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 2024-25
(For the batch admitted in 2022-23)
(R-22)

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
Phones: +91-40-23146040, 23146041
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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-22)** :: B.E. - ECE : FIFTH SEMESTER (2024 - 25)

B.E (ECE) V - 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								
U22PC510EC	Microprocessors and Microcontrollers	3	-	-	3	60	40	3
U22PC520EC	Integrated Circuits and Applications	3	1	-	3	60	40	4
U22PC530EC	Analog and Digital Communication Systems	3	-	-	3	60	40	3
U22PC540EC	Antennas and Wave Propagation	3	1	-	3	60	40	4
U22OE5XXXX	Open Elective – III	3	-	-	3	60	40	3
U22HS510EH	Skill Development Course-V: Communication Skills in English-II	1	-	-	2	40	30	1
U22PE510EC	Skill Development Course-VI : Technical Skills - II	1	-	-	2	40	30	1
PRACTICALS								
U22PC511EC	Microprocessors and Microcontrollers Lab	-	-	2	3	50	30	1
U22PC521EC	Integrated Circuits and Applications Lab	-	-	2	3	50	30	1
U22PC531EC	Analog and Digital Communication Systems Lab	-	-	2	3	50	30	1
U22PW519EC	Mini Project – II	-	-	2	-	50	30	1
	TOTAL	**17**	**2**	**8**		**580**	**380**	**23**
	GRAND TOTAL	**27**				**960**		
Left over hours will be allocated for : Sports / Library / Mentor - Mentee Interaction / CC / RC / TC / ECA / CCA								
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. V – SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **U22PC510EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To familiarize the students on 8086µp and 8051µc architecture to realize the concepts of SoC built-in peripheral programming in Assembly and embedded-C to develop a system.	On completion of the course, students will be able to 1. Conceptualize the architectural features of 8086µp. 2. Interface and program 8086µp with memory, PPI, timer and DMA. 3. Apply the knowledge of Architectural features of 8051 µc to program 8051µc. 4. Interface and program on chip peripherals of 8051µc. 5. Interface off chip peripherals with 8051µc and design a system around 8051µc based system

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2										2		
CO2	2	2	1										1		
CO3	2	2	1										1		
CO4	3	2	1	1	1								1	1	1
CO5	1	1	1	1	1								2	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: 8086 Interfacing

Memory interfacing: RAM, EPROM IC Chips
I/O interfacing: 8255 PPI, 8257 DMA interface
Interfacing programmable interval timers – 8253/8254

UNIT - III: 8051 Microcontroller

Architecture of 8051, Pin configuration, built-in ROM & RAM organization, Stack organization.

Assembly language Programming with 8051: Instruction set, Data transfer, Arithmetic, logical and Branching instructions, Addressing modes.

UNIT - IV: Peripheral and interfacing programming in Assembly and Embedded-C

8051 Timers in different modes, counter programming, 8051 Serial data communication; Interrupt programming.

Off-chip EPROM, SRAM, Expansion of I/O using 8255; Sensor interface– ADC0804, ADC0808; DAC interface.

UNIT - V:Real world interfacing and Device drivers in Embedded-C

Interfacing Seven-segment display, 2x16 LCD, 4x3 Matrix Keyboard, DC Motor, Stepper Motor, DS12887 RTC. Applications of 8086 & 8051: Speed control in Industrial, Automotive with PWM generation; Home automation.

Learning Resources:

1. Ray A.K & Bhurchandhi K.M, "Advanced Microprocessor and Peripherals," 2/e, TMH, 2007.
2. Douglas V Hall, "Microprocessors and Interfacing Programming and Hardware," 2/e, THM, 2007.
3. Mazidi M.A, Mazidi J.G & Rolin D. Mckinlay, "The 8051 Microcontroller & Embedded Systems using Assembly and C," 2/e, Pearson Education, 2007.
4. Microprocessors and Microcontrollers by Dr. Santhanu chatopadhya, IIT Kharagpur https://onlinecourses.nptel.ac.in/noc18_ec03/course
5. Microprocessors and Microcontrollers, IIT Kanpur. https://nptel.ac.in/courses/Webcourse-contents/IIT- KANPUR/microcontrollers

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. V – SEMESTER

L:T:P (Hrs./week): 3:1:0	SEE Marks : 60	Course Code: **U22PC520EC**
Credits : 4	CIE Marks : 40	Duration of SEE : 3 Hours

COURSEOBJECTIVES	COURSEOUTCOMES
1. Students will acquire the knowledge of IC based amplifiers and design various circuits using IC's for any given specifications. 2. Student shall describe specifications of a digital IC for various logic families and design combinational and sequential circuits with Digital ICs.	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, 8038 etc,. 5. Design and analyze applications using different combinational and Sequential circuits (IC's)

CO-PO/PSOMapping

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

UNIT-I:

IC Amplifiers: basic current mirror, Wilson MOS mirror and Widlar current source. Cascode amplifier (common source), differential amplifier with active load, differential gain, common mode gain, CMRR.

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, 741 Op- 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:

Active Filters: First Order and Second Order Low Pass, High Pass filters, Band Pass, Band Reject and All Pass Filters. Analysis and Design of Function Generators

using IC 8038.
555 Timers: Functional Diagram, Monostable, Astable Operations and Applications.

UNIT-IV:
IC Regulators: Analysis and design of fixed voltage regulators & IC 723 voltage regulator
Data convertors : Basic DAC Techniques – Weighted Resistor Type, R- 2R Ladder Type, Inverted R- 2R Type DAC's Different types of ADCs – Parallel Comparator Type, Counter Type, Successive Approximation Register Type and Dual Slope Type.

UNIT-V:
Logic Families: Classification of Digital Integrated Circuits, Standard TTL NAND Gate-Analysis & Characteristics, TTL Open Collector Outputs, Tristate TTL, MOS & CMOS Open Drain and Tristate Outputs,. Comparison of various Logic Families, IC Interfacing - TTL Driving CMOS& CMOS Driving TTL.
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. Adel S. Sedra and Kenneth C. Smith "Micro Electronic Circuits theory and applications" 7th edition Oxford publications, 2017.

NPTEL:

1. https://nptel.ac.in/courses/108106069/
2. https://nptel.ac.in/courses/108108111/
3. https://nptel.ac.in/courses/108108114/

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. V – SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **U22PC530EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To impart knowledge on analog and digital communication.	On completion of the course, students will be able to 1. Determine power, bandwidth, and figure of merit of amplitude modulated signal. 2. Design FM transmitter for a specified frequency and analyze superheterodyne receiver 3. Apply source coding techniques and pulse modulation techniques to convert analog signal to digital signal. 4. Estimate probability of errors for various digital modulation schemes. 5. Encode and decode digital signal for error control.

CO-PO/PSO Mapping

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

UNIT - I : Amplitude modulation

Principle of modulation, Quantitative analysis of amplitude modulation: AM, DSBSC, SSBSC, VSB. 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. Low level transmitters, High level transmitters. 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), Differential pulse code modulation, 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, MSK, QPSK, 8-PSK, QAM. 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.

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

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

Antennas and Wave Propagation

SYLLABUS FOR B.E. V – SEMESTER

L:T:P (Hrs./week): 3:1:0	SEE Marks : 60	Course Code: **U22PC540EC**
Credits : 4	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Students will 1. Understand the fundamentals of antenna operation and working for different applications. 2. Acquire the knowledge of different modes of 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. 4. Analyze the behaviour of various VHF, UHF and Microwave Antennas 5. Compare modes of wave propagation for different applications

CO-PO/PSO Mapping

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

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 Linear and Loop Antennas

Infinitesimal dipole, region separation, Half wave dipole, quarter wave mono pole, Ground effects, small circular loop.

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.

UNIT - IV: VHF, UHF and Microwave Antennas

Helical Antennas-Geometry, Helix modes, Design considerations for Helical Antenna, Horn Antenna, Parabolic Reflector Antennas, Yagi-Uda Array and Log Periodic Array. Micro strip Antennas- Basic characteristics of micro strip antennas, feeding methods. Advanced antennas for spacecraft applications.

UNIT - V: Smart Antennas and Wave Propagation

Basic Concepts of Smart Antennas-Concept and benefits of smart antennas. Different modes of Radio Wave propagation used in current practice: Ground wave propagation, Sky wave propagation and Space wave propagation. Introduction to EMI/EMC

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.K. Shevgaonkar, "Electromagnetic Waves", Tata McGraw Hill, 2005.
6. R.E. Crompton, Adaptive Antennas, John Wiley.
7. https://nptel.ac.in/courses/108101092/

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 HUMANITIES & SOCIAL SCIENCE

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

SYLLABUS FOR B.E. V – SEMESTER

L:T:P (Hrs./week): 1:0:0	SEE Marks : 40	Course Code: **U22HS510EH**
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									2	3					
CO2									2	3					
CO3									2	3					
CO4									2	3					

UNIT-I: Delightful Discussions

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

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

UNIT-III: Fact, Observation and Inference

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

Unit 4: Effective Technical Writing

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

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

Microprocessors and Microcontrollers Lab

SYLLABUS FOR B.E. V – SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U22PC511EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To enable the students with 8086µp and 8051µc based programming with built in peripheral and interfacing off chip peripherals to develop an interface system using µVision5 IDE & simulate on proteus 7.2.	On completion of the course, students will be able to 1. Apply knowledge in writing the programs using MASM assembler tool for 8086 Microprocessor. 2. Apply knowledge in writing the programs in assembly using µVision5 for 8051µc. 3. Interface on chip peripherals of 8051µc using modern tool. 4. Interface off chip peripherals and I/O with interrupt programming to arrive at designs in implementing mini projects.

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1										1		
CO2	2	2	1										2	1	1
CO3	2	2	1	1	1								2	1	1
CO4	2	2	1	1	1							1	2	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 and Proteus for on-chip interface.

3. Programs related to arithmetic instructions.
4. Programs related to logical instructions.
5. Timer and counter programming.

6. Square wave generation with variable duty cycle (PWM).
7. Interrupt programming.

Cycle – II:
Embedded C programming with 8051 using Keil IDE & Proteus for off chip peripheral interface.

8. Serial communication using RS 232 UART protocols.
9. Sensor interfacing with off chip ADC applications.
10. Transducer interfacing with off chip DAC applications.
11. Program to control stepper motor
12. LCD display interfacing (4-bit and 8-bit mode).
13. Keypad interfacing.

Mini project
Mini project based on applications that possibly can be developed using 8051μC by interfacing with on-chip and off-chip peripherals.

New / Additional experiments planned:
1. Design and implementation of user authentication module.
2. Design of UART driver for transmitting the data at 19200bps.

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

Duration of Internal Tests: 3 Hours

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Integrated Circuits and Applications Lab

SYLLABUS FOR B.E. V – SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U22PC521EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Students will Design and verify circuits using IC's for the given specifications.	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 filters and 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	2	1	2									3		
CO2	3	1							1				2		
CO3	3	2	2		2				2				3		
CO4	3	1							1				2		
CO5	3	2	2		2				2				3		

CYCLE - I Experiments

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

CYCLE - II Experiments

Simulation experiments using Cadence tool)

1. Simulate two inputs CMOS NAND gate and plot its transfer characteristics.
2. Design and simulate low pass active filter using Op-Amp.

3. Design and simulate Wilson Current mirror.
4. Design and simulate differential amplifier with active load.
5. Simulate sample and hold circuit using Op-Amp.
6. Simulate switch capacitive filter using Op-amp

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.
3. Analysis and design of circuits, wherever possible, should be carried out using SPICE tools.

New / Additional experiments planned:

1. Designing Synchronous, Asynchronous up/down counters
2. Full Adders, Subtractors using logic gates and multiple bits IC Adder / Subtractor and arithmetic Circuits.

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

Duration of Internal Tests: 3 Hours

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Analog and Digital Communication Systems Lab

SYLLABUS FOR B.E. V – SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U22PC531EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To demonstrate analog and digital communication modulation and demodulation schemes for a given signal.	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. Analyze channel effects on transmitted signals

CO-PO/PSO Mapping

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

Cycle-I

1. Modulation and demodulation of DSB with full carrier.
   AM radio signal reception using Superheterodyne receiver
2. Modulation and demodulation of DSB with suppressed carrier
   Modulation and demodulation of SSB with suppressed carrier
   Frequency division multiplexing and demultiplexing
3. FM signal reception using FM discriminator
   Characteristics of Pre emphasis and deemphasis
4. Generation and detection of PAM signal
   Time division multiplexing of PAM signals
5. Generation and detection of PWM signals in GNU
   Generation and detection of PPM signals

6. Scanning spectrum for FM signals in RF analyzer

Cycle- II

7. Generation and detection of PCM signals
   Time division multiplexing of PCM signals
8. Source coding using Delta modulation
   Source coding using Adaptive delta modulation
9. Generation and detection of ASK, FSK and BPSK signals
10. Generation and detection of QPSK signals in GNU
11. Generation and detection of MSK signals
12. Signal generation using VSG

New / Additional experiments planned:

1. Introducing SystemVue tool for signal transmission
2. Wireless transmission of signals using SDR platform.

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

Duration of Internal Tests: 3 Hours

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Mini Project - II

SYLLABUS FOR B.E. V – SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U22PW519EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3

COURSE OBJECTIVES	COURSE OUTCOMES
Students should be 1. Exposed to contemporary technologies in Electronics and Communication Engineering and apply engineering knowledge into a real world problem with proper Design.	On completion of the course, students will be able to 1. Review the literature survey to identify the problem 2. Propose the solution to address the problem 3. Design/Develop/Implement /Solve the problem and test the solution 4. Demonstrate the work done in the mini project through presentation and documentation 5. Adapt to contemporary technologies

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3			2	2					
CO2				3	3							
CO3								3		3		
CO4									3			3
CO5											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-22)** :: B.E. - ECE : SIXTH SEMESTER (2024 - 25)

B.E (ECE) VI – SEMESTER								
Course Code	Name of the Course	Scheme of Instruction Hours per Week			Duration in Hrs	Scheme of Examination Maximum Marks		Credits
		L	T	P		SEE	CIE	
THEORY								
U22PC610EC	Control Systems Engineering	3	-	-	3	60	40	3
U22PC620EC	Digital Signal Processing	3	1	-	3	60	40	4
U22PC630EC	Computer Networks	3	-	-	3	60	40	3
U22PC640EC	Computer Organization and Architecture	3	-	-	3	60	40	3
U22OE6XXXX	Open Elective – IV	3	-	-	3	60	40	3
U22HS040EH	Economics and Finance for Engineers	2	-	-	3	60	40	2
U22HS630EH	Skill Development Course-VII: Verbal Ability	1	-	-	2	40	30	1
U22PE610EC	Skill Development Course-VIII: Technical Skills - III	1	-	-	2	40	30	1
PRACTICALS								
U22PC611EC	Control Systems Engineering Lab	-	-	2	3	50	30	1
U22PC621EC	Digital Signal Processing Lab	-	-	2	3	50	30	1
U22PC631EC	Computer Networks Lab	-	-	2	3	50	30	1
U22PW619EC	Theme Based Project	-	-	2	-	50	30	1
-	NPTEL Certification Course: 8 or 12 weeks duration	-	-	-	-	-	-	2
	TOTAL	**19**	**1**	**8**		**640**	**420**	**26**
	GRAND TOTAL	**28**				**1060**		
Left over hours will be allocated for : Sports / Library / Mentor - Mentee Interaction / CC / RC / TC / ECA / CCA								
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

Control Systems Engineering

SYLLABUS FOR B.E. VI – SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **U22PC610EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Analyse the performance of a given system in time and frequency domains and choose appropriate compensator if needed.	On completion of the course, students will be able to 1. Develop the mathematical model of the physical systems and find its transfer function 2. Determine time domain specifications of a second order system and analyse its response. 3. Construct Bode plot, Nyquist plot for a given system and analyse its stability. 4. Design a compensator/ controller to meet desired specifications. 5. Analyse MIMO system using state variable approach

CO-PO/PSO Mapping

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

UNIT - I :

Control System fundamentals and Components: Classification of control systems, Open and Closed loop systems. Mathematical modelling of mechanical systems and their conversion into electrical systems. Block diagram reduction and Signal flow graphs.

UNIT - II :

Time response Analysis: Transfer function and Impulse response, types of input. Transient response of second order system for step input. Time domain specifications. Types of systems, static error coefficients, Routh - Hurwitz criterion for stability.

Root locus techniques: Analysis of typical systems using root locus techniques. Effect of location of roots on system response.

UNIT - III :

Frequency response Analysis: Frequency domain specifications, bode plots, Gain margin and Phase Margin. Principle of argument, Nyquist plot and Nyquist criterion for stability.

UNIT - IV :

Compensators: Introduction to compensators, Lag compensator, Lead compensator, Lag- Lead compensator, Design of compensators.
Controllers: Introduction to controllers, P, I, D, PI, PD, PID controllers

UNIT - V :

State space representation: Concept of state and state variables. State models of linear time invariant systems, State transition matrix, Solution of state equations. Controllability and observability.

Learning Resources:

1. Nagrath, I.J., and Gopal, M., "Control System Engineering," New Age Publishers, 5/e, 2009.
2. Ogata, K., "Modern Control Engineering," 5/e, PHI, 2010.
3. Benjamin C. Kuo, "Automatic Control Systems," 7/e, PHI, 2010.
4. Nise, Norman S. Control Systems Engineering. 5th ed. New York, NY: John Wiley & Sons, 2007
5. Richard C. Dorf & Robart H. Bishop, "Modern Control Systems," 11/e, Pearson, 2008.
6. http://www.nptelvideos.in/2012/11/control-engineeringprof-gopal.html
7. https://nptel.ac.in/courses/108101037/ 9. https://nptel.ac.in/courses/108106098/

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. VI – SEMESTER

L:T:P (Hrs./week): 3:1:0	SEE Marks : 60	Course Code: **U22PC620EC**
Credits : 4	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Students will apply FFT algorithms, discuss various design methods of FIR & IIR filters, describe the concepts of multirate signal processing and identify important features of TMS320C67XX DSP processors.	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 filter design using various techniques. 4. Implement Digital IIR filters using various methods. 5. Construct sampling rate convertor by using decimation and interpolation rate converters. 6. Illustrate the architecture of TMS320C67XX DSP processors.

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
CO6	2	2	2												2

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

UNIT - V: Introduction to DSP Processors

Difference between DSP and other microprocessors architectures- Importance of DSP Processors-General purpose DSP processors- TMS320C67XX processor, architecture, registers, pipelining, addressing modes and introduction to instruction set.

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. Li Tan, "Digital Signal Processing: Fundamentals and Applications," Elsevier,2012.
6. B. Venkataramani & M. Bhaskar, "Digital Signal Processor Architecture, Programming and Application," TMH, 2e 2013.
7. Rulph Chassaing, "Digital Signal Processing and Applications with the C6713 and C6416 DSK", John wiley& sons, 2005.
8. https://nptel.ac.in/courses/117102060/
9. https://nptel.ac.in/courses/117104070/

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

Computer Networks

SYLLABUS FOR B.E. VI – SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **U22PC630EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To experience the designing and managing of communication protocols while getting a good exposure to the TCP/IP protocol suite and to understand the different topologies and configurations in the area of computer networks	On completion of the course, students will be able to 1. Describe the network requirements for a given organization and select most appropriate network architecture 2. Design and analyze the performance of LAN for small and medium organizations. 3. Analyze the existing routing and congestion control algorithms. 4. Identify deficiencies in existing protocols and then formulate new and better protocols. 5. Apply and use of cryptography and network security in day to day applications.

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

UNIT - I :

Data communication, LAN, WAN, MAN, Network Topologies: Bus, Star, Mesh, Ring, Hybrid. Line configurations. Reference Models: OSI, TCP/IP, ATM.

Data Link Layer: Design issues, Framing, Error Detection and Correction, Flow control Protocols: Stop and Wait, Sliding Window, ARQ Protocols

UNIT - II :

MAC Sub Layer: Multiple Access Protocols: ALOHA, CSMA, Wireless LAN. IEEE 802.2, 802.3, 802.11, 802.16 standards. Bluetooth, Bridges and

Routers. Circuit switching: Circuit Switching Principles and concepts. Packet switching: Virtual circuit and Datagram subnets.

UNIT - III :

Network Layer: Network layer Services, Routing algorithms: Shortest Path Routing, Flooding, Hierarchical routing, Broadcast, Multicast, Distance Vector Routing and Congestion Control Algorithms. Internet Working: The Network Layer in Internet, IPV4, IPV6 and Internet control protocols.

UNIT - IV :

Transport Layer: Transport Services, Elements of Transport Layer, Connection management, TCP and UDP protocols.

UNIT - V :

Application Layer: Domain Name System, SNMP, Electronic Mail, World Wide Web. Network Security: Cryptography Symmetric Key and Public Key algorithms, Digital Signatures, Authentication Protocols.

Learning Resource:

1. Andrew S Tanenbaum, "Computer Networks," 5/e, Pearson Education, 2011.
2. Behrouz A. Forouzan, "Data Communication and Networking," 5/e, TMH, 2008.
3. William Stallings, "Data and Computer Communications," 8/e, PHI, 2004.
4. S. Keshav, "An Engineering Approach to Computer Networks," 2/e, PearsonEducation.
5. https://onlinecourses.nptel.ac.in/noc18_cs38/preview

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

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

Duration of Internal Tests: 90 Minutes

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Computer Organization and Architecture

SYLLABUS FOR B.E. VI - SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **U22PC640EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To familiarize the students with the concept of organization of a computer system, issues related to performance analysis of CPU in the aspect of memory and I/O interface.	On completion of the course, students will be able to 1. Apply digital engineering fundamentals to acquire knowledge of arithmetic algorithms for different processors. 2. Analyze the performance of Micro programmed Control unit organization. 3. Implementing the techniques of pipelining and parallelism to analyze the performance of a Processor. 4. Apply the conceptual knowledge of system development with appropriate I/O Interface. 5. Interpret various techniques for efficient memory utilization to develop a system application.

CO-PO/PSO Mapping

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

UNIT - I:

Data Representation and Computer Arithmetic: Introduction to Computer Organization and architecture, evolution and computer generations; Fixed point representation of numbers, digital arithmetic algorithms for Addition, Subtraction, ripple carry adder, carry look-ahead adder, Multiplication using Booth's algorithm and Division using restoring and non restoring algorithms. Floating point representation with IEEE standards and its arithmetic operations.

UNIT-II:

Basic Processor Organization: General Register Organization, Stored Program Organization, Stack Operation, RPN-Reverse Polish Notation, Instruction formats-Zero, One, Two and Three-Address instructions. Hardwired control unit, Micro programmed Control organization, address

sequencing, micro instruction format 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.

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 SDRAM, DDR Memories.

Learning Resources:

1. Morris Mano, M., "Computer System Architecture," 3/e, Pearson Education, 2005.
2. Hamacher, Vranesic, Zaky, "Computer Organization," 5/e, McGraw Hill, 2007.
3. William Stallings, "Computer Organization and Architecture: Designing for performance," 7/e, Pearson Education, 2006.
4. Govindarajulu, B., "Computer Architecture and Organization," 2/e, TMH, 2010.
5. John Hennessy and David Patterson, Computer Architecture : A Quantitative Approach, 5th Edition, Elsevier.
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

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 HUMANITIES & SOCIAL SCIENCES

Economics and Finance for Engineers

SYLLABUS FOR B.E. VI – SEMESTER

L:T:P (Hrs./week): 2:0:0	SEE Marks : 60	Course Code: **U22HS040EH**
Credits : 2	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the learners to: Understand the concepts and tools of economics, cost and finance that will equip them for decision making.	At the end of the course the learner will be able to : 1. Gain a conceptual understanding of economics as a discipline. 2. Construct a cost sheet and classify costs and make use of break-even analysis in decision making. 3. Evaluate the accounting cycle and explain its importance in recording business transactions 4. Analyze the financial position of business a firm through calculation and interpretation of ratios. 5. Compare and evaluate Long term investment decisions in business

CO-PO/PSO Mapping

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

UNIT-I: Concepts in Economics

Definition of Managerial Economics- Scope of Managerial Economics - Relevance of Economics for Engineers- Law of Demand- assumptions and exceptions - Price elasticity of demand (Application-oriented approach)

UNIT-II: **Cost Analysis and Profit Planning**

Concept of Cost - Classification of Costs (Fixed Vs Variable, Implicit Vs Explicit, Incremental Vs Marginal)–Preparation of Cost Sheet (Simple Problems)–Breakeven Analysis (Application-oriented approach)

UNIT-III: **Conceptual Understanding of Accounting**

Accounting Cycle-Journal-Subsidiary Books- Ledger-Trial Balance-Final

Accounts (Trading, Profit and Loss Account, Balance Sheet (Theory Only) Preparation of Trading and Profit and Loss Account and Balance Sheet (Problems without adjustments)

UNIT-IV: **Financial Statement Analysis**

Ratio Analysis-uses and limitations- Liquidity, Solvency, Activity & Profitability Ratios (simple problems)

UNIT-V: **Long Term Investment decisions:**

Capital Budgeting –Traditional and DCF Techniques (simple problems)

Learning Resources for students:

1. S.P.Jain and K.L Narang., "Financial Accounting", Kalyani Publishers –Latest edition.
2. S.P.Jain and K.LNarang., "Cost Accounting", Kalyani Publishers, Latest edition.
3. M.Y.Khan and P.K. Jain., "Financial Management – Text, Problems and Cases", Mc Graw Hill Education Private Limited, New Delhi. Latest edition.
4. M. Kasi Reddy & Saraswathi, Managerial Economics and Financial Analysis, PHI New Delhi, Latest edition.

Reference books:

1. Mehta P.L., "Managerial Economics: Analysis, Problems and Cases", Sultan Chand and Sons. Latest edition.
2. Narayanaswamy, "Financial Accounting: A Managerial Perspective", Prentice Hall India
3. M. L. Seth., "Micro Economics", Lakshmi Narain Agarwal. Latest edition.
4. Dr. R.P. Rustagi., "Fundamentals of Financial Management" Taxmann Publications. Latest edition

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)
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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Skill Development Course – VII : Verbal Ability

COMMON FOR ALL BRANCHES – B.E. VI - SEMESTER

L:T:P (Hrs./week): 1:0:0	SEE Marks : 40	Course Code: **U22HS630EH**
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					
CO2										3					
CO3										3					
CO4										3					
CO5										3					

UNIT-I: 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-II: 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-III: 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 Parajumbles
3.3 Jumbled Sentences

UNIT-IV: 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-V: 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

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

ASSESSMENTS

- Online assignments
- Individual and Group

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

Control Systems Engineering Lab

SYLLABUS FOR B.E. VI – SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U22PC611EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To analyze control systems using MATLAB/ SIMULINK	On completion of the course, students will be able to 1. Model any system using MATLAB/ SIMULINK 2. Sketch the response of a system for a given input and determine the specifications of a system. 3. Perform stability analysis of a given system using various plots. 4. Analyze MIMO system using state variable approach. 5. Design a Compensator/Controller for given specifications.

CO-PO/PSO Mapping

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

List of Experiments:

Exp. No.	Name of the Experiment
1	a) Modeling transfer function of a control system. b) Transfer function for given closed loop system through block diagram representation.
2	Time domain specifications of a given control system.
3	Steady state errors of a given transfer function.
4	Stability analysis of a control system using root locus-effect of adding poles, zeros

5 Stability of a given system using bode plot.

6 Stability of a closed loop/open loop system using Nyquist plot.

7 ON/OFF temperature control system

8 Tuning of PID controller to meet required specifications

9 Speed control of servo motor, DC motor, stepper and BLDC motor using Quanser Mechatronics Actuator board.

10 Frequency response of compensating networks

11 Closed loop P, PD, PI, PID Controller on second order systems.

12 State space model for classical transfer function using MATLAB

New / Additional Experiments Planned

1 Implementing Zero order hold circuit for discrete time control system.

2 Measurement of frequency domain specifications

Learning Resources / Tools:

Modeling, Analysis and Design of Control Systems in MATLAB and Simulink, Dingyü Xue, North eastern University China Yang Quan Chen, University of California, World Scientific Publishing Co., 2015.

The break-up of CIE :

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

Duration of Internal Tests: 3 Hours

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Digital Signal Processing Lab

SYLLABUS FOR B.E. VI – SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U22PC621EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Students will develop C & MATLAB programs for operation of sequences, design and obtain the frequency response of various digital filters and to implement techniques of multi rate processing.	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

CO-PO/PSO Mapping

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

List of Experiments (Conduct any Twelve experiments from given list)

1. Basic matrix operations and Generation of test signals.
2. Linear Convolution
3. Circular convolution
4. Discrete Fourier Transform(DFT) and frequency analysis
5. Fast Fourier Transform(FFT) and frequency analysis
6. FIR filter design using different windows and noise removal
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. Decimation and Interpolation.

New/ Additional experiments planned:

1. Sine wave generation using DSP development kit.
2. Video Processing using DSP development kit.
3. Design & Simulate a Multistage decimator using MATLAB.
4. Audio Signal processing using Matlab

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 andapplication", 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

Duration of Internal Tests: 3 Hours

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Computer Networks Lab

SYLLABUS FOR B.E. VI – SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U22PC631EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To provide comprehensive knowledge of networking devices, tools and skills required to implement, test and trouble computer networks	On completion of the course, students will be able to 1. Implement IP addressing schemes and different sub netting scenarios. 2. Perform basic configurations of networking devices like switches androuters 3. Build and implement simple networking topologies and troubleshooting the networks. 4. Implement and troubleshoot virtual LANs and inter-VLAN routing. 5. Implement and test routing protocols like RIPv1, RIPv2, single-area and multi-area OSPF.

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

CYCLE - I Experiments

1. Getting started with Packet Tracer tool and Internetworking OperatingSystem.
2. Implementation of different sub netting scenarios and IP addressingschemes
3. Basic configuration of networking devices
4. Building and troubleshooting different networking topologies
5. Building and testing Wired Local Area Networks

6. Building and testing Wireless Local Area Networks
7. Implementation and understanding of different servers like HTTP,TFP, TFTP and DNS

CYCLE - II Experiments

8. Creating and testing Wide Area Networks
9. Implementation of routing protocols
10. Implementation of Virtual Local Area Networks (VLAN) and inter VLANrouting
11. Testing and troubleshooting networks with Protocol Data Units
12. Implementation of access lists for traffic control in networking
13. Implementation of Gateway protocols (Boarder Gateway Protocols)
14. Experiments on DATA LINK LAYER

New / Additional experiments planned:

1. Network cabling
2. Connections in LAN
3. Case Study: Network based Firewalls.

Learning Resources / Tools :

1. Packet tracer
2. CCNA module 1CCNA Routing and Switching: Introduction to Networks
3. CCNA module-2 CCNA Routing and Switching: Routing and Switching Essentials www.netacad.com

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

Duration of Internal Tests: 3 Hours

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Theme Based Project

SYLLABUS FOR B.E. VI – SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **U22PW619EC**
Credits : 1	CIE Marks : 30	Duration of SEE : 3

COURSE OBJECTIVES	COURSE OUTCOMES
Students should be 1. Exposed to contemporary technologies in Electronics and Communication Engineering and apply engineering knowledge into a real world problem with proper Design.	On completion of the course, students will be able to 1. Review the literature survey to identify the problem 2. Propose the solution to address the problem 3. Design/Develop/Implement / Solve the problem and test the solution 4. Demonstrate the work done in the mini project through presentation and documentation 5. Adapt to contemporary technologies

CO-PO/PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	3			2	2					
CO2				3	3							
CO3								3		3		
CO4									3			3
CO5											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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OPEN ELECTIVES - III		
Department	**Code**	**Title**
Civil	U22OE510CE	Spatial Information Technology
CSE	U22OE510CS	Introduction to Operating Systems
	U22OE520CS	Fundamentals of Artificial Intelligence (Stream- Artificial Intelligence & Machine Learning)
ECE	U22OE510EC	Introduction to Biomedical Electronics
	U22OE530PH	Signal Engineering
EEE	U22OE510EE	Modelling and Simulation of Basic Photovoltaic Systems
IT	U22OE510IT	Essentials of Operating Systems
	U22OE520IT	Introduction to Artificial Intelligence (Stream: Artificial Intelligence & Machine Learning)
Mechanical	U22OE510ME	Drives and Control Systems for Robotics (Stream: Robotics)
	U22OE520ME	Introduction to Robotics
English	U22OE530EH	Design Thinking
	U22OE540EH	Basics of Entrepreneurship

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DEPARTMENT OF CIVIL ENGINEERING

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:U22OE510CE
Credits : 3	CIE Marks:40	Duration of SEE:3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to	Upon the completion of the course, students are expected to
1. To provide fundamental knowledge on geo spatial technology such as Remote sensing GPS and GIS.	1. Select the type of remote sensing technique/data, identify and analyze the earth surface features from the satellite images. 2. Identify GPS components, interpret the navigational message and signals received by the GPS satellites, Identify the error sources and apply corrections for accurate positioning. 3. Analyse the basic components of GIS, process spatial and attribute data, identify and rectify mapping inaccuracies and prepare thematic maps

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: 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, 2015
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. BasudebBhatta, 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. ThanappanSubash., Geographical Information System, Lambert Academic Publishing, 2011.
8. Paul Longley., Geographic Information systems and Science, John Wiley & Sons, 2005
9. John E. Harmon & Steven J. Anderson., The design and implementation of Geographic Information Systems, John Wiley & Sons, 2003
10. ArcGIS 10.1 Manuals, 2013.
11. Kang Tsung Chang., Introduction to Geographic Information Systems, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2008.
12. Burrough, P.A., Principles of GIS for Land Resource Assessment, Oxford Publications, 2005.
13. C.P.Lo& Albert K. W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice Hall India Pvt.Ltd, 2002.

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 : **U22OE510CS**
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.

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:**U22OE520CS**
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

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

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Biomedical Electronics

(Open Elective - III)

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

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U22OE510EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To provide fundamental knowledge of biomedical signals, transducers and various instruments.	On completion of the course, students will be able to 1. recite the basic need of biomedical signals and basic instruments. 2. comprehend the principles of basic bioelectric signals, electrodes and transducers in biomedical electronics. 3. demonstrate the principle of various therapeutic, prosthetic and non invasive instruments for use and prediction of diseases. 4. to acquire knowledge of the mathematical, physical and computational principles underlying modern medical imaging system for visualization and analysis of medical image data.

CO-PO-PSO Mapping

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

UNIT - I :

Basics of Biomedical Electronics: Physiological systems of the body, sources of biomedical signals, basic medical instrumentation system, performance requirements of medical instrumentation systems, Intelligent medical instrumentation systems, General constraints in design of medical instrumentation systems.

UNIT - II :

Bioelectric Signals, Electrodes, Transducers: Origin of bioelectrical signals, recording electrodes, electrodes for ECG, EEG, EMG, micro-electrodes. Transducer: Introduction, classification of transducers, performance characteristics of transducers, displacement position and motion transducers, pressure transducers, photoelectric transducer.

UNIT - III :

Therapeutic and Prosthetic Devices: Cardiac pacemaker, defibrillators, hemodynamic & haemodialysis, ventilators, infant incubators, surgical instruments, therapeutic applications of laser.

UNIT - IV :

Non-invasive Instrumentation: Temperature measurements, principles of ultrasonic measurements and its applications in medicine, medical thermography, physics of thermography infrared detectors and thermographic detectors.

UNIT - V :

Modern Medical Imaging System: Radiography: Production of X-rays, units of X-radiation, block diagram of X-ray machine, MRI, computed tomography: Block diagram and working.

Learning Resources:

1. L. Cromwell, Biomedical Instrumentation and Measurements, Prentice Hall.
2. Handbook of Biomedical Instrumentation by R.S. Khandpur.
3. S.K. Venkata Ram, Bio-medical Electronics and Instrumentation, Galgotia Publications, Pvt. Ltd.

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

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:**U22OE530PH**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To Provide the fundamental knowledge of Signaling and interlocking to control and regulate the movement of trains safely & efficiently.	On completion of the course, students will be able to 1. Acquire knowledge on railway signaling principles. 2. Acquire the working of railway signals & their failsafe and safety aspects. 3. Understand various systems of train working, interlocking features and general requirements of signaling.

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	2	1												2
CO3	3	2	1												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 Photovoltaic Systems

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

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: **U22OE510EE**
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES The course will enable the students to:	**COURSE OUTCOMES** On completion of the course, students will be able to
1. Understand photovoltaic systems concepts, design criteria and conclusions, 2. Verify model of photovoltaic systems using PSpice.	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.

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

Essentials of Operating Systems
(GENERAL 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 : **U22OE510IT**
Credits :3	CIE Marks: 40	Duration of SEE :3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
Learn the principles of modern operating systems i.e various functionalities provided by an operating system such as process management, memory management, Storage and I/O management.	1. Analyze the importance and its key principles by differentiating and categorizing the functionalities of an operatingsystem 2. Examine mechanisms involved in memory management to handle processes and threads. 3. Evaluate and solve deadlocks by assessing various handling strategies related to each of the conditions for deadlock. 4. Interpret the mechanisms adopted for storage organization and access. 5. Interpret the mechanisms adopted for I/O organization and access.

UNIT-I: Introduction and Process Management:
Operating System Functionalities, Types of Operating Systems, User Operating System Interface, System calls, System Boot. Process Concept: Overview, Threads. Process Scheduling - Uniprocessor scheduling algorithms, Multiprocessor and Real-time scheduling algorithms.

UNIT-II: Memory Management:
Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation. Virtual Memory Management: Demand Paging, Page replacement algorithms, Thrashing.

UNIT-III: Process Synchronization:
Inter Process Communication, Process Synchronization - Peterson's Solution, Bakery Algorithm, Semaphores, Critical Section, Monitors. Classical problems of synchronization. Deadlocks: Deadlock prevention,

deadlock avoidance and Deadlock Detection and Recovery - Bankers Algorithm.

UNIT-IV: Storage Management:

File System-Basic Concepts, File System Structure, File System Mounting, Directory Structure, Allocation Methods, Free Space Management.

UNIT-V: I/O Management:

I/O Management: Disk Structure, RAID Structure, Disk Scheduling, Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix.

Learning Resources:

1. Operating System Concepts - Operating System Concepts, Tenth Edition, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, John Wiley & Sons Inc.
2. Modern Operating Systems- Andrew S Tanenbaum, Prentice Hall
3. Operating Systems - Operating System: Internals and Design Principles , William Stallings
4. Operating Systems - System Programming and Operating Systmes D M Dhamdhere, Tata Mc Graw Hill
5. Operating Systems - Operating Systems: A Modern Perspective, Gary Nutt, Addison Wesley
6. Operating Systems - Operating Systems, Achyut S Godbole, Tata Mc Graw Hill
7. https://nptel.ac.in/courses/106108101/
8. https://www.classcentral.com/course/udacity-introduction-to-operating-systems-3419

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: **U22OE520IT**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
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.	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-SEMESTER

Instruction : 3Hours	SEE Marks : 60	Course Code : U22OE510ME
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	12	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, Open Loop & Closed Loop 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 ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

INTRODUCTION TO ROBOTICS

(General Pool)

(Open Elective-III)

SYLLABUS FOR B.E. V-SEMESTER

L:T:P(Hrs./week):3	SEE Marks : 60	Course Code: U22OE520ME
Credits : 3	CIE Marks: : 40	Duration of SEE: 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.	On completion of the course, the student will be able to 1. understand the anatomy of the robot and various robot configurations for it's selection depending on the task. 2. classify the end effectors , understand different types of joints, various types of robot drive systems for carrying out the assigned job effectively. 3. analyze a planar manipulator through forward kinematics and understand the control of robot manipulator for better reliability and efficiency using python programming. 4. Classify the various sensors used in robots for proper selection to an application. 5. summarize various industrial and non-industrial applications of robots for their selection to a particular task.

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

UNIT-I

ROBOT BASICS

Robot-Basic concepts, Definition, Need, Law, History, Anatomy, specifications.
Robot configurations-cartesian, cylindrical, polar ,articulated and SCARA, Serial manipulator &ParallelManipulator
Robot wrist mechanism, Precision and accuracy of robot.

UNIT-II

ROBOT ELEMENTS

End effectors-Classification, Robot drive system types: Electrical, pneumatic and hydraulic. Robot joints and links-Types, Motion interpolation, Robot trajectories2D and 3D Transformation- Scaling, Rotation and Translation, Homogeneous transformation

UNIT-III
ROBOT KINEMATICS AND CONTROL
Robot kinematics – Basics of direct and inverse kinematics. D-H matrix. Forward kinematics for a 2-link RR planar manipulator.
Control of robot manipulators – Point to point and Continuous Path Control. Robot programming methods.Introduction to solve any robotic kinematic problem using python programming.

UNIT-IV
ROBOT SENSORS
Sensors in robots – Touch sensors-Tactile sensors – Proximity and range sensors. Force sensors, Light sensors, Pressure sensors, position and velocity feedback devices.
Introduction to Machine Vision and Artificial Intelligence.

UNIT-V
ROBOT APPLICATIONS
Applications of robots in Industries, Medical, Household, Entertainment, Space, Underwater, Defense, and Disaster management.
Applications of Micro and Nanorobots, Future Applications of robots.

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

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

1	No. of Internal Tests:	02	Max.Marks for each Internal Test:	30
2	No. of Assignments:	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
COURSE NAME-DESIGN THINKING
(Open Elective) SYLLABUS FOR B.E. 3/4 – V SEMESTER

Instruction: 3 Hours	SEE: 60	Course code: U22OE530EH
Credits: 3	CIE: 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
The course will enable the learners to: **1.** Understand the critical design thinking skills needed to either improve an existing product or think about designing a new product. **2.** Learn to identify customer needs and draft customer needs statements as your first step toward user innovations. **3.** Learn how to translate user needs into product specifications quantitatively, and how establishing product metrics can help to define those specifications. **4.** Learn to apply creativity, brainstorming, and concept generation process in designing needs solutions. **5.** Learn to select and implement a product development process that's aligned with your project needs. Explore prototyping methods, strategies, and real-life examples where these have been applied to create a design that represents customer needs and product specifications.	**At the end of the course the learners will be able to: -** **1.** Learn the concepts that drive design thinking. **2.** Submit project ideas around user Innovations. **3.** Identify prospective customer needs and user groups. **4.** Translate needs into product specifications **5.** Build out the product architecture, Create a prototype and present the prototype.

Unit 1: Design Thinking Skills

Understand the critical design thinking skills needed to either improve an existing product or design a new product.

1.1 The Need for Design Thinking
1.2 What makes design thinking unique?
1.3 Design thinking checklist

Unit 2: Identifying Customer Needs

Learn to identify customer needs and draft customer needs statements as your first step towards user innovations.

2.1 Think Users' First
2.2 Users' inherent needs
2.3 Empathy and Design Thinking
2.4 Asking the Right Questions
2.5 Persona Empathy map

Unit 3: Product Specifications

Learn how to translate user needs into product specifications quantitatively, and how establishing product metrics can help define those specifications

3.1 Creating a Design Brief Template

3.2 Stakeholder map template
3.3 Customer journey template
3.4 Context map template
3.5 Opportunity map template

Unit 4: Applied Creativity

Learn to apply creativity, brainstorming, and concept generation process in designing needs solutions.

4.1 The need to ideate
4.2 The Rules of ideation
4.3 Participating in an ideation session
4.4 Building a Creative Culture
4.5 Divergent—5 common ideation techniques

Unit 5: Product Development Processes and Prototyping

Learn to select and implement a product development process that's aligned to your project needs. Explore prototyping methods, strategies, and real-life examples where these have been applied to create a design that represents customer needs and product specifications.

5.1 The need for a prototype
5.2 The Need to Test and how to conduct a structured test
5.3 How to conduct the observers' debrief

METHODOLOGY

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

ASSESSMENTS

- Online assignments
- Individual and Group

Suggested Books

The Art of Innovation, by Tom Kelley*
Insight Out, by Tina Seelig*
Change by Design, Tim Brown
Weird Ideas That Work, by Robert Sutton*
Wired to Care, by Dev Patnaik
Rapid Viz, by Kurt Hanks and Larry Belliston

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 ENGINEEING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
Department of H & SS

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

L:T: P (Hrs./week):3: 0 : 0	SEE :60	Course Code: U22OE540EH
Credits: 3	CIE:40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
The objectives of this course are to: 1. Deeply understand and discover entrepreneurship 2. Build a strong foundation for the students to start, build, and grow a viable and sustainable venture 3. Develop an entrepreneurial mind-set equipped with the critical skills and knowledge required	On completion of the course the student will be able to: 1. Take-up entrepreneurship as a career choice 2. Create and Validate business models. Build a Minimum Viable Product (MVP). 3. Identify various costs and revenue streams for a venture. 4. Build successful teams and acquire sales skills. 5. Understand the business regulations and various Government schemes available.

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, Customer Adoption Process, Crafting your Value Proportions, Customer-Driven Innovation.

UNIT-II

Business Model and its Validation: Types of Business Models, Lean Approach, the Problem-Solution Test, Solution Interview Method, Difference between Start-up Venture and small Business, Industry Analysis, 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 Respondents, Explore Collaboration Tools and Techniques-brainstorming, Mind Mapping. Importance of Project Management, Time Management, Work Flow, Network Analysis Techniques.

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, & Government schemes.

Learning Resources:

1. Rajeev Roy, Entrepreneurship, 3E 3rd Edition, Oxford University Press, India, 2020
2. Robert D. Hisrich, Michael P Peters, "Entrepreneurship", Sixth edition, McGraw-Hill Education.
3. Thomas W. Zimmerer, Norman M. Scarborough, "Essentials of Entrepreneurship and small business Management", Fourth edition, Pearson, New Delhi, 2006.
4. Alfred E. Osborne, "Entrepreneurs Toolkit", Harvard Business Essentials, HBS Press, USA, 2005
5. MadhurimaL all and Shikha Sahai, "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: **1 Hour 30 Minutes**

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

OPEN ELECTIVES - IV		
Department	**Code**	**Title**
Civil	U22OE610CE	Project Management
CSE	U22OE610CS	Introduction to Database Management System
	U22OE620CS	Fundamentals of Machine Learning (Stream- Artificial Intelligence & Machine Learning)
ECE	U22OE610EC	Internet of Things and Applications
	U22OE630PH	Automatic Train Protection System – Kavach
EEE	U22OE610EE	Introduction to Batteries and Battery management System
IT	U22OE610IT	Web application development & Security
	U22OE620IT	Introduction to Machine Learning
Mechanical	U22OE610ME	Industry 4.O (Stream : Robotics)
	U22OE620ME	Additive Manufacturing and its Applications (General Pool)
English	U22OE630EH	Advanced Course in Entrepreneurship
Physics	U24OE610PH	Introduction to Nanotechnology

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: U22OE610CE
Credits: 3	CIEMarks:40	DurationofSEE:3Hours

COURSE OBJECTIVES	COURSE OUTCOMES
Objectives of this course are to:	Upon the completion of this course the students will be expected to:
1. Learn the concept of project management along with function and objectives. 2. Understand the 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.	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: Tender form, 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.

Learning Resources:

1. Srinath L.S., PERT and CPM: Principles and Application, East-West Press, 2001.
2. Peret, F, Construction Project Management an Integrated approach, Taylor and Francis, Taylor and Francis Group, London & New York, 2009
3. Punmia B.C., and Khandelwal, PERT and CPM, Laxmi Publications, 2016.
4. Gahloj. P.S. and Dhiv. B.M., Construction Planning and Management, Wiley Eastern Ltd., 2018.
5. Kumar NeerajJha., Construction Project Management: Theory and Practice, Pearson Education, India, 2015.
6. Seetharaman S., Construction Engineering and Management, Umesh Publications, 2012.

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

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

Duration of Internal Tests : 90 Minutes

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

Department of Computer Science & Engineering

INTRODUCTION TO 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 :**U22OE610CS**
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.

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:**U22OE620CS**
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

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)
ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Internet of Things and Applications

(Open Elective - IV)

SYLLABUS FOR B.E. VI - SEMESTER (EEE & IT)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U22OE610EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. The purpose of this course is to impart knowledge on IoT Architecture, practical constrains. 2. To study various protocols And to study their implementations	On completion of the course, students will be able to 1. Understand the Architectural Overview of IoT 2. Enumerate the need and the challenges in Real World Design Constraints 3. Compare various IoT Protocols. 4. Build basic IoT applications using Raspberry Pi. 5. Understand IoT usage in various applications.

CO-PO Mapping

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

UNIT - I : OVERVIEW

Introduction to IoT – Improving Quality of life.
IoT-An Architectural Overview, M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT.

UNIT - II : Real-World Design Constraints

Real-World Design Constraints- Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control. Power Management in IoT device, Power conditioning using energy harvesting.

UNIT - III : IOT PROTOCOLS

Introduction to MQTT, Quality of services in MQTT,standards and security

in MQTT.
Introduction and implementation of AMQP, Implementation of CoAP and MDNS.

UNIT - IV : Device for IoT

Choice of Microcontroller, Introduction to Raspberry Pi, Features of Pi, Programming platform, Phython programming for Pi. Building basic IoT Applications using Raspberry Pi.

UNIT - V : IoT case studies

Smart Cities and Smart Homes, Connected Vehicles, Agriculture, Healthcare, Activity Monitoring.

Learning Resources:

6. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1 st Edition, Academic Press, 2014.
7. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
8. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
9. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", ISBN: 978-1-118- 47347-4, Willy Publications
10. https://nptel.ac.in/courses/106105166/5
11. https://nptel.ac.in/courses/108108098/4

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

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:**U22OE630PH**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To Provide the knowledge of Kavach technology which is used for an anti-collision system for trains.	On completion of the course, students will be able to 1. Acquire knowledge about the Train Protection Systems in general and Kavach - Indian Railways Automatic Train Protection System in detail. 2. Acquire knowledge about various elements, subsystems associated with Kavach, those on the ground - wayside, those on the train - onboard and related concepts. 3. Design various plans & diagrams required for implementation of Kavach for typical station layout. 4. Simulate & validate the system designs on the testbench.

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

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:**U22OE610EE**
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES The course will enable the students to:	**COURSE OUTCOMES** On completion of the course, students will be able 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.	1. 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

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 electricvehicle, 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 batterylife 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-circuitmethods. 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- SEMESTER

L:T:P(Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U22OE610IT**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
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	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- SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks :60	Course Code: **U22OE620IT**
Credits: 3	CIE Marks: 40	Duration of SEE :3Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
Introduce the fundamental concepts, techniques and modern tools in Artificial intelligence and Machine Learning field to effectively apply it to the real-world problems.	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

INDUSTRY 4.0

(Stream: Robotics)

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

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : U22OE610ME
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

COURSE OBJECTIVES The objectives of the course is to	**COURSE OUTCOMES** On completion of the course, students will be able to
provide an overview of Industry 4.O and its impact on modern manufacturing and develop skills for implementing industry 4.O technologies in production processes.	1. analyse the basic principles and technologies for smart factories and identify their applications in modern manufacturing. 2. evaluate the concepts of Cyber-Physical Systems (CPS) and Cyber-Physical Production Systems (CPPS) and their role in creating new business models. 3. apply the concepts of Digital Twins and Assistance Systems in production processes and their benefits. 4. develop strategies for ensuring safety and security in networked production environments and analyse the challenges and opportunities of Human-Robot Collaboration (HRC). 5. analyse the benefits and challenges of Cloud Manufacturing and the Connected Factory and develop strategies for implementing smart work pieces.

UNIT – I

Introduction to Industry 4.0

Definition of Industry 4.0, Comparison of Industry 4.0 Factory and today's Factory, Difference between conventional automation and Industry 4.0.

Basic principles and technologies of a Smart Factory

Internet of Things (IoT) & Industrial Internet of Things (IIoT) & Internet of Services, Big Data, Cyber-Physical Systems, Value chains in manufacturing companies, Customization of products, Digital Twins, Cloud Computing / Cloud Manufacturing, Security issues within Industry 4.0 networks.

UNIT – II

Cyber-Physical Systems (CPS) and Cyber-Physical Production Systems (CPPS)

Definition of Cyber-Physical System, Core elements of Cyber-Physical Systems and Cyber-Physical Production Systems, Control theory and real-time requirements, Self-organization principles, Communication in cyber-physical systems, Design Methods for Cyber-physical Systems, Applications for cyber-physical systems.

Cyber-Physical Systems and new Business Models

How CPS can induce new Business Models, The Role of horizontal and vertical value streams, New Business Models for the Smart Factory, Characteristics of

Business Models within the Smart Factory, Examples of new Business Models: Service provider, Data provider, Technology provider, Platform provider.

UNIT – III

Digital Twins in Production

Basic concepts of Digital Twins, Benefits, impact and challenges of Digital Twins, Features and Implementation of Digital Twins, Types of Digital Twins, Digital Twin use cases, Applications for digital twins in production.

Assistance systems for production

The connected worker within the Industry 4.0 scenario, Diversity-driven workplaces, Human-and task-centered assistance systems, Technical tools ("Ambient Assisted Working" (AAW)), Mobile information technologies, Shop floor information systems, Production line support systems, Manipulator systems and intelligent chairs, Human work support by using exoskeletons, Applications of assistance systems in production.

UNIT –IV

Human-Robot Collaboration

Human-Robot Collaboration in Industry, Collaborative Robots: tasks, examples, Types of Human-Robot Collaboration, Safety of Human-Robot Collaboration, Applications with Collaborative Robots.

Safety and Security in networked Production Environments

Definition of Safety with Industry 4.0, Safety for connected Machines and Systems, Safety in Human Robot cooperation, Optimizing Safety with Industry 4.0, Security & Security Risks with Industry 4.0.

UNIT – V

Cloud Manufacturing and the connected factory

Virtualization, Cloud Platforms, Big data in production, Cloud-based ERP and MES solutions, Connected factory applications, IT security for cloud applications.

The smart workpiece

Intelligent work piece, Work piece tagging, QR codes and RFID, Communication between work piece and environment, Multi-agent systems in production, Applications for smart work pieces.

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:	10
3	No. of Quizzes:	0	Max. Marks for each Quiz Test:	--

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 : U22OE620ME
Credits: 3	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	12	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)
IBRAHIMBAGH, YDERABAD-31
Department of H&SS

ADVANCED COURSE IN ENTREPRENEURSHIP (OE-IV)
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U22OE630EH
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. Acquire additional knowledge and skills for developing early customer traction into a repeatable business. 2. Learn the tools and methods for achieving sustainable growth, such as refining the product or service and business models, building brand strategy, making a sales and financial plan etc.	1. Develop an A-team 2. Refine business models and expand customer segments, brand strategy and create digital presence, channel strategy for customer outreach 3. Develop strategies to grow revenues and markets, understand Advance Concepts of business finance, do Financial Planning, find Funding for growth 4. Leverage technologies and platforms for growth stage companies 5. Develop key metrics to track progress, understand basics of registering a company.

Unit I: Pivoting and New Business Model
Introduction to Advance 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; Building sales organization: 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 – I: Intro to building the A-team; Examples; 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. Rajeev Roy, Entrepreneurship, 3E 3rd Edition, Oxford University Press, India, 2020
2. Clancy, Ann L. & Binkert, Jacqueline, "Pivoting- A coach's guide to igniting substantial change" Palgrave Macmillan US 2017.
3. Porter, Michael, E., "Competitive Advantage: Creating and Sustaining Superior Performance", Free press, 1st edi.
4. Schwetje, Gerald & Vaseghi Sam, "The Business Plan", Springer-Verlag Berlin Heidelberg.
5. LeMay, Matt, "Product Management in Practice", O'Reilly Media Inc.
6. Smart, Geoff & Randy, Street., "Who: The A method of hiring", Ballantine books, 2008.
7. 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: **1 Hour 30 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

Ibrahimbagh, Hyderabad-500 031, Telangana State

DEPARTMENT OF PHYSICS

Open elective Course

INTRODUCTION TO NANOTECHNOLOGY

B.E. VI-Semester

L : T : P	Credits	CIE		SEE		Course Code
		Marks	Exam Duration	Marks	Exam Duration	
03 :0 :0	03	40	90 min	60	3hours	U24OE610PH

CO-PO Mapping

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

Course objectives	**Course outcomes**	BTL
Students will be able to learn	At the end of the course students will be	
1. Learn bulk, thin and nano structures. 2. Acquire knowledge on properties of nano materials. 3. Appreciate fabrication techniques of nano materials. 4. Learn nanomaterial characterization techniques.	1. Distinguish bulk, thin and nano materials from the point of view of size effects. 2. List various properties of nano materials. 3. Narrate various nanomaterial preparation techniques. 4. Describe characterization techniques of nano materials. 5. Write various applications of CNTs &nano structures.	2 2 2 3 2

UNIT-I: INTRODUCTION TO NANOSCIENCE

The distinction between bulk, thin films and nano materials-surface to volume ratio, change of electronic structure, density of states of nano materials, quantum confinement-quantum size effect, Quantum wells, Quantum wires, Quantum dots.

UNIT-II: PROPERTIES OF NANO MATERIALS

Electrical properties: conductivity, ballistic transport, Magnetic properties: soft and permanent magnetic nano materials, Giant Magneto

Resistance (GMR), chemical properties, optical properties and thermal properties.

UNIT-III: NANOMATERIALS PREPARATION TECHNIQUES

Bottom-up and Top-down approaches. Preparation techniques Bottom-up methods: Physical Vapor Deposition, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Sol-gel method, top-down methods: ball milling, Nanolithography.

UNIT-IV: NANO MATERIAL CHARACTERIZATION TECHNIQUES

Characterization techniques: X-Ray Diffraction (XRD), working principles of Scanning Electron Microscopy (SEM), working of Transmission Electron Microscopy (TEM), Atomic Force Microscopy (AFM), Scanning Tunneling Microscope (STM), Field Emission Microscope (FEM).

UNIT-V: CARBON NANO MATERIALS AND APPLICATIONS

Graphene, Elementary ideas on Carbon nanotubes, types of CNTs-single wall (SWCNT) and multiwall carbon nanotubes (MWCNT), properties and characteristics of SWCNTS and MWCNTS. Applications of nano materials in cosmetic sector, food, agricultural, engineering, automotive Industry, environment, medical applications, textiles, paints, energy, and space Applications.

Learning Resources:

1. K.K. Chattopadhyay and A.N. Benerjee, Introduction to Nanoscience and Nanotechnology, PHI, 2019.
2. Nanomaterials and their Properties, IIT-Kanpur, NPTEL Course

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Academic Activity Planner / Calendar for the Academic Year 2024-25

S.No.	Month	Activities planned
		ODD Semester
1	August	Introduction and objectives of CCA activities and Awareness on Library learning Resources by Mr. Ravi Kumar Librarian, VCE.
2	August	Poster Presentation on "IoT Solutions in Agriculture" in association with IETE Students' Forum (ISF)
3	August	Alumni lecture on "Pre-requisites for CAT Entrance" by Mr. Ajith, IIM Ahmedabad (2021)
4	August	Guest lecture on Being Professional a framework of Engineers mindset by Dr. T.P. Sashi Kumar, Former Scientist, Dept of Space, ISRO.
5	September	Guest lecture on "6G technologies and its challenges" by Dr. Humaira Nishat, Prof., ECE CVR College of Engineering
6	September	"Logical Wizard", A technical event conducted in association with IEEE SB VCE Unit.
7	September	Alumni lecture on "Carrier Guidance in Software Domain" by Mr. Manoj (2023), Traniee Engineer at Principal Global Solutions, Hyderabad
8	October	Guest Lecture on "Advanced Embedded Systems using STM32" by Dr. Thottempudi Pardhu, for V -sem students Assistant professor, BVRIT, HYD
9	October	Technical Essay Writing Competition "Technology in Professional Ethics– need of the hour" in association with IETE Students' Forum (ISF)
10	October	Alumni lecture "Carrier Guidance in product based companies" by Mr. Anudeep (2020) SAP Consultant at L&T.
11	October	Guest lecture on "Life Skills" by Mr. V.T. Shiva, Managing Director, RC All-Tech Power Systems Pvt. Ltd.
12	November	Hackerrank™ based coding contest "Hackathon 2024" for BE ECE Sem-III students in association with IEEE SB.
13	November	A Guidance program on "Career Opportunities after B.Tech" by Mr. S. Manimohan Trinath, GATE/ESE Trainer, motivational speaker
14	November	Hackerrank™ based coding contest "Hackathon 2024" for BE ECE Sem-1 students in association with IEEE SB.

15	November	Alumni lecture on Time Management by Keshava Murthy (1988) Freelancer Consultant, Mysuru
EVEN Semester		
16	January	Guest lecture on IOT implementation using node MCU by Dr. shyam sunder, Associate Professor, ECE Dept, Osmania University, HYD.
17	January	"Hardware circuit design contest" in association with IEEE SB of VCE Unit.
18	January	Alumni Technical talk" by N. Anagha (2023)
19	February	Guest Lecture Introduction to RF Design, Mr. Sourabh Joshi, Senior Team Lead, MathWorks, Hyderabad
20	February	"Tech Lipi – A technical contest" in association with IETE Students' Forum
21	February	Alumni lecture on "Career in ML and Data science" Mr. N Karthik Founding Engineer at Applied AI, Hyd.
22	March	Guest lecture on Communication related by Dr. Chayan Bhar, for VI-sem students Prof. NIT Warangal.
23	March	Guest Lecture on "Developing Business Models for Sustainability in Startup's" by Dr. B. Madhura, Assistant Professor ,School of Management Studies, Hyderabad
24	March	Poster Presentation on "AI & ML solutions for Societal Problems" in association with IETE Students' Forum
25	March	Alumni lecture "Carrier Guidance "by Mr. Shiva (2008) RPO, Vijayawada
26	April	Guest Lecture on "Alumini talk on how to get into core companies" by Mr. Neeraj (2022), Silicon Labs
27	April	Hackerrank™ based coding contest "Top Coder 2025" students in association with IEEE SB
28	April	Alumni lecture "Carrier Guidance" by Mr. Praneeth (2023), Hyundai Mobi's