.w3schools.com/python/numpy/default.asp
8. https://scikit-learn.org/stable/
9. Linear Regression Simulator (mladdict.com)
10. Neural Network Playground simulator
11. https://www.mladdict.com/neural-network-simulator

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 ENGINEEING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

AUTONOMOUS MOBILE ROBOTS

(Stream: Robotics) (Open Elective-IV) SYLLABUS FOR B.E VI Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : U24OE610ME
Credits: 03	CIE Marks:40	Duration of SEE : 03 Hours

COURSE OBJECTIVES The objectives of the course is to	**COURSE OUTCOMES** On completion of the course, students will be able to
• Provide students with fundamental understanding of mobile robots and their operation in real-world environments. • Introduce concepts of robot motion, navigation, and interaction with surroundings. • Develop analytical understanding of robot positioning, movement, and path planning. • Familiarize students with basic autonomous decision-making in robotic systems.	• Understand different types of mobile robots and analyze their motion mechanisms. (CO1) • Apply kinematic relationships to determine position and velocity of mobile robots. (CO2) • Estimate robot position using basic localization techniques. (CO3) • Analyze path planning methods for navigating structured environments. (CO4) • Understand fundamental navigation and obstacle avoidance strategies in autonomous robots. (CO5)

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	2	-	-	-	-	-	-	-	2	2	2	2
CO2	3	3	2	2	-	-	-	-	-	-	2	2	2	2
CO3	3	3	2	-	-	-	-	-	-	-	2	2	2	2
CO4	3	3	3	2	3	-	-	-	-	-	2	2	2	2
CO5	3	3	3	2	3	-	-	-	-	-	2	2	2	2

UNIT-I

Introduction to Mobile Robots:

Definition and classification of mobile robots. Comparison between fixed and mobile robots. Applications of mobile robots in industry and service sectors. Types of locomotion: wheeled, tracked, and legged robots. Degrees of freedom and mobility. Basic concepts of robot motion and constraints.

UNIT-II

Kinematics of Mobile Robots:
Kinematic modeling of wheeled mobile robots. Differential drive and skid-steer mechanisms. Forward and inverse velocity relationships. Instantaneous center of rotation. Motion analysis of mobile robots under simple constraints.

UNIT-III
Localization of Mobile Robots:
Introduction to robot localization. Dead reckoning and odometry. Position estimation using wheel encoders. Sources of error in localization. Basic techniques for improving position estimation. Concept of probabilistic localization.

UNIT-IV
Path Planning Techniques:
Introduction to path planning. Representation of environment: grid-based and graph-based methods. Shortest path concepts. Basic algorithms for path planning. Trajectory generation for mobile robots. Planning under simple constraints.

UNIT-V
Navigation and Obstacle Avoidance:
Autonomous navigation concepts. Reactive and deliberative navigation. Obstacle detection and avoidance strategies. Line following robots. Basic potential field method. Introduction to behavior-based robotics.

Learning Resources:
1. Alasdair Gilchrist, Industry 4.0: The Industrial Internet of Things, Apress, 2016.
2. Ibrahim Garbie, Sustainability in Manufacturing Enterprises: Concepts, Analyses and Assessments for Industry 4.0, Illustrated Edition, Springer, 2016.
3. Klaus Schwab, The Fourth Industrial Revolution, Crown, 2017.

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:	5
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	5

Duration of Internal Test: 90 Minutes

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

DEPARTMENT OF MECHANICAL ENGINEERING

ADDITIVE MANUFACTURING AND ITS APPLICATIONS

(General Pool) (Open Elective-IV) SYLLABUS FOR B.E VI Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : U24OE620ME
Credits: 03	CIE Marks:40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: understand the fundamentals of various additive manufacturing technologies and their applications in Engineering Industry.	On completion of the course the student will be able to: 1. Understand the fundamentals of prototyping and the various data formats used in Additive Manufacturing. 2. Study the principle, process, advantages, limitations and case studies of liquid based AM systems. 3. Study the principle, process, advantages, limitations and case studies of solid based AM systems. 4. Study the principle, process, advantages, limitations and case studies of powder based AM systems. 5. Study the applications of AM in various engineering industries as well as the medical field.

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	3	2		2	1								
CO2	3	2	2		3	2								
CO3	3	2	2		3	2								
CO4	3	2	2		3	2								
CO5	1	3	3		3	3								

UNIT-I

Introduction, Prototyping fundamentals, Historical development, Advantages of AMT, Commonly used terms, **Fundamental Automated Processes,** process chain, 3D modeling, Data Conversion, and transmission, Checking and preparing, Building, Post processing, RP data formats, **Newly Proposed formats,** Classification of AMT process.

UNIT-II

Liquid based systems: Stereo lithography apparatus (SLA): Models and specifications, process, working principle, photopolymers, photo

polymerization, layering technology, laser and laser scanning, applications, advantages and disadvantages, case studies.
Solid ground curing (SGC): Models and specifications, process, working, principle, applications, advantages and disadvantages, case studies.

UNIT-III

Solid based systems: Laminated object manufacturing (LOM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.
Fused Deposition Modeling (FDM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.

UNIT-IV

Powder Based Systems: Selective laser sintering (SLS): Models and specifications, process, materials**,** working principle, applications, advantages and disadvantages, case studies.
Three dimensional printing (3DP): Models and specification, process, working principle, applications, advantages and disadvantages, case studies.

UNIT-V

Applications of AM systems: Applications in Design**,** aerospace industry, automotive industry, jewellery industry, coin industry, GIS Application, arts and architecture.
RP medical and bio engineering Application: planning and simulation of complex surgery, customized implant and prosthesis, design and production of medical devices, forensic science and anthropology, visualization of bio-molecules.

Learning Resources:

1. Chua C.K., Leong K.F. and LIM C.S Rapid prototyping: Principles an Applications, World Scientific publications, 3rdEd., 2010
2. D.T. Pham and S.S. Dimov, "Rapid Manufacturing", Springer, 2001
3. Terry Wohlers, "Wholers Report 2000", Wohlers Associates, 2000
4. Paul F. Jacobs, " Rapid Prototyping and Manufacturing"–, ASME Press, 1996
5. Ian Gibson, Davin Rosen, Brent Stucker "Additive Manufacturing Technologies, Springer, 2nd Ed, 2014.

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)HYDERABAD
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

LOGISTICS AND SUPPLY CHAIN MANAGEMENT

SYLLABUS – COMMON TO ALL BRANCHES VI SEMESTER

Instruction: 3 Hours/Week	SEE: 60	Course code: U24OE611EH
Credits: 3	CIE: 40	Duration of SEE: 3 hrs.

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to 1. To understand the importance of the basics of Supply Chain Management process, strategies, framework and transportation using manufacturing and service examples. 2. To understand the role and applications of inventory management, demand forecasting and supply chain and enable students apply the concepts and techniques through case activities, project studies. 3. To interpret the forces controlling the global supply chain and logistics management operations. 4. To outline IT and AI in Supply Chain and logistics Management.	At the end of the course the learners will be able to: - 1. Explain the role of operations and logistics for effective supply chain management. 2. Explore the role of procurement and relationship management in supply chain strategy. 3. Evaluate improvement strategies and solutions in global supply chain and logistics management. 4. Analyse the role of IT and AI in supply chain and logistics operations and evaluate an operation for sustainable supply chains.

Unit-I:

Introduction to Supply Chain Management

Supply chain – objectives – importance – decision phases – process view – competitive and supply chain strategies – achieving strategic fit – supply chain drivers – obstacles – framework – facilities – inventory – transportation – information – sourcing – pricing.

Unit-II:

Inventory and Logistics Management Planning Demand and Supply

Demand forecasting –Planning and Managing Inventories- Safety inventory and its appropriate level – impact of supply uncertainty, aggregation and replenishment policies. Lab (Excel) : Demand Forecasting: Use historical data with functions like FORECAST.LINEAR to predict future needs, preventing stock outs or overstocking, filters to see current stock levels and trigger reorders ABC Analysis: Classify items by value (A, B, C) and demand volatility (X, Y, Z) to optimize safety stock. Trigger Alerts for ABC using Conditional IF.

Unit-III:

Global Supply Chain Introduction, Forces of Global Supply Chain

Global market force, Technology force, Global cost force, Political force - Issues in international Supply Chain Management –International Versus Regional Product, Local autonomy versus control logistics –Importing & Exporting, Main forces, Barriers. Metrics What are SCM Metrics – – SCOR Model.

Unit-IV:

Supply Chain & Global Logistics (Transportation)

Meaning and Significance of International Transportation- Role of transportation in the integrated logistics process, Basic principles of international transportation, Parties involved in international transportation, Significance of Transportation, Modes of International Transportation – Air, Sea and Road - Criteria for Selection of different modes of transportation.

Unit-V:

IT and AI in Supply Chain Management Supply Chain IT framework

Automation- Predictive Analytics in Supply Chain- AI applications in demand forecasting, inventory management, and logistics. Real-time data analytics and decision making in supply chains, Exploring AI's role in enhancing supply chain agility and resilience- Successful AI implementations in SCM (e.g., Amazon, Walmart).

Case study may be given for Unit 2

Books suggested:

- Ewan Roy, what is global supply chain management? by Trade Ready,2017
- Altekar, supply chain management, and concepts PHI 2013.
- Logistics and Supply Chain management, Third Edition By AILAWADI, SATISH C., SINGH, P. RAKESH - PHINDIA.com.

Reference books:

- R.B. Handfield and E.L. Nochols, Jr. Introduction Supply Chain Management. Prentice Hall, 2nd edition (November 30, 2014)
- Sunil Chopra and Peter Meindl. Supply Chain Management: Strategy, Planning, and Operation, Prentice Hall of India, 6th Edition 2013.
- International Logistics Pierre A. David, 2021

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

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD-31

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

ADVANCED COURSE IN ENTREPRENEURSHIP

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

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U24OE630EH
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

Course Objectives The objectives of this course are to	**Course Outcomes** On completion of the course the student will be able to
1. Develop an A-team 2. Refine business models and expand customer segments. 3. Develop strategies to grow revenues and markets, understand Financial Planning 4. Leverage technologies and platforms for growth stage companies 5. Develop key metrics to track progress.	1. Build and manage a high-performing startup team. 2. Refine business models and identify new customer segments. 3. Formulate revenue growth strategies and apply financial planning principles. 4. Utilize digital tools and platforms to scale growth-stage ventures. 5. Define and track key performance metrics for business progress.

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1									2	1				
CO2			1								1			1
CO3											2		1	
CO4					2							1		
CO5											1			
Avg.			1		2				2	1	1.3	1	1	1

UNIT-I: Pivoting and New Business Model

Introduction to Advanced Course and Recapping the key concepts. Revisit of idea/ solution, business model and team members, Need for a mentor. Pivoting and its need. Types of Business models, Refining business model, Analyzing the Business Model of Competitors, Adding new customer segments to existing business model.

UNIT-II: Business Planning

Product Management: Need for a product management with examples. Making a sales plan. Entrepreneur interview, Hiring sales team, Making a people plan for the venture. Introduction and understanding financial planning and forecasting template. Discussing financial planning and revisiting business model. Creating a procurement plan. Negotiation.

UNIT-III: Customer Life cycle and Building the A-team

Customer life cycle. Identifying secondary revenue streams. Funding Landscape: Funding options for an entrepreneur, Investor hunt: Creating funding plan and designing the pitch deck. Attracting right talent. Introduction to building the A-team. Setting the team for success.

UNIT-IV: Branding and Channel Strategy, Leveraging Technologies

Creating brand Strategy: Drawing venture's golden circle. Defining the positioning statement, values. Creating a Public Image and Presence of the Venture. Identifying the right channel, Platforms for Marketing and Promotion, Platforms for Communication and Collaboration. Making the Tech Plan.

UNIT-V: Measuring Progress, Legal Matters and Role of Mentors & Advisors

Metrics for Customer Acquisition and Retention. Financial Metrics. Finding new revenue streams based on key financial metrics, Re-forecasting financial plan to increase margin. Professional Help and Legal & Compliance Requirements. Selecting IP for organization. Identifying mentors and advisors, Scouting board of directors. Capstone Project.

Learning Resources:

1. Clancy, Ann L. &Binkert, Jacqueline, "Pivoting- A coach's guide to igniting substantial change" Palgrave Macmillan US 2017
2. Porter, Michael, E., "Competitive Advantage: Creating and Sustaining Superior Performance", Free press, 1st edi.
3. Schwetje, Gerald &Vaseghi Sam, "The Business Plan", Springer-Verlag Berlin Heidelberg.
4. LeMay, Matt, "Product Management in Practice", O'Reilly Media Inc.
5. Smart, Geoff & Randy, Street., "Who: The A method of hiring", Ballantine books, 2008.
6. Blokdyk, Gerardus., "Customer Lifecycle Management - A complete guide", 5starcooks, 2018

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 ENGNEERING (AUTONOMOUS), HYDERABAD
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

STRATEGIC MANAGEMENT FOR ENGINEERS

SYLLABUS – COMMON TO ALL BRANCHES VI - SEMESTER

Instruction: 3 Hrs/week	SEE: 60	Course code: U24OE610EH
Credits: 3	CIE: 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: 1. To introduce the fundamentals of strategic management and its relevance to engineering and technology. 2. To develop analytical skills for assessing internal and external business environments. 3. To explore strategic planning, implementation, and performance evaluation in engineering contexts. 4. To understand the role of innovation, competition, and sustainability in strategic decisions. 5. To prepare engineers to contribute to strategic decision-making in technical organizations.	At the end of the course the learners will be able to: - 1. Explain key strategic management concepts and frameworks (e.g., SWOT, PESTEL, Porter's Five Forces). 2. Analyze organizational strengths, weaknesses, opportunities, and threats in engineering-driven firms. 3. Develop strategic plans aligned with technical, operational, and business objectives. 4. Evaluate strategic alternatives in terms of risk, competitiveness, and long-term sustainability. 5. Contribute effectively to strategic discussions in interdisciplinary engineering teams.

Unit-I: Introduction to Strategic Management
Strategic Planning, Planning Process, Strategy definition, Establishing Corporate direction, Vision, Mission And Objectives – Strategic Intent – Strategic Management & Process, A Model of Strategy and Elements used in strategic positioning – Strategic choice and Strategic action.

Unit-II: Environmental Appraisal
Demographic, Social and Cultural environment, Technological environment, Economic Environment, Political environment- Industry analysis - S W O T Analysis, Porter's Five Forces Model - Value chain Analysis – Core Competencies.

Unit-III : Strategy Formulation
Business Level Strategy, Strategy formulation, Situation Analysis, Growth Strategies, Offensive strategies, Defensive strategies, Generic Strategies, Industry Life Cycle Analysis -, Emerging Industries, Maturing Industry,

Fragmented Industry, Strategy For Leaders, Challengers, Followers and Niches.

Unit-IV: Alternative Strategies
Strategy analysis and Choices, Strategy Alternatives - Creating Value through Intensive Growth strategies- Integration Strategies - Diversification Strategies, Mergers & Acquisitions – Strategic Alliances – Outsourcing Strategies,

Unit-V: Strategy Implementation and Control
Forms of Organizational Structures –Evaluation of Organization Structures - Leadership Styles - Corporate Governance - Mechanism for Evaluation - Key Performance Indicators -Difference between Operational and Strategic Controls

Learning resources:
Prescribed Text Books
Strategic Management – Text and Cases, VSP Rao, 2nd Edition, Excel Publishers
Business Policy and Strategic Management – Text and Cases, P Subba Rao, Himalaya Publishers.

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 COLLEGEOF ENGINEERING (Autonomous)
ACCREDITEDBY NAAC 0WITH '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 IRISET
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 IRISET
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 IRISET
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 IRISET