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

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Phones: +91-40-23146020, 23146021

Fax: +91-40-24146090

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

To be a center for academic excellence in the field of Computer Science and Engineering education to enable graduates to be ethical and competent professionals

Department Mission

To enable students to develop logic and problem solving approach that will help build their careers in the innovative field of computing and provide creative solutions for the benefit of society.

.

B.E (CSE) Program Educational Objectives (PEO's)	
Graduates should be able to utilize the knowledge gained from their academic program to:	
PEO I	Solve problems in a modern technological society as valuable and productive engineers.
PEO II	Function and communicate effectively, both individually and within multidisciplinary teams.
PEO III	Be sensitive to the consequences of their work, both ethically and professionally, for productive professional careers.
PEO IV	Continue the process of life-long learning.

B.E. (CSE) 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.
P1O	**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, and give and receive clear instructions.
P11	**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.
P12	**Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

B.E (CSE) PROGRAM SPECIFIC OUTCOMES (PSO's)	
PSO I	Graduates will have knowledge of programming and designing to develop solutions for engineering problems.
PSO II	Graduates will be able to demonstrate an understanding of system architecture, information management and networking.
PSO III	Graduates will possess knowledge of computer science and engineering in the areas of Cloud Computing & Data Analytics and apply them in appropriate domains.

With effect from the Academic Year 2026-27

SCHEME OF INSTRUCTION AND EXAMINATION(R-24)
FOR B.E 2024-25 ADMITTED BATCH V SEMESTER (A.Y 2026-27)

B.E (CSE) 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/D**		**SEE**	**CIE**	
THEORY								
UI24PC510CS	Internet of Things	3	-	-	3	60	40	3
UI24PC520CS	Full Stack Web Development	3	-	-	3	60	40	3
UI24PC530CS	Computer Networks	3	1	-	3	60	40	4
UI24PC540CS	Artificial Intelligence	3	-	-	3	60	40	3
U24OE5XXXX	Open Elective-III	3	-	-	3	60	40	3
U24HS010EH	Design Thinking	1			2	40	30	1
U24HS510EH	Skill Development course -V(Communication Skills-II)	1	-	-	2	40	30	1
UI24PE510CS	Skill Development Course -VI (Technical Skills –III)	1	-	-	2	40	30	1
PRACTICALS								
UI24PC511CS	Internet of Things Lab	-	-	2	3	50	30	1
UI24PC521CS	Full Stack Web Development Lab	-	-	2	3	50	30	1
UI24PC531CS	Computer Networks Lab	-	-	2	3	50	30	1
UI24PC541CS	Artificial Intelligence and Machine Learning Lab	-	-	2	3	50	30	1
UI24PW519CS	Theme Based Project-I	-	-	2	3	50	30	1
Library / Sports / Mentor Interaction		-	-	-	-	-	-	-
Extra-Curricular Activities – II		-	-	-	-	-	-	-
TOTAL		**18**	**1**	**10**		**670**	**440**	**24**
GRAND TOTAL		**26**				**1110**		
Student should acquire one NPTEL course certification of 8 weeks duration (2 credits) during I Sem to VI Sem								

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

INTERNET OF THINGS

SYLLABUS FOR B.E. V-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **UI24PC510CS**
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 Explore IoT technologies, architectures and standards. 2 Develop IoT solutions for a given problem	1 Describe IoT architecture. 2 Develop applications using Raspberry PI. 3 Apply wireless protocols to develop an IoT solution 4 Integrate IoT application with Cloud. 5 Apply IoT technologies to develop solutions for real-world applications such as smart cities, healthcare and agriculture.

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

UNIT-I:

Internet of Things (IoT) : Definition and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment, Sensors and Actuators, Envisioning the Internet of Things Era, Emergence of the IoT Platform as a Service (PaaS) ,Emerging IoT Flavors.

M2M and IoT Technology Fundamentals : Devices and Gateways, Local and Wide Area Networking, Data Management, Business Processes in IoT, Everything as a Service (XaaS), M2M and IoT.

UNIT-II:

Microcontrollers: Arduino Uno Platform, Interfacing with Uno, Raspberry Pi Components, ARM Processor Architecture, ARM vs X86 design, Raspberry Pi Interfaces, Programming Raspberry Pi with Python.

IoT Ecosystem Using Wireless Technologies : Architecture for IoT Using Mobile Devices, Mobile Technologies, 5G, Software-Defined Networking, Ultra Wide Band Technology, Near Field Communication Technology, Low Power Wide Area Networking Technologies – Sigfox, Weightless, LoRa.

UNIT-III: Infrastructure and Service Discovery Protocols for the IoT Ecosystem : Layered Architecture for IoT, Protocol Architecture of IoT, IEEE 802.15.4, IPv6 over Low-Power Wireless Personal Area Networks (6LoWPAN), Parallel Redundancy protocol-PRP, Bluetooth Low Energy, Long Term Evolution-Advanced, RFID, Z-Wave, Zigbee, Device or Service Discovery for IoT- Bluetooth Beacons, Wi-Fi aware, Open Hybrid.

UNIT-IV:

Integration Technologies and Tools for IoT Environments : Sensor and Actuator Networks, Sensor-to-Cloud Integration, IoT Device Integration Concepts, Standards, and Implementations – Service Oriented Device Architecture, Device Profile for Web Services, Open Service Gateway Initiative (OSGi), REST Paradigm, Message Queue Telemetry Transport (MQTT), Advanced Message Queuing Protocol (AMQP), Constrained Application Protocol (CoAP).

Next-Generation Clouds for IoT Applications and Analytics : Hybrid and Federated Clouds, Edge or Fog Clouds, Software-Defined Clouds, Cognitive Clouds, Amazon Web services for IoT, ThingSpeak cloud.

UNIT-V:

Industry 4.0: Industrial Internet of Things (IIoT), Reference Architecture, Characteristics of Industry 4.0.

Case Studies: Introduction, Smart Cities, Smart Homes, Smart Lighting, Smart Transportation, Industrial Automation, Smart Healthcare, Agriculture.

Learning Resources:

1. Pethuru Raj and Anupama C. Raman , "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press.
2. ArshdeepBahga, Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 2014.
3. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
4. Srinivasa K.G., Siddesh G.M., Hanumantha Raju R., "Internet of Things", 1st Edition, Cengage, 2018.
5. "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for the Internet of Things", Pearson, 2017.
6. Jean-Philippe Vasseur, Adam Dunkles, "Interconnecting Smart Objects with IP", Morgan Kaufmann, 2010.
7. Peter Waher**, "**Learning Internet of Things", PACKT Publishing, 2015.
8. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", Springer
9. Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", Wiley Publications.
10. https://www.postscapes.com/internet-of-things-protocols/
11. https://nptel.ac.in/courses/106105166/

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

FULL STACK WEB DEVELOPMENT

SYLLABUS FOR B.E. V-SEMESTER

L:T:P(Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **UI24PC520CS**
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 Develop applications using web technologies.	1 Apply HTML and CSS to design web pages.
2 Develop and publish REST API.	2 Develop dynamic web front end using JavaScript. 3 Design a component driven user interface using React. 4 Develop back-end application using Node.js and MongoDB. 5 Develop and deploy web services to integrate web applications.

CO-PO and CO-PSO mapping

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

UNIT-I:

Web Basics and Overview: Evolution of the Internet and World Wide Web, HTTP, Introduction to HTML5, Linking, Tables, Forms, Form input Types, HTML5 Structural Elements.

Cascading Style Sheets: Selectors, Properties and Values, External Style Sheets, Positioning of Elements, Box Model and Media Queries.

UNIT-II:

JavaScript: Introduction to JavaScript ES6, Variables, Objects, Document and Window Objects, Arrays, String Manipulation, Scripting Functions, Event Handling.

UNIT-III:

React: React Module, Code Sandbox, Templating with JSX, Babel, ES6 Literals, Expressions in JSX, JSX attributes and Styling React Elements, React Components, States and Props, Life Cycle of Components, Stateless Component,

Event Handling, Rendering List, Error Handling, Routers, Single Page Application.

UNIT-IV:

Node.js: Setup, Node Life cycle, REPL, Node Modules- FS, HTTP, URL, NPM, Redirecting Requests, Call backs, Events, Blocking and Non-Blocking Code, Node.js with Express, Express -Handling Requests and Responses.

MongoDB

SQL and NoSQL Concepts, Create and Manage MongoDB, CURD operations on MongoDB, MongoDB with Node.js, Services offered by MongoDB, Valkey for Caching.

UNIT-V:

Web Services: Web Services Architecture, Web Services Technologies - SOAP, REST, Node.js REST API, JSON Web Tokens for Authentication, Microservices Architecture.

Serverless Computing: AWS services, AWS Lambda, Use-Cases, Web application Deployment in Cloud.

Learning Resources:

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, Internet & World Wide Web How to Program, 5th Edition, Pearson Education.
2. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramaniam, Apress, 2019
3. Modern Full-Stack Development, Frank Zammetti, Apress, 2022
4. The Node Craftsman Book, Manuel Kiessling, Packt Publishers, 2017
5. Robert W. Sebesta, Programming the World Wide Web, 8th Edition (2020), Pearson Education.
6. https://www.w3schools.com/html/
7. https://react.dev/learn
8. https://nodejs.dev/learn
9. https://aws.amazon.com/lambda/

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

COMPUTER NETWORKS

SYLLABUS FOR B.E. V-SEMESTER

L:T:P(Hrs./week): 3:1:0	SEE Marks : 60	Course Code: **UI24PC530CS**
Credits : 4	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Apply networking concepts to work on networked systems using the existing for developing end user applications	1 Compare OSI and TCP/IP reference models and explain functionalities of Data Link Layer 2 Explain MAC protocols and networking devices. 3 Analyze the design issues of network layer 4 Describe the services of transport layer 5 Apply application layer protocols for providing network services to the end user

CO-PO and CO-PSO mapping

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

UNIT-I:

Introduction: Network Hardware, Network Software, Reference Models, Comparison of the OSI and TCP/IP Reference Models

Physical Layer: Guided transmission media, Wireless transmission media.

Data Link Layer: Design Issues, Error Detection and Correction, Elementary Data Link Layer Protocols, Sliding Window Protocols

UNIT-II:

Multiple Access Protocols : ALOHA, CSMA, Collision free protocols, Ethernet- Physical Layer, Ethernet Mac Sub layer, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, hubs, bridges, switches, routers and gateways.

UNIT-III:

Network Layer: Network Layer Design Issues.

Routing Algorithms: Shortest path routing, flooding, distance vector routing, link state routing.

IP Addresses: IPV4, Subnetting, Supernetting, CIDR, NAT, IPV6.

Internet Control Protocols: ICMP, ARP, DHCP.

UNIT-IV:

Transport Layer: The Transport Service, Elements of Transport Protocols

The Internet Transport Protocols (TCP and UDP): UDP, TCP: Introduction, The TCP service model, The TCP protocol, The TCP Segment Header, TCP connection establishment, connection release, TCP sliding window, TCP Timer management, TCP Congestion control, Performance issues.

UNIT-V:

Application Layer: Domain Name System-DNS Name Space, Domain Resource Records, Name Servers, FTP, TELNET, SMTP

Learning Resources:

1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5thEdition Pearson, 2012.
2. Data Communications and Networking, 6th Edition, Behrouz Forouzan, Tata McGraw Hill, 2011
3. James F. Kurose and Keith W. Ross, Computer Networking: A Top-Down Approach Featuring the Internet, 5th Edition, Addison-Wesley, 2012
4. Chwan-Hwa (John) Wu, J. David Irwin, Introduction to Computer Networks and Cyber Security, CRC Press, 2013
5. Alberto Leon-Garcia and Indra Widjaja, Communication Networks: Fundamental Concepts and Key Architectures, Tata McGraw-Hill, 2004.
6. http://nptel.ac.in/courses/106105081/1
7. https://www.youtube.com/watch?v=WabdXYzCAOU

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

ARTIFICIAL INTELLIGENCE

SYLLABUS FOR B.E. V-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **UI24PC540CS**
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. Represent the knowledge using propositional logic. 3 Create logical agents to do inference using first order logic. 4 Solve problem with constraints. 5 Perform planning for a given problem.

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

UNIT I:

Introduction: Introduction to AI

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

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: Minimizing the total estimated solution cost, Heuristic Functions, Local Search Algorithms and Optimization Problems.

UNIT II:

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

Logical Agents – Knowledge-Based agents, The Wumpus World, Logic, Propositional Logic: A Very Simple Logic, Propositional theorem proving.

UNIT III:

First Order Logic: Syntax and Semantics of First-Order Logic, Using First-Order Logic, Knowledge Engineering in First-Order Logic.

Inference In First Order Logic: Propositional vs. First-Order Inference, Unification and Lifting, Forward Chaining Algorithm , Backward Chaining algorithm, Resolution.

UNIT IV:

Constraint Satisfaction Problems: Defining Constraint Satisfaction Problems, Constraint Propagation : Node consistency, Arc consistency, Path consistency, K-consistency, Global constraints, Backtracking Search for CSPs : Variable and value ordering, Interleaving search and inference, Intelligent backtracking: Looking backward, Local Search for CSPs, The Structure of Problems.

UNIT V:

Classical Planning: Definition of Classical Planning, Algorithms for Planning with State-Space Search : Forward (progression) state-space search, Backward (regression) relevant-states search, Heuristics for planning : Planning graphs for heuristic estimation, The GRAPHPLAN algorithm, Termination of GRAPHPLAN, Planning Graphs, other Classical Planning Approaches : Planning as first-order logical deduction: Situation calculus , Planning as refinement of partially ordered plans.

Learning Resources:

1. Stuart Russell, Peter Norvig, Artificial Intelligence – A Modern Approach, Third Edition (2019), Pearson
2. Nils J. Nilsson, Artificial Intelligence: A New Synthesis, (1998),Elsevier
3. Daniela Witten, Gareth James, Robert Tibshirani, and Trevor Hastie, An Introduction to Statistical Learning with Applications in R (Springer Texts in Statistics)
4. George F Luger, Artificial Intelligence, Structures and strategies for ComplexProblem Solving, Sixth Edition,(2009), Pearson
5. Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, ThirdEdition(2009), Tata McGraw Hill

6. http://www.nptel.ac.in/courses/106105077
7. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-spring-2005
8. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-fall-2010/lecture-videos

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

With effect from the Academic Year 2026-27

OPEN ELECTIVES OFFERED IN B.E. V SEMESTER (2026-27)

Dept	Title (Open Elective-III)	Code	Credits
Civil	GEO Spatial Information Technology	U24OE510CE	3
ECE	Introduction to Biomedical Electronics (General Pool)	U24OE510EC	3
	Signal Engineering (General Pool)	U24OE530PH	3
	Introduction to Communication Systems (Communication Engineering - Stream)	U24OE540EC	3
EEE	Modelling and Simulation of Basic Photovoltaic Systems	U24OE510EE	3
Mech.	Drives and Control Systems for Robotics (Stream: Robotics)	U24OE510ME	3
H & SS	Marketing Management for Engineers (Management Courses for Engineers-Stream)	U24OE510EH	3
	Financial Analytics (BFSI- Stream)	U24OE520EH	3
	Philosophy (Liberal Arts Courses-Stream)	U24OE530EH	3
	Basics of Entrepreneurship (General Pool)	U24OE540EH	3
Maths	Transform Techniques	U24OE510MA	3
	Applied Statistical Methods	U24OE520MA	3

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

GEO SPATIAL INFORMATION TECHNOLOGY

(Open Elective-III)

SYLLABUS FOR B.E. V SEMESTER

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

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

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

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

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

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

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

UNIT-V:Basic Concepts of GIS: Introduction to GIS, Areas of GIS application, Components of GIS, Overview of GIS Software packages, Current issues and Trends in GIS. Variables-Point, line, polygon, Map projections, Map Analysis.

GIS Data: Data types – spatial, non-spatial (attribute data) – data structure, data format – point line vector – Raster – Polygon

Data Input : Keyboard entry, Manual Digitizing, Scanner, Remotely sensed data, Existing Digital data Cartographic database, Digital elevation data

Data Editing: Detection and correction of errors, data reduction, edge matching

Learning Resources:

1. James B. Campbell & Randolph H. Wynne., Introduction to Remote Sensing, The Guilford Press, 2011
2. Lillesand, Kiefer, Chipman., Remote Sensing and Image Interpretation, Seventh Edition, 2022
3. Leick, A., GPS Satellite Survey, John Wiley: NJ, 2015
4. Hofmann, B., Lichtenegger H. and Collins J., Global Positioning System: Theory and Practice, Springer: Berlin, 2011.
5. Basudeb Bhatta, Remote Sensing and GIS, Oxford University Press, 2011.
6. Hofmann-Wellenh of, Bernhard, Lichtenegger, Herbert, Wasle, Elmar, GNSS – GPS, GLONASS, Galileo and more, 2013
7. Thanappan Subash., Geographical Information System, Lambert Academic Publishing, 2011.
8. Paul Longley., Geographic Information systems and Science, John Wiley & Sons, 2015
9. John E. Harmon & Steven J. Anderson., The design and implementation of Geographic Information Systems, John Wiley & Sons, 2003
10. Kang Tsung Chang., Introduction to Geographic Information Systems, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2021.
11. Burrough, P.A., Mc. Donnel and Christopher, D. Lloyd, Principles of GIS, Oxford Publications, 2015.
12. C.P.Lo & Albert K. W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice Hall India Pvt.Ltd, 2016.

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

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

Duration of Internal Tests : 90 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Biomedical Electronics
(General Pool)
(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: **U24OE510EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To provide foundational knowledge of physiological systems and the origin of biomedical signals relevant to medical instrumentation. 2. To introduce the basic components and performance requirements of medical instrumentation systems, including intelligent and non-invasive systems. 3. To familiarize students with various electrodes and transducers used in biomedical applications, including their working principles and characteristics. 4. To develop understanding of therapeutic and prosthetic devices such as pacemakers, defibrillators, and ventilators, and their role in patient care. 5. To explore modern medical imaging technologies such as X-ray, CT, MRI, and thermography, and their applications in diagnostic medicine.	On completion of the course, students will be able to 1. Recognize the fundamental need for biomedical signal acquisition and describe the structure and function of basic biomedical instrumentation systems. 2. Explain the principles and applications of bioelectric signals, and evaluate the use of electrodes and transducers in biomedical measurements. 3. Demonstrate the working principles and clinical relevance of therapeutic, prosthetic, and non-invasive biomedical instruments used in diagnosis and treatment. 4. Apply mathematical, physical, and computational principles to interpret and analyze data from modern medical imaging systems such as X-ray, CT, and MRI. 5. Integrate knowledge of biomedical instrumentation systems to analyze constraints and design considerations for safe, reliable, and intelligent healthcare solutions.

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
CO5	2	2	2			2							1		2

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.
4. https://onlinecourses.nptel.ac.in/e-learning/preview/noc22_md01
5. https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_bt78

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Signal Engineering

(General Pool)

(Open Elective - III)

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

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

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

CO-PO/PSO Mapping

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

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

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

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

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

UNIT – II: Railway Signaling (6 Hours)

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

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

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

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

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

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

Level Crossing Gates – Working, Circuit Progression, Safety features

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

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

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

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

Practicals at IRISET Laboratory (12 Hours)

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Communication Systems
(Communication Engineering Stream: Open Elective - III)
SYLLABUS FOR B.E. V – SEMESTER (CSE & IT branches)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U24OE540EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
To introduce basic concepts of various communication systems.	On completion of the course, students will beable to 1. Identify the Radio frequency spectrum and the bands of different types of radio systems. 2. Determine the specifications of a radio receiver. 3. Estimate the signal degradation in optical fiber cable. 4. Describe the characteristics of microwave signal. 5. Apply Kepler's law to find satellite orbital parameters.

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

UNIT - I :

Introduction to Electronic Communication: Communication systems, Types of Electronic Communication, The Electromagnetic Spectrum, Bandwidth, Gain and Attenuation definitions, Information, Transmitter, Receiver, Channel

Lab activity: Gain, Bandwidth, Attenuation calculations using MATLAB

UNIT - II :

Radio transmitters and Receivers: Classification of transmitters: High level and low level AM transmitters, FM transmitters.
Receiver characteristics: Sensitivity, Selectivity, Fedility.
Tuned radio frequency (TRF) and super heterodyne receivers, Intermediate frequency, AGC, Image frequency, IFRR.
Lab activity: Image frequency and IFRR calculations using MATLAB

UNIT - III :

Optical Fiber Communication (OFC): Overview, Optical spectral bands, Key elements of Optical fiber systems, Basic optical laws and definitions, optical fiber modes and configurations. Signal degradation in optical fibers: Attenuation, Scattering losses, bending losses
Lab activity: Estimation of optical losses using MATLAB

UNIT - IV :

Microwave Engineering: Importance of Microwave Engineering in modern communication, Microwave frequency band designations, Different Microwave signal generators: Klystron, Magnetron, Gunn diode, Introduction to microwave transmission lines: wave guides, microstrip lines
Lab Activity: Determination of wavelength of a microwave signal in dominant mode, Characteristics of microstrip line using MATLAB

UNIT - V :

Satellite Communication: Benefits of Satellite Communication. Historical evolution of Satellites, Types of satellites, Satellite frequencies, Principles of Operation: Keplers's laws, orbital parameters, Satellite orbits uplink and down link, Telemetry tracking and control, Satellite Communication in India. Introduction to Global Positioning System
Lab Activity : Verification of Kepler's 2nd law using MATLAB

Learning Resources:

1. Electronic Communication Systems by George Kennedy, 5Th edition.
2. Wayne Tomasi, Electronic Communications Systems, 5th Edition, PearsonEducation.
3. Satellite Communication: by R.N Mutagi, Oxford University Press, 2016
4. Microwave Engineering: By Ananapurna Das and Sisir K Das, 4th Edition, 2020, Mc Graw Hill
5. Optical Fiber Communications Principles 3Rd Edition by SENIOR, PEARSON INDIA
6. https://nptel.ac.in/syllabus/syllabus.php?subjectId=117102059
7. https://nptel.ac.in/courses/117101051/12

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MODELLING AND SIMULATION OF BASIC PHOTOVOLTAIC SYSTEMS

Open Elective-III

SYLLABUS FOR B.E. V SEMESTER

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

COURSE OBJECTIVES 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.

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

Unit-1 Introduction to Photovoltaic Systems and PSpice

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

Unit-2 Spectral Response and Short-Circuit Current

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

Unit-3 Electrical Characteristics of the Solar Cell

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

Unit-4 Solar Cell Arrays, PV Modules and PV Generators

Introduction, Series connection of solar cells, Identical solar cells in series, Bypass diode in series strings of solar cells, Shunt connection of solar cells, Shadow effects, The terrestrial PV module, Photovoltaic arrays, Photovoltaic generators and PV plants, Problems

Unit-5 Interfacing PV Modules to Loads and Battery Modelling

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

Learning Resources:

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

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 : **U24OE510ME**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

CO	PO mapping												PSO mapping		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**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, 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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

MARKETING MANAGEMENT FOR ENGINEERS

(Stream: Management Courses for Engineers)

OPEN ELECTIVE-III - B.E. V Semester

L:T:P(Hrs/Week):3:0:0	SEE Marks:60	Course Code: **U24OE510EH**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

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

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

Unit-1: Introduction

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

Unit-2: Market Segmentation and Positioning
Concept - Levels and Bases for Segmentation - Segmenting Consumer Markets and Business Markets - Evaluation of Market Segments - Selecting Market Segments - Product Positioning, Positioning Strategies

Unit-3: Buyer Behaviour
Introduction to buyer behaviour - Contemporary dimensions of buyer behaviour - Motivation and buyer behavior, Consumer decision making and buyer attitude: Information search, evaluation of alternatives. Steps between evaluation of alternatives and purchase decision, Post-purchase behaviour.

Unit-4: Advertisement and Promotion
Promotion Decision - Promotion mix - Advertising Decision, Advertising objectives - Advertising and Sales Promotion – Developing Advertising Programme – Role of Media in Advertising - Advertisement effectiveness

Unit-5: Digital Marketing
Importance of digital marketing - Difference between traditional marketing and digital marketing - Trends and scenario of the industry. Importance of Search Engine Optimization (SEO), Digital Campaign (creation, Site targeting, Keyword targeting, Demographic targeting/ bidding) - Blogging, Social networking, Video creation & Sharing, Use of different social media platforms, Web analytics.

Learning resources:-
Prescribed Text Books
Marketing Management – A South Asian Perspective, 13th Edition, by Philip Kotler ISBN 978-0-12-600998-6
Fundamentals of Digital Marketing, Puneet Bhatia, Pearson Ed , ISBN – 978-9352861415

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

1	No. of Internal Tests:	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 Tests: 90 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

FINANCIAL ANALYTICS

(Stream: BFSI)

OPEN ELECTIVE-III - B.E. V Semester

L:T:P(Hrs/Week):3:0:0	SEE Marks:60	Course Code: **U24OE520EH**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

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

CO-PO mapping

CO/PO	PO											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1					1			2			3	3
CO2					1			2			3	3
CO3					1			2			3	3
CO4					1			2			3	3

Unit 1 (5 hours) Introduction to Financial Management

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

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

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

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

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

Unit 4 (5 hours) Capital Structure

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

Unit 5 (15 hours) Business Valuation

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

LEARNING RESOURCES:-

Textbooks

Units 1,2,3,4 –Financial Management by M Y Khan
Unit 5 – Institute of Company Secretaries Study book

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

1	No. of Internal Tests:	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 Tests:	90 Minutes		

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEEING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

PHILOSOPHY

(Liberal Arts Course – Stream)

(Open Elective-III)

SYLLABUS FOR B.E V Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code: **U24OE530EH**
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

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

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

Unit 1: What Is Philosophy?

Definition and scope of philosophy

Branches of philosophy: metaphysics, epistemology, ethics, logic, aesthetics

Philosophical methods and the role of reasoning

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

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

Unit 4: Political Philosophy
The state, justice and authority
Liberty, rights and duties

Unit 5: Social Philosophy
Social contract theory and
Civil disobedience

LEARNING RESOURCES:-

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

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

1	No. of Internal Tests:	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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEEING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

BASICS OF ENTREPRENEURSHIP

(Open Elective-III)

SYLLABUS FOR B.E V Semester

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

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

CO-PO and CO-PSO mapping														
CO	PO mapping											PSO mapping		
	1	2	3	4	5	6	7	8	9	10	11	1	2	3
CO1								3	2	3	2	1		
CO2		2						2	2	1				
CO3										3				
CO4			2				1		2	1	1			1
Avg.		2	2				1	2.5	2	2	1.5	1	0	1

UNIT-I

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

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

Learning Resources:

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

4. MadhurimaLall and ShikhaSahai, "Entrepreneurship", Excel Books, First Edition, New Delhi,2006

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

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

Duration of Internal Test: **90 Minutes**

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MATHEMATICS

TRANSFORM TECHNIQUES

OPEN ELECTIVE –III, B.E. V Semester

(for CSE, AIML and IT only)

L:T: P (Hrs/Week):3	SEE Marks:60	Course Code: **U24OE510MA**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

COURSE OBJECTIVES	**COURSE OUTCOMES**
The course will enable the students to:	*At the end of the course students will be able to:*
1. Understand the Definition of Laplace and its Properties. **2. Understand** the Definition of inverse Laplace Transforms-Properties 3 **Understand** the applications of Laplace Transforms. 4 **Study** the Definition of Z-Transforms and its properties 5 **Understand** the applications of Z- Transforms	**1. Evaluate** Laplace transforms of functions. **2. Evaluate** Inverse Laplace transforms of functions. **3. Apply** Laplace transforms to evaluate integrals and to solve ordinary differential equations arising in engineering problems. **4. Evaluate** Z- transforms of Sequences **5. Apply** Z-transforms to solve ordinary difference equations arising in engineering problems.

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

UNIT – I: (8 Hours)

LAPLACE TRANSFORMS

Introduction to Laplace transforms - Existence of Laplace Transform – Properties of Laplace Transform-First shifting theorem - Second shifting

theorem -Change of scale property –Differentiation of Laplace transform – Integration of Laplace Transform – Laplace Transform of Derivatives - Laplace Transform of Integrals

UNIT – II: (8 Hours)

INVERSE LAPLACE TRANSFORMS

Introduction to Inverse Laplace transforms -Properties of Inverse Laplace Transform-First shifting theorem - Second shifting theorem -Change of scale property- Multiplication with s - Division by s – Convolution Theorem (without proof).

UNIT – III: (8 Hours)

APPLICATIONS OF LAPLACE TRANSFORMS

Applications of Laplace transforms to Initial and Boundary Value Problems upto second order –Laplace transform of periodic functions – Triangular wave – Square wave – Saw tooth wave.

UNIT – IV: (8 Hours)

Z-TRANSFORMS

Introduction - Z-transforms of Standard sequences - Linearity Property – Scaling Property - Shifting Properties- Initial value theorem - Final value theorem – Differentiation of Z-transform.

UNIT – V: (8 Hours)

INVERSE Z-TRANSFORMS

Introduction –Inverse Z-transforms of Standard functions - Convolution Theorem – Application of Z-Transforms to solve Difference Equations.

Text Books:

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

Reference Books:

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

Online Resources:

https://onlinecourses.nptel.ac.in/noc24_ma17/preview

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MATHEMATICS

APPLIED STATISTICAL METHODS

OPEN ELECTIVE –III, B.E. V Semester
(for CSE, AIML and IT only)

L:T: P (Hrs/Week):3	SEE Marks:60	Course Code: **U24OE520MA**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to:	***At the end of the course students will be able to:***
1. **Understand** fitting of a straight line to a given data and measuring Correlation between variables. 2. **Study** the concepts and application of Time series. 3. **Distinguish** the various methods of Designs of Experiments 4. **Provide** the knowledge to the students about Prediction and control by statistical methods Regression and SQC. 5. **Learn** the concept of pure birth and death models of Queuing theory.	1. **Solve** problems on fitting of a straight line to the given data and also to find co-efficient of correlation and to determine regression lines and their application problems. 2. **Apply** concept of Time series to solve the real time problems. 3. **Apply** the methods of Designs of Experiments 4. **Evaluate** the performance measures of the systems in networks, transportation systems, production lines. 5. **Apply** the comprehensive levels of Queuing theory for calculating service time, traffic intensity, queue length etc. in special and general queues.

UNIT – I: (8 Hours)
CORRELATION AND REGRESSION ANALYSIS

Correlation –Scatter diagrams-Spearman's Rank of Correlation-Curve fitting by the Method of Least Squares - Fitting of Straight line - Parabola - Exponential curves: $y = a\,e^{bx}$ & $y = a\,b^{x}$-
– Regression - Lines of Regression - Multiple Regression - Curvilinear regression.

UNIT – II: (8 Hours)
TIME SERIES

Time series and Forecasting: Introduction-Moving averages, weighted average method smoothening of curves forecasting models and Methods.

UNIT – III: (8 Hours)

DESIGN OF EXPERIMENTS

Introduction to Design of experiments - Aim of the Design of experiments - Randomized Block Design (R.B.D) - Latin Square Design (L.S.D) - Comparison of RBD and LSD - Related problems.

UNIT – IV: (8 Hours)

QUEUEING THEORY

Introduction- Input pattern - service pattern- queue discipline - Queue behavior- Kendal's notation, Pure Birth and Death Models - Traffic intensity; (M/M/1: ∞/FIFO)-Model: (M/M/1: N/FIFO)-Model.

UNIT – V: (8 Hours)

STATISTICAL QUALITY CONTROL

Introduction, Methods for preparing control charts, variable charts – mean and range charts, Attribute charts- np, p and c charts.

TEXT BOOKS:

1. Probability, Statistics and Random Processes, T Veera Rajan, Tata McGraw-Hill companies
   (Seventh edition)
2. Probability & statistics and Random Processes; K.Murugesan & P.Gurusamy - Anuradha publishers
3. Probability & Statistics for Engineers, Miller& John E. Freund, Prentice Hall of India (Third edition)

REFERENCE BOOKS:

1. T.K.V. Iyengar et al, Probability and Statistics, S. Chand Publications, Revised edition.
2. Probability & Statistics for Engineers, Antony J. Hayter, CENGAGE Learning (India edition)

ONLINE SOURCES:

1. https://onlinecourses.nptel.ac.in/noc24_ch03
2. https://onlinecourses.nptel.ac.in/noc24_ma28

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

DESIGN THINKING

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/Week):2:0:0	SEE Marks:40	Course Code: **U24HS010EH**
Credits: 1	CIE Marks:30	Duration of SEE:Hours:2

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

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

OVERVIEW:

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

UNIT 1: Introduction to Design Thinking

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

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

Learning Outcomes:

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

UNIT 2: Ideation and Problem Definition

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

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

Learning Outcomes:

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

UNIT 3: Prototyping and Feedback

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

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

Learning Outcomes:

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

UNIT 4: Real-World Applications

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

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

Learning Outcomes:

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

Suggested Books

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

LEARNING RESOURCES

learn.talentsprint.com

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

1	No. of Internal Tests:	1	Max. Marks for each Internal Test:	20
2	No. of Assignments:	1	Max. Marks for each Assignment:	05
3	No. of Quizzes:	1	Max. Marks for each Quiz Test:	05

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Skill Development Course-V (Communication Skills-II)

SYLLABUS FOR B.E.V-SEMESTER

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

COURSE OBJECTIVES	**COURSE OUTCOMES**
The course will enable the learners to:	**At the end of the course the learners will be able 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.	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 mapping												
CO/PO	**PO**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1										3		
CO2										3		
CO3										3		
CO4				3								

Unit 1: Delightful Discussions

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

1.1 Six Thinking Hats

1.2 Group Discussion Techniques (Initiation Techniques, Generating Points, Summarization techniques)

1.3 Case Study Based Group Discussions

Unit 2: Powerful Presentations

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

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

Unit 3: Fact, Observation and Inference

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

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

Unit 4: Effective Technical Writing

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

1.1 Report writing
1.2 Image Writing
1.3 Book Reviews
1.4 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 : 1 Hour 30 Minute

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

Skill Development Course-VI (Technical Skills-III)

Industry Standard Coding Practices – 2024

SYLLABUS FOR B.E.V-SEMESTER

L:T:P (Hrs/Week): 1:0:0	SEE Marks: 40	Course Code: **UI24PE510CS**
Credits: 1	CIE Marks: 30	Duration of SEE: 2 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. Understand importance of problem solving approaches for programming complex data structure problems. 2. Understand importance of optimized solutions for problems solving and its relevance to industry. 3. Implement mathematical and logical understanding approaches to implement test driven development practices. 4. Start participating in global coding competitions relevant to the syllabus.	1. Able to understand test and development aspects of programming by solving problems at Industry standards. 2. Able to identify and implement appropriate algorithm for a given problem. 3. Able to learn and apply string algorithms to optimize solutions to problems relevant to industry 4. Able to solve scenario based problems using trees 5. Able to code efficiently implementing the sorting algorithms for quick search operations

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

Problem Solving with Algorithms - backtracking Algorithms

The backtrack view, Applications of the backtracking, Iterative approach Vs Loop free approach, State Space tree illustration using 3-bit number problem, finding triplets exactly equal to a given sum, finding triplets less than or equal to a given sum, Grid Solution: Solution to N-Queens problem, Grid Solution: Solution to Find path in a maze problem, Company Specific Examples & Competitive Programming Practice Problems.

Contextual implementation using Competitive Coding using global coding platforms: Code chef/ Leet code / Codeforces / Hackerrank etc

Problem Solving Through Advanced backtracking Algorithms

Problem Solving on Grid based inputs using backtracking, Finding the valid words in the grid, Problem solving for the Knight's tour problem, Open and close tours, solution for open tour Recursive, Solution for tour Iterative, Company Specific Examples & Competitive Programming Practice Problems.

Contextual implementation using Competitive Coding using global coding platforms: Code chef/ Leet code / Codeforces / Hackerrank etc

Advanced Graph algorithms for Company Specific Problem Solving

Path finding algorithms, Detecting Cycle in the Graph, Cloning a graph, Company Specific Examples & Competitive Programming Practice Problems.

Contextual implementation using Competitive Coding using global coding platforms: Code chef/ Leet code / Codeforces / Hackerrank etc

Problem Solving Through String Algorithms

Problem Solving implementing TRIE Data structure, Regular Expressions, Pattern matching algorithm, KMP algorithm, Company Specific Examples & Competitive Programming Practice Problems.

Contextual implementation using Competitive Coding using global coding platforms: Code chef/ Leet code / Codeforces / Hackerrank etc

Problem Solving Through SQL Queries I

Industry Standards of leveraging SQL concepts: SQL Queries, Entity Relationship Models, case studies, Question and answers

Problem Solving Through SQL Queries II

Industry Standards of leveraging SQL concepts: Query Optimization, Transactions & Concurrency, Normalization, case studies, Question and answers

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

1	No. of Internal Tests	:	1	Max. Marks for each Internal Test	:	20
1	No. of Quizzes	:	1	Max. Marks for each Quiz	:	10

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

INTERNET OF THINGS LAB

SYLLABUS FOR B.E. V-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **UI24PC511CS**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Develop programs to interface sensors & actuators with Raspberry PI and Arduino Uno.	1 Implement programs on Arduino Uno board
	2 Develop application programs to interface sensors and actuators with Raspberry PI.
2 Develop applications for smart home.	3 Implement programs to demonstrate communication protocols
	4 Develop applications to publish data on to the cloud
	5 Build an IoT prototype

CO-PO and CO-PSO mapping

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

Programming Exercise:

1. Experiments using Arduino Uno Board
2. Programming Raspberry PI to read data from onboard sensors
3. Interfacing ultrasonic, IR sensors to Raspberry PI
4. Interfacing Soil Moisture sensor for Agriculture based Application
5. Developing Control applications to interface servo motor
6. Developing Control applications to interface stepper motor
7. Demonstrate communication protocol Bluetooth
8. Demonstrate communication protocol LoRa

9. Develop an application using MQTT Protocol
10. Demonstration of Zigbee protocol for IoT applications
11. Publishing data on to the Cloud
12. Develop a project that addresses a specific domain.

Learning Resources:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press, 2014.
2. https://www.raspberrypi.org/.
3. https://www.arduino.cc/.
4. http://electronicsforu.com/resources/embedded-systems-overview/.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

FULL STACK WEB DEVELOPMENT LAB

SYLLABUS FOR B.E. V - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code : **UI24PC521CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Develop web applications.	1 Design a website using HTML and CSS.
2 Publish web services.	2 Design interactive web pages using Java script.
	3 Develop component driven user interface using React.
	4 Develop dynamic web applications using Node.js and Mongo DB.
	5 Create and publish Web Services.

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

Programming Exercise:

1. Creation of Static Web Site using HTML.
2. Creation of Static Web Site using HTML Forms.
3. Apply CSS to the Static Web Site.
4. Validation of Static Website using JavaScript.
5. Creation of Web Site using React.
6. Creation of web app using Node JS.
7. Providing data store support using Mongo DB.
8. Publishing and Consuming a Web Service using REST.

9. Develop a web application and deploy it to the cloud.
10. Upgradation of the software.
11. Develop a web application for a given problem statement.

Learning Resources:

1. Paul J. Deitel, Harvey M. Deitel, Abbey Deitel, Internet & World Wide Web How to Program, 5th Edition, Pearson Education.
2. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramaniam, Apress, 2019
3. Modern Full-Stack Development, Frank Zammetti, Apress, 2022
4. The Node Craftsman Book, Manuel Kiessling, Packt Publishers, 2017
5. Robert W. Sebesta, Programming the World Wide Web, 8th Edition (2020), Pearson Education.
6. https://www.w3schools.com/html/
7. https://react.dev/learn
8. https://nodejs.dev/learn
9. https://aws.amazon.com/lambda

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

COMPUTER NETWORKS LAB

SYLLABUS FOR B.E. V-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **UI24PC531CS**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Implement major functions of TCP/IP protocol stack with suitable algorithms. 2 Develop client server application using socket API.	1 Implement functionalities of TCP/IP protocol stack 2 Develop iterative and concurrent echo server using socket API. 3 Design wired and wireless topologies using NS3 4 Simulate networking protocols using NS3.

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

Programming Exercise:

1. Understanding and using the following commands: ifconfig, netstat, ping, arp, telnet, tftp, ftp, nslookup and dig.
2. Implementation of Data Link Framing Methods- Bit, Byte and Character Stuffing using socket programming
3. Implementation of 16-bit CRC Error Detection Technique.
4. Implementation of Sliding Window Protocol.

5. Implementation of Dijkstra's Algorithm for computing the shortest path in a graph and Implementation of Distance vector routing algorithm.
6. Implementation of Iterative Echo Server using Connection Oriented Protocol (TCP)
7. Implementation of Concurrent Echo Server using Connection Oriented Protocol (TCP)
8. Implementation of Iterative Echo Server using Connection Less Protocol (UDP).
9. Implementation of Concurrent Echo Server using Connection Less Protocol (UDP).
10. Simulate a three nodes point – to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.
11. Packet Sniffing: using wireshark

Learning Resources:

1. W. Richard Stevens, Unix Network Programming – The Sockets Networking, Volume I – 3rd Edition (2003), Pearson Education, India
2. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 5th Edition (2012), Pearson Education, India
3. Cryptography & Network Security: Principles and Practices, 6th Edition (2013), Pearson India
4. James F. Kurose, Computer Networking: A Top-Down Approach, 5th Edition (2012), Pearson Education.
5. Data Communications & Networking, Behrouz. A. Forouzan, 5th Edition (2012), Tata McGraw Hill.
6. https://www.isi.edu/nsnam/ns/ With effect from the A.Y 2018-19

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LAB

SYLLABUS FOR B.E. V-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code: **UI24PC541CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

	COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1	Understand issues and techniques involved in the creation of intelligent systems	1 Design python programs for various learning algorithms. 2 Identify and apply machine learning algorithms to solve real world problems. 3 Implement uninformed and informed search to solve the search problems. 4 Implement the Game playing algorithm such as Minimax and AlphaBeta pruning 5 Build Neural network to solve classification problems.

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

Programming Exercise:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a CSV file.

2. Write a program to implement k-Nearest Neighbor algorithm to classify dataset. Print both correct and wrong predictions. Python ML library classes can be used for this problem.
3. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.
4. Write a machine learning program for Decision tree construction
5. Write a machine learning program for the perception model and calculate the Error for the back propagation in multilayer network.
6. Apply EM algorithm to cluster a set of given data.
7. Implement k-Means algorithm.
8. Write a program for implementation of genetic algorithm
9. Implement an AI program on Uninformed search algorithm Breadth first search, Depth First search ,IDFS.
10. Implement an AI program for Water jug problem, missionaries and cannibals Problem.
11. Implement an AI program on 8-Puzzle problem using A*
12. Implement an AI program on 8-queens problem.
13. Implement an AI program for Alpha beta pruning.
14. Implement an AI Program for the TIC TAC TOE using minimax method.
15. Implementation on Prompt Engineering
16. Implement Convolutional Neural Network for classification

Learning Resources:

1. Tom Mitchell, "Machine Learning", McGraw-Hill Science, First edition.
2. Stuart Russell, Peter Norvig, Artificial Intelligence – A Modern Approach, Third Edition (2015),
3. Daniela Witten, Gareth James, Robert Tibshirani, and Trevor Hastie, An Introduction to Statistical Learning with Applications in R (Springer Texts in Statistics).
4. George F Luger , Artificial Intelligence, Structures and strategies for Complex Problem Solving, Sixth Edition,(2009), Pearson
5. Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, Third Edition(2009), Tata McGraw Hill
6. http://www.nptel.ac.in/courses/106105077

7. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-spring-2005
8. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-fall-2010/lecture-videos

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

THEME BASED PROJECT-I

SYLLABUS FOR B.E. V-SEMESTER

L:T:P(Hrs./week):0:0:2	SEE Marks:50	Course Code: **UI24PW519CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Develop an application in the relevant area of Computer Science	1 Review the literature survey to identify the problem.
2 Learn contemporary technologies.	2 Design a model to address the proposed problem. 3 Develop and test the solution. 4 Demonstrate the work done in the project through presentation and documentation. 5 Adapt to contemporary technologies.

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

The students are required to carry out a theme-based project by selecting any one of themes like Agriculture, Food & Supply Chain Technology, Health, Bio-medical & Assistive Technology, Climate, Environment & Sustainability, Cyber Security & Digital Forensics and Robotics & Drones or themes in any other area relevant to Computer Science.

Students are required to submit a report on the theme based project at the end of the semester.

With effect from the Academic Year 2026-27

SCHEME OF INSTRUCTION AND EXAMINATION(R-24)
FOR B.E 2024-25 ADMITTED BATCH VI SEMESTER (A.Y 2026-27)

B.E (CSE) VI Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
UI24PC610CS	Natural Language Processing	3	-	-	3	60	40	3
UI24PC620CS	Software Engineering	3	-	-	3	60	40	3
UI24PC630CS	Cyber Security	3	-	-	3	60	40	3
UI24PC640CS	Agentic AI	3	-		3	60	40	3
U24OE6XXXX	Open Elective-IV	3	-	-	3	60	40	3
U24HS630EH	Skill Development Course -VII (Verbal Aptitude)	1	-	-	2	40	30	1
UI24PE610CS	Skill Development Course -VIII (Technical Skills –IV)	1	-	-	2	40	30	1
PRACTICALS								
UI24PC611CS	Natural Language Processing Lab	-	-	2	3	50	30	1
UI24PC621CS	Software Engineering Lab	-	-	2	3	50	30	1
UI24PC631CS	Cyber Security Lab	-	-	2	3	50	30	1
UI24PC641CS	Agentic AI Lab	-	-	2	3	50	30	1
UI24PW619CS	Theme Based Project-II	-	-	2	3	50	30	1
	Co-Curricular Activities –II	-	-	-				
Library/ Sports/Mentor Interaction		-	-	-	-	-	-	-
	TOTAL	**17**	**-**	**10**		**630**	**410**	**22**
	GRAND TOTAL	**27**				**1040**		
Student should acquire one NPTEL course certification of 8 weeks duration (2 credits) during I Sem to VI Sem								

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

NATURAL LANGUAGE PROCESSING

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks:60	Course Code: **UI24PC610CS**
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. Gain a comprehensive understanding of NLP fundamentals, including theoretical principles, technical terminology, and industry use cases.	1. Apply N-grams for language modeling. 2. Apply HMM algorithm for part of speech tagging. 3. Apply Text classification and summarization. 4. Understand working of machine translation application. 5. Understand working of Transformers and Large Language Models.

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

UNIT-I

Introduction: Knowledge in Speech and Language processing, Ambiguity, Models and algorithms, Text Normalization, Minimum Edit Distance, N-Grams, Smoothing.

UNIT-II:

Vector Semantics and Embeddings: Words and Vectors, Cosine for measuring similarity, TF-IDF: Weighing terms in the vector, Applications of the TF-IDF vector model, Word2Vec, HMM Part-of-Speech Tagging, Named Entity Recognition, Word Disambiguation.

UNIT-III:
NLP CLASSIFIERS
Applications, Text classification systems, LSTMs for Text classification, Text classification with Large, pre-Trained Language Models, Text Summarization, Recommender Systems for Textual Data.

UNIT-IV:
Machine Translation: Language Divergences and Typology, Machine Translation using Encoder-Decoder, Details of the Encoder-Decoder Models, Constituency, CKY Parsing: A Dynamic Programming Approach

UNIT-V:
Transformers and Large Language Models:
Large Language Models, Multimodal transformers,Vision and language transformers, Bidirectional Transformer Encoders.

Learning Resources:

1. Daniel Jurafsky and James H. Martin, "*Speech and Language Processing*", (3rd ed.)
2. Allen, James, "*Natural Language Understanding*", Second Edition, Benjamin/ Cumming, 1995.
3. Sowmya Vajjala, Bodhisattwa Majumder, Anuj Gupta, Harshit Surana, "*Practical Natural Language Processing: A Comprehensive Guide to Building Real-World NLP Systems*", O'REILY,2020.
4. https://www.bishopbook.com/

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

SOFTWARE ENGINEERING

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code:**UI24PC620CS**
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 Explain the concepts involved in the lifecycle of software development 2 Design Software Requirements Specifications, analyze risks and apply DevOps to develop, test and maintain software project	1 State the software process, compare prescriptive and evolutionary process models 2 Explain Agile software process methodology and design Software Requirements Specifications (SRS) document 3 Apply DevOps lifecycle for developing an application 4 Develop test cases and apply relevant testing strategies for various applications 5 Analyze security requirements of a given application and choose the appropriate product metric for quality assurance

CO-PO and CO-PSO mapping

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

UNIT-I:

Introduction to Software Engineering

The Nature of Software: Defining Software, Software Application Domain, Legacy Software, The changing Nature of the software :
WebApps, Mobile Applications, Cloud Computing, Product line software

Software Engineering : The Process Frame work, Umbrella Activities, Process Adaption, Software development myths

The Software Process: Defining framework activities, Identifying a task set, Process patterns, Process Assessment and improvement

Process Models: Prescriptive models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process, personal software process, Team Software Process.

UNIT-II:

Agile Development: What is Agility, Agility and the cost of change, What is an Agile Process, Agile Process Extreme programming, SCRUM, Dynamic Systems Development Method, Agile Unified Process.

Requirements Engineering: Establishing the ground work, Eliciting requirements, Developing use cases, Building the Analysis model, Negotiating Requirements, Requirement Monitoring, Validating Requirements.

Design concepts: The Design Process, Design Concepts, The Design Model.

UNIT-III:

DevOps: Introduction to DevOps, why DevOps DevOps process and continues delivery, Pipeline, Release management, Kanban DevOps Architecture, DevOps life cycle for business Agility and Continuous testing.

UNIT-IV:

Testing Strategies: A Strategic approach to software testing ,Strategic issues, Test strategies for Object Oriented Software, Test strategies for WebApps, Test strategies for MobileApps, Validation testing, System testing, the art of debugging.

Testing Conventional Applications: Software testing fundamentals, Black box and White box testing, Basis path testing, Control Structure, O-O testing methods, Class level testing methods, Inter class test case design, Testing for specialized environments, architectures and Applications testing patterns.

UNIT-V:

Software Configuration Management : Software Configuration Management, The SCM Repository, The SCM process, Configuration Management for Web and Mobile Apps

Product Metrics: Software quality, A frame work for Product metrics , Metric for the analysis model, Metrics for the Design Model , Metrics for Source code, Metrics for testing, Metrics for maintenance, Site Reliability Engineering (SRE) KPIs: Mean Time to Detect (MTTD) and Mean Time to Recovery (MTTR).

Learning Resources:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, 8th Edition (2005), Tata McGrawHill.
2. Joakin Verona " Practical DevOps" , 2nd Edition, Ingram short Title; 2nd Edition, 2018
3. Deepak Gaikwad, Viral Thakkar, "DevOps Tools from Practioner's viewpoint" Wiley Publications, 2019.
4. Shari Lawrence Pfleeger, Software engineering Theory and Practices, 4th Edition (2011), Pearson Education, India.
5. Pankaj Jalote, An Integrated Approach to Software Engineering, 3rd Edition (2005), Narosa Publishing House.
6. http://nptel.ac.in/courses/106101061/
7. http://freevideolectures.com/Course/2418/Software-Engineering
8. http://www.ece.rutgers.edu/~marsic/books/SE/instructor/slides/
9. https://ocw.mit.edu/courses/aeronautics-and-astronautics/16-355j-software-engineering-concepts-fall-2005/lecture-notes/

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

CYBER SECURITY

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks:60	Course Code: **UI24PC630CS**
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. Learn the fundamentals of Cyber Security 2. Gain understanding of relevant terminology, concepts in Cyber Security.	1. Understand Cyber Security Fundamentals. 2. Gain knowledge about attacker techniques and motivation 3. Gain knowledge about exploitations used by the attackers 4. Understand the various kinds of malicious codes. 5. Gain knowledge about defense and analysis techniques.

CO-PO and CO-PSO mapping

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

UNIT-I

Cyber Security Fundamentals:

Network and Security Concepts – Information Assurance Fundamentals, Basic Cryptography, Symmetric Encryption, Public Key Encryption, The DNS, Firewalls.

OS Security Concepts, Microsoft Windows Security Principles – Window Tokens, Window Messaging, Windows Program Execution, The Windows Firewall.

Digital certificates – Concept and implementation details.

UNIT-II:
Attacker Techniques and Motivations:
Usage of Proxies by Attackers, Tunneling techniques.

Fraud Techniques – Phishing, Smishing, Vishing, Mobile malicious code, Rogue antivirus, Click fraud and Ransomware.
Threat Infrastructure – Botnets, Fast-Flux, Advanced Fast-Flux.

UNIT-III:
Exploitation:
Techniques to gain a foothold- Shell code, Integer overflow vulnerabilities, Stack based buffer overflow, Format string vulnerabilities, SQL injection, Malicious PDF files, Race conditions, Web exploit tools, Dos Conditions, Brute Force and dictionary attacks.
Misdirection, Reconnaissance, and Disruption Methods – Cross site scripting, Social Engineering, WarXing, DNS Amplification attacks

UNIT IV:
Malicious Code:
Self-replicating malicious code – worms and viruses.
Evading detection and Elevating Privileges – Obfuscation, VM Obfuscation, Persistent software techniques, Rootkits, Spyware, Attacks against privileged user accounts and escalation of privileges, token kidnapping, VM detection.
Stealing information and exploitation – Form grabbing, Man-in-the-middle attacks, DLL injections, Browser Helper objects.

UNIT V:
Defense and Analysis techniques:
Memory Forensics – Importance and capabilities of memory forensics, Memory analysis frameworks, Dumping physical memory, Installing and using volatality, Finding hidden processes, Volatality Analyst Pack.
Honeypots, Malicious code naming, Automated Malicious Code Analysis Systems: Passive Analysis, Active Analysis.
Intrusion Detection Systems
Need of Cyber laws: the Indian Context
Case Study: Cyber Security Breaches and Lessons Learned

Learning Resources:

1. James Graham, Richard Howard, Ryan Olson, "Cyber Security Essentials", CRC Press, 2016.
2. Nina Godbole and Sunit Belapure, "Cyber Security", Wiley India, 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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

AGENTIC AI

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks:60	Course Code: **UI24PC640CS**
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. To introduce students to the foundations and evolution of Agentic AI, characteristics, and use cases of autonomous agents. 2. To equip students with the skills to design, implement, and optimize agentic systems, focusing on architecture, interaction patterns, memory management, and performance enhancement through reflection and self-governance mechanisms.	1. Understand the fundamentals of Agentic AI, characteristics, types of agents, applications and multi-agent systems. 2. Implement reflective reasoning and performance monitoring in AI agents using Crew AI, enabling self-explanation and system transparency. 3. Understand the coordinator-worker-delegator -CWD Model and Agent Roles 4. Develop and optimize agentic workflows by employing state-space modeling, memory architecture, and integration strategies for both sequential and parallel processing. 5. Build Retrieval-Augmented Generation (RAG) Systems with Lang Chain.

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

Unit-I

Introduction to Agentic AI, Traditional AI Vs Agentic AI and Generative AI, Capabilities of Agentic AI, Benefits and Agentic AI Use cases, Autonomous Agents,

Reviewing Intelligent agents and their characteristics, Exploring the architecture of agentic systems, Deliberative architectures, Reactive architectures, Hybrid architectures, multi-agent systems (MASs), Definition and characteristics of MAS, Interaction mechanisms in MASs

Unit-II

Reflection in agents, implementing reflective capabilities, Traditional reasoning, Meta-reasoning with AI agents and Crew AI framework, Performance monitoring, Self-explanations transparency with AI agents, Learning and refinement with AI agents.

Unit-III

Understanding the coordinator-worker-delegator (CWD) model, designing agents with role assignments, Communication and collaboration between agents, Implementing the CWD approach in generative AI systems.

Unit-IV

Effective Agentic System Design Techniques, Focused system prompts and instructions for agents, State spaces and environment modeling, Integration and interaction patterns, Monitoring and adaptation, Agent memory architecture and context management, Sequential and parallel processing in agentic workflows, Workflow optimization,

Unit-V

Introduction to Large Language Models, Retrieval-Augmented Generation (RAG) Model, Agentic AI tools and frameworks- Lang Chain: Modular agent design, RAG integration, Lang Graph: low-level orchestration framework for building, managing, and deploying stateful agents and Lang Smith.

Textbooks:

1. Building Agentic AI Systems: Create intelligent, autonomous AI agents that can reason, plan, and adapt by Anjanava Biswas, Wrick Talukdar, Matthew R Scott, Packt Publication, April 2025
2. Artificial Intelligence: A Modern Approach, Authors: Stuart Russell, Peter Norvig, 4th Edition, Pearson, 2021.
3. Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations, Yoav Shoham, Kevin Leyton-Brown, 1st Edition, Cambridge University Press, 2009

Learning Resources:

1. "Introduction to Agentic AI for Executives: Fundamental Concepts, Practical Applications, Implementation Strategies, and Future Trends", Dr. Ivan Del Valle, Paperback, 208 pages, 2024
2. Agentic Artificial Intelligence: Harnessing AI Agents to Reinvent Business, Work, and Life", Pascal Bornet, Jochen Wirtz, Thomas H. Davenport, Nandan Mullakara, Brian Evergreen, David De Cremer, Phil Fersht, Rakesh Gohel, Shail Khiyara, Pooja Sund, Irreplaceable Publishing, 2025
3. Agentic AI: Build Your First Autonomous Agent System—A Practical Hands-On Guide", Leandro Calado, Kindle eBook (111 pages), 2025
4. https://konverge.ai/pdf/Ebook-Agentic-AI.pdf
5. https://www.pwc.com/m1/en/publications/documents/2024/agentic-ai-the-new-frontier-in-genai-an-executive-playbook.pdf
6. https://www.udemy.com/course/the-complete-agentic-ai-engineering-course/?srsltid=AfmBOooNSYbinopPhhXaVkBuKqP0ngm-ZkWIA5b2sBLMvIhLHPgzlmi1&couponCode=ST16MT230625G1
7. https://python.langchain.com/docs/tutorials/rag/

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

OPEN ELECTIVES OFFERED IN B.E. VI SEMESTER (2026-27)

Dept	Title Open Elective-IV	Code	Credits
Civil	Project Management	U24OE610CE	3
ECE	Internet of Things and Applications (General Pool)	U24OE610EC	3
	Automatic Train Protection System – Kavach (General Pool)	U24OE630PH	3
	Introduction to Wireless Communication Technologies (Communication Engineering-Stream)	U24OE640EC	3
EEE	Introduction to Batteries and Battery management System	U24OE610EE	3
MECH.	Autonomous Mobile Robots (Stream: Robotics)	U24OE610ME	3
	Additive Manufacturing and its Applications (General Pool)	U24OE620ME	3
H & SS	Strategic Management for Engineers (Management Courses for Engineers – Stream)	U24OE610EH	3
	Logistics and Supply chain Management (Management Courses for Engineers – Stream)	U24OE611EH	3
	Business Intelligence (BFSI – Stream)	U24OE620EH	3
	Psychology (Liberal Arts Courses-Stream)	U24OE630EH	3
	Advanced course in Entrepreneurship (General Pool)	U24OE630EH	3
Physics	Introduction to Nanotechnology	U24OE610PH	3
Maths	Applied Algebra for Computing	U240E610MA	3

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

PROJECT MANAGEMENT
(Open Elective-IV)

SYLLABUS FOR B.E. VI SEMESTER

L:T:P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code: **U24OE610CE**
Credits: 3	CIE Marks:40	Duration of SEE: 3 Hrs

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 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.

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

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

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

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

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

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

Learning Resources:

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

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

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

Duration of Internal Tests : 90 Minutes

With effect from the Academic Year 2026-27

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: **U24OE610EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To enable students to understand the fundamentals and architecture of the Internet of Things (IoT) and explore its role in enhancing quality of life through interconnected devices and systems. 2. To familiarize learners with various IoT communication protocols such as MQTT, AMQP, CoAP, and mDNS, and equip them with the knowledge to address real-world design constraints, including technical limitations and power management. 3. To introduce students to IoT hardware platforms, focusing on the selection and integration of microcontrollers and Raspberry Pi for prototyping and building practical IoT applications using Python. 4. To provide an in-depth understanding of IoT data representation, visualization, and device-level interactions, along with remote control capabilities and power conditioning techniques using energy harvesting methods. 5. To expose students to real-world case studies and application domains of IoT such as Smart Cities, Connected Vehicles, Smart Agriculture, Healthcare, and Activity Monitoring, fostering innovation in interdisciplinary domains.	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, Data management, Introduction to cloud IOT platforms like MS Azure, AWS IOT, Google Cloud IOT, Thingworx, Business processes in IoT, IoT Enabling Technologies, IoT Levels & Deployment.

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:

1. 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.
2. Peter Waher, "Learning Internet of Things", PACKT publishing, BIRMINGHAM – MUMBAI
3. Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", ISBN 978-3-642-19156-5 e-ISBN 978-3-642-19157-2, Springer
4. 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
5. https://nptel.ac.in/courses/106105166/5
6. 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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Automatic Train Protection System - Kavach

SYLLABUS FOR B.E. VI – SEMESTER

(CSE, CSE(AI&ML), ECE, EEE, IT & Mechanical)

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

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

CO-PO/PSO Mapping

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

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

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

Working of Train Protection System – Kavach: Overview of Kavach and its Working, Features, Subsystems, Communication Interfaces, Signalling Interfaces

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

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

UNIT – II: (6 Hours)

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

UNIT – III: Design –Kavach: (8 Hours)

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

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

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

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

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

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

Practicals at IRISET Laboratory (12 Hours)

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2026-27

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Wireless Communication Technologies

(Communication Engineering Stream: Open Elective - IV)

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

L:T:P (Hrs./week) :3:0:0	SEE Marks : 60	Course Code: **U24OE640EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
1. To understand the technology trends changing from generation to generation. 2. To have an insight into the various propagation models and the effects of fading. 3. To understand the multiple access techniques and Mobile communication system specifications.	On completion of the course, students will be able to 1. Analyze various methodologies to improve the cellular capacity. 2. Identify various Propagation effects. 3. Identify the effects of fading and multi path propagation. 4. Categorize various multiple access techniques for Mobile Communications. 5. Analyze the specifications of GSM based Mobile Communication Systems.

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

UNIT - I:

Introduction to Wireless Communication Systems: Evolution of Mobile Radio Communications, Examples of Wireless Communications Systems, Trends in Cellular Radio and Personal Communication Systems.

The Cellular Concept – System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Improving Coverage and Capacity in Cellular Systems.

Lab Activity: Calculation of frequencies for cellular system design using MATLAB

UNIT - II:

Mobile Radio Propagation - Large Scale Path Loss: Introduction to Radio wave Propagation, Free Space Propagation Model, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Scattering.

Lab Activity: Path loss calculations using MATLAB

UNIT - III:

Mobile Radio Propagation - Small Scale Fading and Multipath: Small Scale Multipath Propagation, Small – Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small-Scale Fading, Rayleigh and Ricean Distributions.

Lab Activity: Small scale fading parameter calculations using MATLAB

UNIT -IV:

Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Space Division Multiple Access (SDMA).

Lab Activity: Demonstrating multiple access techniques using MATLAB.

UNIT -V:

Wireless Systems and Standards: Global System for Mobile (GSM) – Services and features, System architecture, GSM Radio subsystem, channel types, Frame structure for GSM.

Learning Resources:

1. Theodore S. Rappaport, Wireless Communications Principles and Practices, 2nd edition, Pearson Education.
2. David Tse, Pramodh Viswanath, Fundamentals of Wireless Communication, 2005, Cambridge University Press.
3. Name of the course: Introduction to Wireless and Cellular Communications
   Course url: https://swayam.gov.in/nd1_noc19_ee48/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

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

INTRODUCTION TO BATTERIES AND BATTERY MANAGEMENT SYSTEM
Open Elective-IV
SYLLABUS FOR B.E. VI SEMESTER

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

COURSE OBJECTIVES **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, modeling and charging requirements. The course will help learner to develop battery management algorithms for batteries.	1. Interpret the role of battery management system. 2. Identify the requirements of Battery Management System. 3. Interpret the concept associated with battery charging / discharging process. 4. Calculate the various parameters of battery and battery pack. 5. Design the model of battery pack

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

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

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

estimation, Cell total energy and cell total power.

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

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

UNIT –IV: Modelling and Simulation:

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

UNIT -V: Design of battery BMS:

Design principles of battery BMS, Effect of distance, load, and force on 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 Tests : 90 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEEING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

AUTONOMOUS MOBILE ROBOTS
(Steam: Robotic) Open Elective-IV)

SYLLABUS FOR B.E VI Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : **U24OE610ME**
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 students with fundamental understanding of mobile robots and their operation in real-world environments. • Introduce concepts of robot motion, navigation, and interaction with surroundings. • Develop analytical understanding of robot positioning, movement, and path planning. • Familiarize students with basic autonomous decision-making in robotic systems.	• Understand different types of mobile robots and analyze their motion mechanisms. (CO1) • Apply kinematic relationships to determine position and velocity of mobile robots. (CO2) • Estimate robot position using basic localization techniques. (CO3) • Analyze path planning methods for navigating structured environments. (CO4) • Understand fundamental navigation and obstacle avoidance strategies in autonomous robots. (CO5)

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

UNIT-I

Introduction to Mobile Robots:

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

UNIT-II

Kinematics of Mobile Robots:

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

UNIT-III

Localization of Mobile Robots:

Introduction to robot localization. Dead reckoning and odometry. Position estimation using wheel encoders. Sources of error in localization. Basic techniques for improving position estimation. Concept of probabilistic localization.

UNIT-IV

Path Planning Techniques:

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

UNIT-V

Navigation and Obstacle Avoidance:

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

Learning Resources:

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

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

1	No. of Internal Tests:	02	Max. Marks for each Internal Test:	30
2	No. of Assignments:	03	Max. Marks for each Assignment:	5
3	No. of Quizzes:	03	Max. Marks for each Quiz Test:	5

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEEING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

ADDITIVE MANUFACTURING AND ITS APPLICATIONS

(General Pool)

(Open Elective-IV)

SYLLABUS FOR B.E VI Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code: **U24OE620ME**
Credits: 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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD-31

Department of Humanities & Social Sciences

STRATEGIC MANAGEMENT FOR ENGINEERS

(Stream: Management Courses for Engineers)

(Open Elective-IV)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U24OE610EH**
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. To introduce the fundamentals of strategic management and its relevance to engineering and technology. 2. To develop analytical skills for assessing internal and external business environments. 3. To explore strategic planning, implementation, and performance evaluation in engineering contexts. 4. To understand the role of innovation, competition, and sustainability in strategic decisions. 5. To prepare engineers to contribute to strategic decision-making in technical organizations.	1. Explain key strategic management concepts and frameworks (e.g., SWOT, PESTEL, Porter's Five Forces). 2. Analyze organizational strengths, weaknesses, opportunities, and threats in engineering-driven firms. 3. Develop strategic plans aligned with technical, operational, and business objectives. 4. Evaluate strategic alternatives in terms of risk, competitiveness, and long-term sustainability. 5. Contribute effectively to strategic discussions in interdisciplinary engineering teams.

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

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

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

Unit-III : Strategy Formulation
Business Level Strategy, Strategy formulation, Situation Analysis, Growth Strategies, Offensive strategies, Defensive strategies, Generic Strategies, Industry Life Cycle Analysis -, Emerging Industries, Maturing Industry, Fragmented Industry, Strategy For Leaders, Challengers, Followers and Niches.

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

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

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

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

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

Duration of Internal Tests : 90 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD-31

Department of Humanities & Social Sciences

LOGISTICS AND SUPPLY CHAIN MANAGEMENT

(Stream:BFSI)

(Open Elective-IV)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U24OE611EH**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

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

Unit-I: Introduction to Supply Chain Management

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

Unit-II: Inventory and Logistics Management Planning Demand and Supply

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

Unit-III: Global Supply Chain Introduction, Forces of Global Supply Chain

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

Unit-IV: Supply Chain & Global Logistics (Transportation)

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

Unit-V: IT and AI in Supply Chain Management Supply Chain IT framework

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

Case study may be given for Unit 2

Books suggested:

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

Reference books:

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

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

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

Duration of Internal Tests : 90 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD-31

Department of Humanities & Social Sciences

BUSINESS INTELLIGENCE

(Stream:BFSI)

(Open Elective-IV)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U24OE620EH**
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. To introduce the concepts and architecture of Business Intelligence (BI) systems. 2. To familiarize students with data warehousing, data mining, and analytics tools. 3. To provide insights into BI implementation and its role in decision-making.	1. Define the architecture, evolution, and benefits of Business Intelligence. 2. Explain data warehousing and mining techniques, and apply them in real-time data environments. 3. Use Business Performance Measurement (BPM) tools and performance dashboards for managerial decision-making. 4. Employ Business Analytics and data visualization techniques in business contexts. 5. Discuss the challenges in BI implementation and emerging trends such as social BI and reality mining.

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

Unit-I: Introduction to Business Intelligence (BI)

Definition, History and Evolution, Styles of Business Intelligence, Benefits of Business Intelligence, Real-time Business Intelligence, Business Intelligence Value chain, Architecture of Business Intelligence.

Unit- II: Data ware housing and Data mining

Date Warehousing (DWH): Definition, Characteristics, types,-Date warehousing frame world, Data Warehousing architecture, Alternative architectures, Data ware housing integration, Data ware housing-Development approaches, Real time data warehousing.

Data Mining: Definition, Characteristics, Benefits, Data mining functions, Data mining applications, Data mining techniques and tools. Text mining, Web mining.

Unit -III: Business Performance Measurement (BPM)

Definition, BPM v/s BI, Summary of BPM Process, Performance measurement, BPM methodologies, BPM architecture and applications, Performance dash boards.

Unit-IV: Business Analytics and Data Visualization

Business Analytics-Definitions, Tools and techniques of BA, Advanced business analytics Business Analytics and Web usage, Benefits and success factors of Business Analytics.

DataVisualization: Definition, New direction in Data Visualization, GIS, GIS v/s GPS

Unit-V: Business Intelligence implementation and emerging trends

Implementing Business Intelligence-Implementation Factors, Critical success factors of Business implementation, Managerial issues related to BI implementation, Business Intelligence and integration -Types, Need, and Levels of Business Intelligence integration.

Emerging trends in Business Intelligence implementation, Social networks and Business Intelligence, Collaborative decision making, Reality mining.

Suggested Readings:

1. Business Intelligence-A Managerial Approach, Turban, Sharada, Delen, King- Pearson -Second Edition-2014.
2. Decision Supportand Business Intelligence Systems-Turban, Aaronson, Liang, Sharada- Pearson, and latest Edition.
3. Successful Business Intelligence, CindiHowson,McGrawHillEducation-IndianEdition.
4. BusinessIntelligence-AhandsonapproachbyN.Rajeshwari,1stEdition,PHI
5. Ramesh Sharda, TurbanE, Business Intelligence and analytics,10th Edition, Pearson Books
6. Bernard Marr,"Datastrategy"KoganPagepublishing
7. AnoopV KKumar, "Business Intelligence demystified " 1st edition 2022, BPB publications

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD-31

Department of Humanities & Social Sciences

PSYCHOLOGY

(Liberal Arts Course – Stream)

(Open Elective-IV)

SYLLABUS FOR B.E.VI-SEMESTER

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

Course Objectives The objectives of this course are to	**Course Outcomes** On completion of the course the student will be able to
1. Introduce students to the foundational concepts, theories, and branches of psychology. 2. Develop an understanding of human behaviour and mental processes through scientific approaches. 3. Encourage critical thinking and analytical reasoning in the study of psychological phenomena. 4. Foster awareness of the biological, cognitive, and socio-cultural influences on behaviour. 5. Equip students with basic research skills and ethical considerations in psychological practice.	1. Explain core psychological theories and their relevance to everyday life. 2. Analyze behaviour using major psychological perspectives (e.g., behavioural, cognitive, humanistic, etc.). 3. Apply psychological principles to real-world situations such as learning, motivation, and social interaction. 4. Demonstrate basic skills in psychological research, including hypothesis formulation, data collection, and analysis. 5. Evaluate ethical issues and cultural factors that influence psychological practice and research.

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

Course Description:

This course provides an overview of psychology as a scientific discipline. Students will explore the biological, cognitive, social, and developmental foundations of human behaviour. No prior knowledge is required.

Unit 1: Foundations of Psychology

1. History of psychology (structuralism, functionalism, behaviorism)
2. Major perspectives to understand psychology (biological and sociological)

Unit 2: Cognitive Psychology

1. Cognition and Cognitive Development (Piaget)
2. Intelligence
3. Working memory & Executive Function

Unit 3: Positive Psychology

1. Building human strength: Moving from Negative to positive
2. Classification of Strengths
3. PERMA Model of well-Being

Unit 4: Health Psychology

1. Illness-Wellness continum
2. Stress and coping stress
3. Health Protective Behavior

Unit 5: Social Psychology

1. Socio-emotional development (Eric Erikson)
2. Attitudes, conformity, and group behaviour
3. Academic Motivation

Textbook

Galloti: Cognitive Psychology
Baron, R.A., & Branscomb, N.R. (2012). Social Psychology (13th ed.). NJ, USA: Pearson.

Lopez, S.J., Pedrotti, J.T., & Snyder, C.R. (2019). Positive Psychology - The Scientific and Practical Exploration of Human Strengths (4th edition). New Delhi: Sage Publications India Private Limited.

Taylor Shelley.E(2012) Health Psychology(8thEdition) Pub by McGraw-Hill ISBN:978-0-07-803519-7

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
Duration for SEE : 180 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD-31

Department of Humanities & Social Sciences

ADVANCED COURSE IN ENTREPRENEURSHIP

(Open Elective-IV)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U24OE640EH**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

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

CO-PO Mapping

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

UNIT-I: Pivoting and New Business Model

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

UNIT-II: Business Planning

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

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

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

UNIT-IV: Branding and Channel Strategy, Leveraging Technologies

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

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

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

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF PHYSICS

INTRODUCTION TO NANOTECHNOLOGY
(Open Elective-IV)

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks:60	Course Code: **U24OE610PH**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

Course Objectives	Course Outcomes
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 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.

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

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 sectors, 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

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MATHEMATICS

APPLIED ALGEBRA FOR COMPUTING

OPEN ELECTIVE –IV, B.E. VI Semester

(for CSE, AIML and IT only)

L:T: P (Hrs/Week):3	SEE Marks:60	Course Code: **U24OE610MA**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

COURSE OBJECTIVES	COURSE OUTCOMES
The course will enable the students to :	**At the end of the course students should be able to:**
1. Understand binary operations and algebraic structures such as semigroups, monoids, and groups with suitable examples. **2. Study** the concepts of subgroups, order of groups and elements, and cyclic groups, and to develop the ability to analyze group structures. **3. Acquire** the knowledge of cosets, index of subgroups, and Lagrange's theorem **4. Understand** homomorphisms and isomorphisms of groups along with their basic properties and kernels, normal subgroups, and factor groups. **5. Develop** foundational knowledge algebraic structures called rings and their related systems such as subrings, integral domains, fields, and polynomial rings.	**1.Apply** the concepts of groups, subgroups, cyclic groups, and finite groups them in Modular arithmetic in computing systems and symmetry operations in computer graphics etc., **2. Implement** the concepts of subgroups and cyclic groups in periodic patterns in computing systems, Structure analysis in discrete systems (state machines) modular-based computations in cryptography. **3. Apply** the concepts of cosets and Lagrange's theorem to analyze group structures, partitioning of sets, and constraints in discrete systems such as computing and cryptographic frameworks. **4. Relate** these concepts to analyze structure-preserving transformations in discrete systems such as automata theory, compiler design, cryptography, and data structure mappings. **5. Identify** ring structures, subrings, integral domains, fields, and polynomial rings, and examine their significance in computational domains such as cryptographic systems, coding theory, and symbolic computation.

UNIT – I: (8 Hours)

GROUPS

Binary operations - Algebraic systems - Groups – Elementary properties of groups (without proofs) –Additive and Multiplicative group of integers *modulo* n – Finite Groups.

UNIT – II: (8 Hours)

SUBGROUPS & CYCLIC GROUPS

Subgroups- Basic properties without proofs - Order of a group and Order of an element of a group.

Cyclic Groups – Basic Properties of Cyclic Groups – Examples with emphasis on integer *modulo* n - Fundamental theorem of Cyclic Groups- Statement (without proof).

UNIT – III: (8 Hours)

COSETS & LAGRANGE'S THEOREM

Cosets- Definition and examples –Index of a subgroup - Definition and examples – Basic Properties of Cosets (without proofs) - Lagrange's theorem – Statement and interpretation (without proof)- Applications.

UNIT – IV: (8 Hours)

HOMOMORPHISM & ISOMORPHISM OF GROUPS

Homomorphism – Basic Properties (without proofs) – Kernel of Homomorphism - Normal Subgroups via Kernel of Homomorphism - Factor Groups – Isomorphism – Basic Properties (without proofs).

UNIT – V: (8 Hours)

RINGS

Rings – Examples with emphasis on integer *modulo* n – Basic properties of Rings (without proofs) – Subrings - Integral domains and Fields –Polynomial Rings – Division Algorithm.

Text Books:

1. Advanced Course Modern Algebra, Goyal and Gupta, Pragathi Prakashan
2. Contemporary Abstract Algebra, Joseph A. Gallian, CRC Press
3. Discrete Mathematical Structures, Rm.Somasundaram, Prentice Hall of India
4. Discrete Mathematics, P.K.Mittal, Cyber Tech Publications

Reference Books:

1. A First Course in Abstract Algebra, John B. Fraleigh, Pearson Education Limited.
2. Abstract Algebra Theory and Applications Thomas W. Judson Stephen F. Austin State University.
3. Abstract Algebra: Structure and Application, David W. Finston, Patrick J. Morandi, John Wiley & Sons.
4. A Book of Abstract Algebra – Charles C. Pinter, Dover Publications, Inc., Mineola, New York

Online Resources :

1. https://onlinecourses.nptel.ac.in/noc19_cs78/preview
2. http://abstractalgebra.altervista.org/aafmt.pdf
3. https://ocw.mit.edu/courses/18-703-modern-algebra-spring-2013/

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

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

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Skill Development Course-VII (Verbal Aptitude)

SYLLABUS FOR B.E. VI-SEMESTER

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

COURSE OBJECTIVES	**COURSE OUTCOMES**
The course will enable the learners to:	**At the end of the course the learners will be able 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	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 and CO-PSO mapping												
CO/PO	**PO**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1										3		
CO2										3		
CO3										3		
CO4				3								
CO5										3		

Unit 1: Vocabulary- Reading for Content and Context

Overview:

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

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

Unit 2: Fill in the Blanks- Applying Content and Context
Overview:
This course is designed for students to identify the clue/ theme words in sentences, then understand the context in which the words are used and finally apply concepts like collocation, antonyms, and synonyms to solve questions.

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

Unit 3: Jumbles
Overview:
This course is designed to develop and improve reading and study skills needed for college work. Topics include identifying main idea and supporting details, determining author's purpose and tone, distinguishing between fact and opinion, identifying patterns of organization in a sentence or passage and the transition words associated with each pattern, recognizing the relationships between words and sentences, identifying and using context clues to determine the meanings of words, identifying logical inferences and conclusions.

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

Unit 4: Critical Reading Skills
Overview:
Research shows that good reading skills can lead to well written assignments. In this unit, students will learn, develop and improve reading and study skills needed for college work. Building on these basic strategies, students will develop skills to critically analyze texts and then the ability to identify its theme.
4.1 Concepts- Basic Introduction & Short Passages
4.2 Article & Article Based Passages
4.3 Theme Detection

Unit 5: Spotting the Errors
Overview:
In this unit students will focus on identifying errors in sentences, rectifying them and improving the quality of sentences. Building on these skills will also have an impact on the written and spoken skills of students since they will be aware of the common and often made errors and therefore be able to avoid them while using language.

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

METHODOLOGY **ASSESSMENTS**

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

- 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 : 1 Hour 30 Minutes

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

Skill Development Course-VIII (Technical Skills-IV)

Industry Standard Coding Practices – 2024

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week): 1:0:0	SEE Marks : 40	Course Code: **UI24PE610CS**
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. Understand importance of problem solving approaches for programming complex data structure problems. 2. Understand importance of optimized solutions for problems solving and its relevance to industry. 3. Implement mathematical and logical understanding approaches to implement test driven development practices. 4. Start participating in global coding competitions relevant to the syllabus 5. Write Efficient coding solutions using appropriate algorithm	1. Choose the right data structure based on the requirements of the problem. 2. Design algorithm for a given problem by choosing appropriate design technique and provide optimal solution.

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

Algorithms – Greedy Methods - II

Review of Greedy Strategies, Problem solving on greedy problems: Job sequencing solutions, Activity selection problem, Scenario based problem solving implementing Greedy Methods

Algorithms - Dynamic Programming - I
Introduction to Dynamic programming, Coding solutions to form Sub structures, Problem solving on Dynamic Knapsack, Trip optimization problem, Scenario based problem solving using Dynamic Programming approaches, Coding solutions on Coin-change sub structure, Comparison of Greedy Vs DP for Coin change, Sum of sub sets problem

Algorithms - Dynamic Programming - II
Problem solving using Grid Memo, Problem solving on Longest Common Sub string, Longest Common subsequence, Minimum Edit Distance problems, Longest Increasing Sub sequences, Min sum path matrix, Max sum Sub square, Scenario based problem solving using Dynamic Programming approaches

Non-Linear Data structures – Graph Theory Introduction to Graphs Problems, Types of graphs, Problem solving on graph traversals, Checking the degree sequence, , DFS, BFS, Scenario based problem solving implementing graphs, Practice Problems

Non-Linear Data structures – Graph Algorithms
Problem solving on Graph Coloring, Introduction to DAG, Topological sorting on DAGs, Spanning Tree, Graph
Reduction, Kahn's Algorithm, Practice Problems

Backtrack Algorithms
Introduction to Backtracking, Differences between backtracking and brute force methods, State space diagram, N Queens problem, Finding a way, Solving Grid based backtracking problems, practice problems

String Algorithms
TRIE Data structure, Finite state machine for pattern matching, KMP algorithm, Example problem solving

Operating Systems
Operating Systems Overview, Process Management, CPU Scheduling algorithms, Deadlocks, Memory Management, Examples.

Networking
The OSI Model, The TCP/IP Model, Network typologies and Ethernet, Internet Protocol v4 and v6, Media Access Control and Address Resolution Protocols, IP Addressing, Examples.

Introduction to Java and Expressions and control Statements
Introduction to Java, Java Setup, first Java program, Variable and data type, Primitive Data Types, String basics, Type casting, Operators in Java, Control Statements: If Statements, Switch case, For loop, While loop, Do while loop, Break and continue, Nested loops, Modulo operator, Methods parameters and return type, Method overloading, Naming convention, BigDecimal class

Object Oriented Programming Through Java - 1
Orientation to Object oriented programming, Classes, Constructors, introducing inheritance, Type of inheritance, Composition Introduction Encapsulation, Polymorphism, Concepts of Java: Interfaces, Abstract class, Example Problems

Object Oriented Programming Through Java - 2
Introduction, Multiple inheritance using interfaces, Inner classes, Types of nested class, Local inner class, Anonymous object, Anonymous inner class, Advantages of inner class, User input, Static elements, Final keyword, Final keyword with method and class, Packages, Access modifier

Exception Handling through Java
Introduction to Exception handling, Multiple catch blocks, Finally block, Throw and throws, User defined exception, Checked and unchecked exceptions

Strings through Java
Introduction to Strings, Difference between String literal and String Object, String methods, String formatting, String functions, manipulating strings, example problems

DBMS
Introduction to DBMS, SQL Queries, ER And Relational Models, Data Definition And Querying, Transactions
And Concurrency, Normalization, case studies, Example Problems.

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

1	No. of Internal Tests	:	1	Max. Marks for each Internal Test	:	20
2	No. of Quizzes	:	1	Max. Marks for each Quiz	:	10

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2026-27

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

Department of Computer Science & Engineering

NATURAL LANGUAGE PROCESSING LAB
SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code**:UI24PC611CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** On completion of the course, students will be able to
1. Demostrate N-gram, Neural Language Models and HMM	1. Implement the word tokenization and Minimum Edit Distance algorithm 2. Compute cosine similarity between the words 3. Implement the N-gram and Neural language models 4. Implement HMM for POS tagging. 5. Implement parsing algorithms for grammar checking

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

The following experiments are to implemented using Python library nltk and spaCY and without using the library wherever applicable. And each student is expected to develop and submit a mini project in the area of NLP at the end of the course.

1. Implement a word tokenization using UNIX utilities
2. Implement a word tokenization using regular expressions
3. Implement Minimum Edit Distance (MED) algorithm for spelling correction
4. Implement n-gram language model
5. Implement Laplace smoothed n-gram language model.
6. Compute cosine similarity between the words using term-

document matrix

7. Compute cosine similarity between the words using term- term-term matrix
8. Compute tf-idf matrix for the given document set
9. Implement language model using Feed forward Neural Network
10. Implement POS tagging using HMM
11. Implement language model using Transformer
12. Implement CKY parsing algorithm

Learning Resources:

1. DanielJurafsky&JamesH.Martin,"SpeechandLanguageProcessing", 3rd edition,PearsonEducation. (https://web.stanford.edu/~jurafsky/slp3/)
2. James Allan, Natural Language Understanding, 2ndedition(1995), Pearson Education
3. Charnaick, Eugene, Statistical Language Learning, MIT Press, 1993
4. Christopher D.Manning, HinrichSchutze, Foundations of Statistical Natural Language Processing, (1999),The MIT Press.
5. Tanveer Siddiqui, US Tiwary, Natural Language Processing and I Retrieval, (2008), Oxford University Press.

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

SOFTWARE ENGINEERING LAB

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P(Hrs./week): 0:0:2	SEE Marks :50	Course Code: **UI24PC621CS**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** On completion of the course, students will be able to
1. Apply software engineering principles for analyzing, specifying, and designing software-intensive systems using professional standards. 2. Utilize modern modeling techniques, AI-assisted engineering, and DevOps tools to build and document software artifacts.	1. Identify functional and non-functional requirements and document them following IEEE standards for a given system. 2. Design data and logic flows while aligning system behavior with user mental models and personas. 3. Construct structural, behavioral, and architectural UML models to represent system interaction and organization. 4. Implement design-to-code translation using AI-assisted tools (Codex) and manage collaborative development through DevOps pipelines. 5. Build automated test cases and synthesize all engineering artifacts into a comprehensive final technical report.

Programming Exercise:

1. Develop a Software Requirements Specification (SRS) document as per ANSI/IEEE Std 830-1984 for a given application.
2. Model data movement and control logic using Data Flow Diagrams (DFD) and Flow-based logic charts for a given application.
3. Formulate user mental models and personas to align system behavior with user expectations for a given application.
4. Design behavioral models using Use Case Diagrams to demonstrate user requirements for a given application.

5. Develop interaction models using Sequence and Collaboration Diagrams to demonstrate object communication for a given application.
6. Create structural models using Class Diagrams to demonstrate the static architecture for a given application.
7. Implement AI-assisted code generation and refactoring using Codex to bridge design and implementation for a given application.
8. Design architectural models using Component and Deployment Diagrams to demonstrate physical distribution for a given application.
9. Manage source code versions and collaborative branching using Git to create and maintain repositories for a given application.
10. Automate continuous integration and deployment pipelines using Jenkins to implement build jobs for a given application.
11. Execute functional testing and automated script validation using RFT to ensure requirement compliance for a given application.
12. Build a comprehensive design model and final technical synthesis to consolidate all engineering phases for a given application.

Learning Resources:

Roger S. Pressman, Software Engineering: A Practitioner's Approach, 6th Edition, (2005) Tata McGrawHill.

1. Grady Booch, James Rumbagu, Ivor Jacobson, The Unified Modeling Language-User guide , 2nd Edition, (2007), Pearson Education, India.
2. Joakim Verona. "Practical Devops", Second Edition. Ingram short title; 2nd edition, 2018.
3. Deepak Gaikwad, Viral Thakkar, "DevOps Tools from Practitioner's Viewpoint". Wiley publications, 2019.
4. http://www.nyu.edu/classes/jcf/g22.2440-001_sp09/handouts/UMLBasics.pdf
5. https://courses.cs.washington.edu/courses/cse403/11sp/lectures/lecture08uml1.pdf
6. https://www.coursera.org/learn/intro-to-devops

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

CYBER SECURITY LAB

SYLLABUS FOR B.E. VI - SEMESTER

L:T:P(Hrs./week):0:0:2	SEE Marks:50	Course Code : **UI24PC631CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** On completion of the course, students will be able to
1. Understand the core principles of cyber security, 2.Analyze common attacker techniques and exploitation methods 3. Explore operating system security concepts, 4. Study malicious code behaviors 5. Apply forensic and defense techniques,	1. Demonstrate understanding of core cyber security concepts, including information assurance, cryptography, and network security mechanisms. 2. Identify and describe various attacker tools, techniques, and motivations used in modern cyber attacks. 3. Analyze different types of vulnerabilities and exploits, such as buffer overflows, injection attacks, and misdirection methods. 4. Explain the behavior of malicious software and methods for evading detection and privilege escalation. 5. Apply memory forensics and intrusion detection techniques to detect, analyze, and respond to cyber security threats.

CO-PO and CO-PSO mapping															
CO	**PO**												**PSO**		
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**	**3**
Co1	3	2	-	-	-	-	-	-	-	2	-	-	3	2	-
CO2	3	3	2	-	-	-	-	-	-	2	-	-	3	3	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	2	3	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	3	-
CO5	3	3	3	-	-	-	-	-	-	2	-	-	3	3	2

Lab Exercises

1. Network Scanning and Information Gathering: Perform host

discovery, port scanning, and service enumeration.
Tools: Nmap, Netcat, Wireshark

2. Cryptography – Symmetric and Asymmetric Encryption
: Encrypt and decrypt messages using AES (Symmetric) and RSA (Public Key).
Tools: OpenSSL, Python (PyCryptodome)
3. Windows OS Security Configuration:
Simulate DNS spoofing and analyze traffic.
Tools: Ettercap, Wireshark, Kali Linux
4. DNS Spoofing and Packet Inspection: Simulate DNS spoofing and analyze traffic.
Tools: Ettercap, Wireshark, Kali Linux
5. Email Phishing and Spoofing Detection: Create a phishing email scenario and analyze email headers.
Tools: Social Engineering Toolkit (SET), Thunderbird, Wireshark
6. SQL Injection Attack: Demonstrate SQL injection on a vulnerable web app and understand input sanitization.
Tools: DVWA (Damn Vulnerable Web App), SQLMap
7. **Buffer Overflow Exploit:** Illustrate a basic stack-based buffer overflow attack in C.
Tools: Linux (GDB), C compiler
8. Malware Behavior Analysis: Upload a malware sample and review static and dynamic analysis reports.
Tools: VirusTotal, Hybrid Analysis, Any.run
9. Memory Forensics with Volatility: Extract and analyze information from a memory dump.
Tools: Volatility Framework, Memory Dump files
10. Intrusion Detection Using Snort: Configure Snort IDS, create custom rules, and monitor traffic.
Tools: Tools: Snort, Wireshark, Kali Linux

Learning Resources:

1. **Computer Security: Principles and Practice" by William Stallings & Lawrie Brown**
    - Comprehensive coverage of OS, network, and cryptography concepts.
2. **"Cryptography and Network Security" by William Stallings**
    - Excellent for symmetric, public key encryption, and real-world crypto protocols.
3. **"The Web Application Hacker's Handbook" by Dafydd Stuttard & Marcus Pinto**
    - Ideal for learning web application attacks like SQL injection and XSS.
4. **"Practical Malware Analysis" by Michael Sikorski & Andrew Honig**
    - A practical guide to dissecting malware and understanding its behavior.> ,/n

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

AGENTIC AI LAB

SYLLABUS FOR B.E. VI - SEMESTER

L:T:P(Hrs./week):0:0:2	SEE Marks:50	Course Code : **UI24PE641CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1. To develop hands-on skills in designing and implementing intelligent agents using foundational Agentic AI concepts. 2. To explore the use of modern AI tools and frameworks for building, deploying, and evaluating agent-based systems.	1. Understand the differences between traditional AI and agentic approaches. 2. Design and implement basic intelligent agents with reactive, deliberative, and hybrid behaviors. 3. Demonstrate communication, coordination, and memory in multi-agent and role-based systems. 4. Apply LLMs and RAG models for agent reasoning and information retrieval. 5. Use agentic AI tools like LangChain, LangGraph, and LangSmith for building and monitoring simple workflows

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

Lab Experiments

1. Implement Rule-Based Agent vs Ollama-Powered Agent and compare decision making
2. Create Reactive Agent and Planning Agent using Ollama
3. Develop Multi-Agent Collaboration using CrewAI
4. Implement Manager-Agent, Research-Agent, Writer-Agent architecture
5. Advanced Prompt Engineering using Ollama (Zero-shot, Few-shot, Chain-of-Thought)
6. Build Local RAG System using Ollama + ChromaDB
7. Implement Conversational Memory using LangChain Memory
8. Build Self-Evaluating Agent with Reflection Loop
9. Design Multi-Step Agent Workflow using LangGraph
10. Agent Observability using LangGraph Studio / OpenTelemetry

Learning Resources:

1. "Introduction to Agentic AI for Executives: Fundamental Concepts, Practical Applications, Implementation Strategies, and Future Trends", Dr. Ivan Del Valle, Paperback, 208 pages, 2024
2. "Agentic Artificial Intelligence: Harnessing AI Agents to Reinvent Business, Work, and Life", Pascal Bornet, Jochen Wirtz, Thomas H. Davenport, Nandan Mullakara, Brian Evergreen, David De Cremer, Phil Fersht, Rakesh Gohel, Shail Khiyara, Pooja Sund, Irreplaceable Publishing, 2025
3. "Agentic AI: Build Your First Autonomous Agent System—A Practical Hands-On Guide", Leandro Calado, Kindle eBook (111 pages), 2025
4. https://docs.langchain.com/oss/python/langchain/overview
5. https://www.udemy.com/course/the-complete-agentic-ai-engineering-course/?couponCode=MT260601G1
6. https://www.pwc.com/m1/en/publications/documents/2024/agentic-ai-the-new-frontier-in-genai-an-executive-playbook.pdf

No. of Internal Tests:	01	Max. Marks for Internal Test:	12
Marks for day-to-day laboratory class work			18
Duration of Internal Test: 2 Hours			

With effect from the Academic Year 2026-27

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

THEME BASED PROJECT-II

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code:**UI24PW619CS**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Develop an application in the relevant area of Computer Science	1 Review the literature survey to identify the problem.
2 Learn contemporary technologies.	2 Design a model to address the proposed problem. 3 Develop and test the solution. 4 Demonstrate the work done in the project through presentation and documentation. 5 Adapt to contemporary technologies.

CO-PO and CO-PSO mapping

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

The students are required to carry out a theme-based project by selecting any one of themes like Agriculture, Food & Supply Chain Technology, Health, Bio-medical & Assistive Technology, Climate, Environment & Sustainability, Cyber Security & Digital Forensics and Robotics & Drones or themes in any other area relevant to Computer Science.

Students are required to submit a report on the theme based project at the end of the semester.