

**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 2023-24  
(For the batch admitted in 2021-22)  
(R-21)**



**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING  
Phones: +91-40-23146020, 23146021  
Fax: +91-40-23146090**

### **Institute Vision**

Striving for a symbiosis of technological excellence and human values

### **Institute Mission**

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

### **Department Vision**

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:

<b>PEO I</b>	Solve problems in a modern technological society as valuable and productive engineers.
<b>PEO II</b>	Function and communicate effectively, both individually and within multidisciplinary teams.
<b>PEO III</b>	Be sensitive to the consequences of their work, both ethically and professionally, for productive professional careers.
<b>PEO IV</b>	Continue the process of life-long learning.

<b>B.E. (CSE) PROGRAM OUTCOMES (PO's)</b>	
<b>Engineering Graduates will be able to:</b>	
<b>PO1</b>	<b>Engineering Knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO2</b>	<b>Problem Analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO3</b>	<b>Design/development of solutions:</b> 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.
<b>PO4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO5</b>	<b>Modern tool usage:</b> 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.
<b>PO6</b>	<b>The engineer and society:</b> 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.
<b>PO7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>P10</b>	<b>Communication:</b> 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.
<b>P11</b>	<b>Project management and finance:</b> 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.
<b>P12</b>	<b>Lifelong learning:</b> 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>B.E (CSE) PROGRAM SPECIFIC OUTCOMES (PSO's)</b>	
<b>PSO I</b>	Graduates will have knowledge of programming and designing to develop solutions for engineering problems.
<b>PSO II</b>	Graduates will be able to demonstrate an understanding of system architecture, information management and networking.
<b>PSO III</b>	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 2023-24

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)**  
**SCHEME OF INSTRUCTION AND EXAMINATION(R-21)**  
**FOR B.E 2021-22 ADMITTED BATCH V SEMESTER (A.Y. 2023-24)**

<b>B.E (CSE) V Semester</b>									
<b>Course Code</b>	<b>Name of the Course</b>	<b>Scheme of Instruction</b>			<b>Scheme of Examination</b>				
		<b>Hours per Week</b>			<b>Duration in Hrs</b>	<b>Maximum Marks</b>		<b>Credits</b>	
		<b>L</b>	<b>T</b>	<b>P/D</b>		<b>SEE</b>	<b>CIE</b>		
<b>THEORY</b>									
UI21PC510CS	Full Stack Web Development	3	-	-	3	60	40	40	3
UI21PC520CS	Computer Networks	3	-	-	3	60	40	40	3
UI21PC530CS	Artificial Intelligence	3	-	-	3	60	40	40	3
UI21PC540CS	Automata, Languages and Computation	3	-	-	3	60	40	40	3
U21HS040EH	Economics and Finance for Engineers	2	-	-	3	60	40	40	2
U21OE5XXXX	Open Elective-III	3	-	-	3	60	40	40	3
U21HS510EH	Skill Development Course-V(Communication Skills in English II )	1	-	-	2	40	30	30	1
U21PE510CS	Skill Development Course -VI(Technical Skills –II)	1	-	-	2	40	30	30	1
<b>PRACTICALS</b>									
UI21PC511CS	Full Stack Web Development Lab	-	-	2	3	50	30	30	1
UI21PC521CS	Computer Networks Lab	-	-	2	3	50	30	30	1
UI21PC531CS	Artificial Intelligence and Machine Learning Lab	-	-	2	3	50	30	30	1
UI21PW519CS	Mini Project	-	-	2	3	50	30	30	1
<b>TOTAL</b>		<b>19</b>	<b>0</b>	<b>8</b>		<b>640</b>	<b>420</b>	<b>420</b>	<b>23</b>
<b>GRAND TOTAL</b>		<b>27</b>				<b>1060</b>			<b>23</b>
<b>Student should acquire one NPTEL course certification of 8 weeks duration ( 2 credits ) during I Sem to VI Sem</b>									

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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: <b>UI21PC510CS</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
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.

**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, CRUD operations on MongoDB, MongoDB with Node.js, Services Offered by MongoDB.

#### **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, Vasanth Subramanian, 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	:	<input type="text" value="2"/>	Max. Marks for each Internal Test	:	<input type="text" value="30"/>
2	No. of Assignments	:	<input type="text" value="3"/>	Max. Marks for each Assignment	:	<input type="text" value="5"/>
3	No. of Quizzes	:	<input type="text" value="3"/>	Max. Marks for each Quiz Test	:	<input type="text" value="5"/>
	Duration of Internal Tests	:	1 Hour 30 Minutes			



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**Department of Computer Science & Engineering**

**COMPUTER NETWORKS**  
SYLLABUS FOR B.E. V-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: <b>UI21PC520CS</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b>	
	<i>On completion of the course, students will be able to</i>	
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	

**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, 5th Edition Pearson, 2012.
2. Data Communications and Networking, 6<sup>th</sup> 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	:	<input type="text" value="2"/>	Max. Marks for each Internal Test	:	<input type="text" value="30"/>
2	No. of Assignments	:	<input type="text" value="3"/>	Max. Marks for each Assignment	:	<input type="text" value="5"/>
3	No. of Quizzes	:	<input type="text" value="3"/>	Max. Marks for each Quiz Test	:	<input type="text" value="5"/>

Duration of Internal Tests : 1 Hour 30 Minutes

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**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: <b>UI21PC530CS</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVE</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
1. Understand issues and techniques involved in the creation of intelligent systems.	<ol style="list-style-type: none"><li>1 Solve searching problems using A*.</li><li>2 Develop an algorithm for playing games. Represent the knowledge using propositional logic.</li><li>3 Create logical agents to do inference using first order logic.</li><li>4 Perform planning and solve problem with constraints.</li><li>5 Explain Bayesian Networks to do probabilistic reasoning</li></ol>

**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-BetaPruning.

**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, Backtracking Search for CSPs, Local Search for CSPs, The Structure of Problems.

**Classical Planning:** Definition of Classical Planning, Algorithms for Planning with State-Space Search, Planning Graphs, other Classical Planning Approaches.

## **UNIT V:**

**Uncertainty:** Acting under Uncertainty, Basic Probability Notation, Inference Using Full Joint Distributions, Independence, Bayes' Rule and its Use.

**Probabilistic Reasoning** – Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distribution, Exact Inference in Bayesian Networks; Inference by enumeration, The variable elimination algorithm

### **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>

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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

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

Duration of Internal Tests : 1 Hour 30 Minutes

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**Department of Computer Science & Engineering**

**AUTOMATA, LANGUAGES AND COMPUTATION**

SYLLABUS FOR B.E. V-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : <b>UI21PC540CS</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
1 Understand the relationships among machines, languages and computational problems.	1 Design Finite Automata for Regular Languages.
2 Design abstract models for formal languages.	2 Apply formal mathematical methods to prove properties of languages, grammars and Automata.
3 Determine the decidability of computational problems.	3 Analyze the language and Design pushdown automata. 4 Design Turing machines for simple problems. 5 Describe and determine the Undecidability of a problem.

**UNIT-I:**

**Automata:** Introduction to Finite Automata, Central Concepts of Automata Theory.

**Finite Automata:** An Informal Picture of Finite Automata, Deterministic Finite Automata, Nondeterministic Finite Automata, An application, Finite Automata with Epsilon Transitions. Finite Automata with outputs-mealy and moore machines, Simulation of Finite Automata using JFLAP tool.

**Regular Expressions and Languages:** Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic Laws for Regular Expressions.

## **UNIT – II:**

Properties of Regular Languages: Proving Languages not to be Regular, Closure properties of Regular Languages, Decision Properties of Regular Languages, Equivalence and Minimization of Automata.

**Context Free Grammars and Languages:** Context-Free Grammars, Parse Trees, Applications of CFG's, Ambiguity in Grammars and Languages.

## **UNIT – III:**

**Pushdown Automata:** Definition, Languages of a PDA, Equivalence of PDA's and CFG's, Deterministic Pushdown Automata. Simulation of Pushdown Automata using JFLAP tool.

**Properties of Context Free Languages:** Normal Forms for Context-Free Grammars, Pumping Lemma for CFL's, Closure properties, Decision Properties of CFL's.

## **UNIT – IV:**

**Linear Bounded Automata:** Context sensitive grammars and languages, Linear bounded automata.

**Introduction to Turing Machines:** Problems That Computers cannot Solve, The Turing Machine, Programming Techniques for Turing Machines, Extensions to the Basic Turing Machine, Restricted Turing Machines, Turing Machines and Computers. Simulation of Turing Machine using JFLAP tool

## **UNIT – V:**

**Undecidability:** A Language that is not Recursively Enumerable, An undecidable Problem that is RE, Undecidable problems about Turing Machines, Post's Correspondence Problem, Other Undecidable Problems.

**Intractable Problems:** The Classes P and NP, An NP-Complete Problem, A Restricted Satisfiability Problem

### **Learning Resources:**

1. John. E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation, 3<sup>rd</sup> edition (2009), Pearson Education.
2. John C.Martin, Introduction to Languages and the Theory of Computation, 4<sup>th</sup> Edition (2004) Tata McGraw Hill.
3. Bernard M.Moret, The Theory of Computation (2002), Pearson Education.
4. Michael Sipser, Introduction to Theory of Computation, 3<sup>rd</sup> Edition (2012), Course Technology.
5. Mishra and Chandrashekar, 'Theory of computer science - Automata, Languages and Computation', 2<sup>nd</sup> Edition, PHI
6. ZviKohavi , Switching and finite Automata Theory,3<sup>rd</sup> Edition (1976), TMH.
7. <http://www.nptelvideos.in/2012/11/theory-of-computation.html>

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8. <http://nptel.ac.in/courses/106106049/>
9. <http://user.it.uu.se/~pierref/courses/FLAT/>
10. <http://www.eecs.wsu.edu/~ananth/CptS317/Lectures/>
11. <http://www.ics.uci.edu/~goodrich/teach/cs162/notes/>

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

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

Duration of Internal Tests : 1 Hour 30 Minutes



With effect from the Academic Year 2023-24

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**Department of Humanities and Social Sciences**

**ECONOMICS AND FINANCE FOR ENGINEERS**

SYLLABUS FOR B.E-V SEMESTER

L:T:P(Hrs/Week): 2:0:0	SEE Marks : 60	Course Code: <b>U21HS040EH</b>
Credits: 2	CIE Marks : 40	Duration of SEE : 03 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
1. The course will enable the learners to: Understand the concepts and tools of economics, cost and finance that will equip them for decision making.	<ol style="list-style-type: none"><li>1. Gain a conceptual understanding economics as a discipline.</li><li>2. Construct a cost sheet and classify costs and make use of break-even analysis in decision making.</li><li>3. Evaluate the accounting cycle and explain its importance in recording business transactions</li><li>4. Interpret the ratios and dissect comparative and common size statements</li><li>5. Compare the sources of finance and evaluate them</li></ol>

**Unit I: Concepts in Economics**

Scarcity of Resources-Relevance of Economics for Engineers- Scope of Managerial Economics

Law of Demand- assumptions and exceptions -Price elasticity of demand(Application-oriented approach)

**Unit II:Cost Analysis and Profit Planning**

Concept of Cost -Costing –Classification of Costs –Preparation of Cost Sheet (Simple Problems)

–Breakeven Analysis(Application-oriented approach)

### **Unit III: Conceptual Understanding of Accounting**

Accounting Cycle-Journal-Subsidiary Books- Ledger-Trial Balance-Final Accounts (Manufacturing/Trading, Profit and Loss Account, Balance Sheet (Theory Only)

### **UNIT IV: Financial Statement Analysis**

Financial Statements- Meaning - Types –Purpose-Comparative and Common Size Statements

Ratio Analysis-Liquidity, Solvency, Activity & Profitability Ratios(including simple problems on Ratio Analysis)

### **Unit V:Long Term Sources and Uses of Finance**

Long term sources of finance-Debt, Equity, Hybrid, Start- Up finances, Crowd Funding, Peer to Peer lending platforms.

Capital Budgeting –Traditional and DCF Techniques (including simple problems)

#### **Learning Resources for students:**

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

#### **Reference books:**

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

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

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

Duration of Internal Tests : 1 Hour 20 Minutes

**OPEN ELECTIVES OFFERED IN B.E. V SEMESTER (2023-24)**

<b>Dept</b>	<b>Title (Open Elective-III)</b>	<b>Code</b>	<b>Credits</b>
Civil	Spatial Information Technology	U21OE510CE	3
ECE	Introduction to Biomedical Electronics	U21OE510EC	3
EEE	Solar Power and Applications	U21OE510EE	3
Mech	Introduction to Robotics	U21OE510ME	3
	Introduction to Automobile Engineering	U21OE520ME	3
Maths	Integral Transforms	U21OE510MA	3
Physics	Thin Film Technology and Applications	U21OE510PH	3
H&SS	Basics of Entrepreneurship	U21OE540EH	3
	Design Thinking	U21OE530EH	3
	Technical Writing and Professional Presentations	U22OE020EH	3

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DEPARTMENT OF CIVIL ENGINEERING

**SPATIAL INFORMATION TECHNOLOGY  
(Open Elective-III)**

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):3:0: 0	SEE Marks:60	Course Code: <b>U21OE510CE</b>
Credits : 3	CIE Marks:40	Duration of SEE:3 Hrs

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

**Unit-I: Introduction and Basic Concepts of Remote Sensing**

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

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

**Unit-III: Global positioning Systems (GPS) :**Overview of GNSS and Introduction to GPS, GLONASS, GALILEO, COMPASS, IRNSS systems , Applications of GPS.

GPS: Basic concepts, Functional system of GPS – Space segment, control segment and user segment, Working principle of GPS, Signal structure and code modulation, Pseudo-range measurements and navigation message

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

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

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

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

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

### **Learning Resources:**

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

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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, 2005
9. John E. Harmon & Steven J. Anderson., The design and implementation of Geographic Information Systems, John Wiley & Sons, 2003
10. ArcGIS 10.1 Manuals, 2013.
11. Kang Tsung Chang., Introduction to Geographic Information Systems, Tata Mc Graw Hill Publishing Company Ltd, New Delhi, 2008.
12. Burrough, P.A., Principles of GIS for Land Resource Assessment, Oxford Publications, 2005.
13. C.P.Lo & Albert K. W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice Hall India Pvt.Ltd, 2002.

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

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

With effect from the Academic Year 2023-24

**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  
(Open Elective - III)**

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

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: <b>U21OE510EC</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b>
To provide fundamental knowledge of biomedical signals, transducers and various instruments.	On completion of the course, students will be able to <ol style="list-style-type: none"><li>1. recite the basic need of biomedical signals and basic instruments.</li><li>2. comprehend the principles of basic bioelectric signals, electrodes and transducers in biomedical electronics.</li><li>3. demonstrate the principle of various therapeutic, prosthetic and non invasive instruments for use and prediction of diseases.</li><li>4. to acquire knowledge of the mathematical, physical and computational principles underlying modern medical imaging system for visualization and analysis of medical image data.</li></ol>

**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,

With effect from the Academic Year 2023-24

performance characteristics of transducers, displacement position and motion transducers, pressure transducers, photoelectric transducer.

### **UNIT - III :**

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

### **UNIT - IV :**

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

### **UNIT - V :**

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

### **Learning Resources:**

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

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

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

Duration of Internal Tests: 90 Minutes



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**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**SOLAR POWER AND APPLICATIONS**

**Open Elective-III**

SYLLABUS FOR B.E. V SEMESTER

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: <b>U210E510EE</b>
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b>
The course will enable the students to:	On completion of the course, students will be able to
To impart the basics of solar energy harnessing and solar panel and array.	<ol style="list-style-type: none"><li>1. Compare different energy resources.</li><li>2. Identify and choose proper type of meter for solar radiation measurement.</li><li>3. Use proper solar thermal system according to the load requirements.</li><li>4. Categorize and compare photovoltaic cells.</li><li>5. Apply the knowledge of solar energy.</li></ol>

**Unit – I**

**Fundamentals of Energy Sources:** Oil crisis of 1973, Classifications of Energy Resources, Importance of Non-conventional energy sources, Advantages-disadvantages and salient features of Non-conventional energy sources.

**Unit – II**

**Solar Energy Basics:** Sun as a source of energy, the Earth, Radiation Spectrums, Extraterrestrial and Terrestrial Radiations, Depletion of solar Radiation, Pyranometer, Pyrheliometer, Sunshine Recorder.

**Unit – III**

**Solar Thermal Systems:** Solar Collectors, Solar Water Heater, Solar Passive space – heating and cooling systems, Solar Cookers, Solar

With effect from the Academic Year 2023-24

furnaces, Solar thermal water pump, Vapour compression refrigeration and Solar pond Electric power plant.

#### **Unit – IV**

**Solar Photovoltaic Systems:** Solar Cell fundamentals, Cell characteristics, Cell classification, Module, Panel and Array, Maximizing the Solar PV output and load matching, MPPT.

#### **Unit – V**

**Solar PV systems & Applications:** Solar PV system classification - Stand-Alone Solar PV system and Grid-Interactive Solar PV system. Applications - Water Pumping, lighting, medical refrigeration, village power and Telecommunication.

#### **Suggested Reading:**

1. B H Khan, Non-Conventional Energy Resources, 2<sup>nd</sup> Edition, Tata McGraw Hill.
2. G. D. Rai, Non-Conventional Energy Sources, 13<sup>th</sup> Reprint 2014, Khanna Publications.

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2023-24

## VASAVI COLLEGE OF ENGINEERING (Autonomous)

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

### DEPARTMENT OF MECHANICAL ENGINEERING

### INTRODUCTION TO ROBOTICS (Open Elective-III)

SYLLABUS FOR B.E. V-SEMESTER

L:T:P(Hrs./week):3	SEE Marks : 60	Course Code: <b>U21OE510ME</b>
Credits : 3	CIE Marks: : 40	Duration of SEE: 3 Hours

Course objectives	Course Outcomes
<p><b>The objectives of this course are to:</b> Identify robots and its peripherals for satisfactory operation and control of robots for industrial and non-industrial applications.</p>	<p><b>On completion of the course, the student will be able to</b></p> <ol style="list-style-type: none"><li>1. understand the anatomy of the robot and various robot configurations for its selection depending on the task.</li><li>2. classify the end effectors, understand different types of joints, various types of robot drive systems for carrying out the assigned job effectively.</li><li>3. analyze a planar manipulator through forward kinematics and understand the control of robot manipulator for better reliability and efficiency using python programming.</li><li>4. Classify the various sensors used in robots for proper selection to an application.</li><li>5. summarize various industrial and non-industrial applications of robots for their selection to a particular task.</li></ol>

#### UNIT-I

##### ROBOT BASICS

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

Robot configurations-cartesian, cylindrical, polar, articulated and SCARA, Serial manipulator & Parallel Manipulator

Robot wrist mechanism, Precision and accuracy of robot.

## **UNIT-II**

### **ROBOT ELEMENTS**

End effectors-Classification, Robot drive system types: Electrical, pneumatic and hydraulic. Robot joints and links-Types, Motion interpolation, Robot trajectories 2D and 3D Transformation- Scaling, Rotation and Translation, Homogeneous transformation

## **UNIT-III**

### **ROBOT KINEMATICS AND CONTROL**

Robot kinematics – Basics of direct and inverse kinematics. D-H matrix. Forward kinematics for a 2-link RR planar manipulator.

Control of robot manipulators – Point to point and Continuous Path Control. Robot programming methods. Introduction to Solve any robotic kinematic problem using python programming.

## **UNIT-IV**

### **ROBOT SENSORS**

Sensors in robots – Touch sensors-Tactile sensors – Proximity and range sensors. Force sensors, Light sensors, Pressure sensors, position and velocity feedback devices.

Introduction to Machine Vision and Artificial Intelligence.

## **UNIT-V**

### **ROBOT APPLICATIONS**

Applications of robots in Industries, Medical, Household, Entertainment, Space, Underwater, Defense, and Disaster management.

Applications of Micro and Nanorobots, Future Applications of robots.

### **Learning Resources:**

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

With effect from the Academic Year 2023-24

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

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

Duration of Internal Test: **1 Hour 30 Minutes**

With effect from the Academic Year 2023-24

## VASAVI COLLEGE OF ENGINEERING (Autonomous)

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

### DEPARTMENT OF MECHANICAL ENGINEERING

### INTRODUCTION TO AUTOMOBILE ENGINEERING SYLLABUS FOR B.E. V-SEMESTER (Open Elective-III)

Instruction : 3Hours	SEE Marks : 60	Course Code: <b>U21OE520ME</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
<p><b>The objectives of this course are to:</b></p> <ol style="list-style-type: none"><li>familiarize the student with the different types of automobiles and engine components along with its working.</li><li>impart adequate knowledge in fuel supply, cooling, lubrication and ignition of IC engines.</li><li>understand the steering geometry, steering mechanism and types of suspension systems.</li><li>gain the knowledge about working of clutch, gear box mechanism, and brakes</li><li>make the student conversant with types of wheels, tyres and pollution control techniques.</li></ol>	<p><b>On completion of the course, the student will be able to:</b></p> <ol style="list-style-type: none"><li>identify types of Automobiles and engine components and describe its working.</li><li>describe the engine fuel Supply system in petrol and Diesel engines, cooling system, and lubrication systems.</li><li>describe the steering mechanism, suspension systems</li><li>describe the working principle and operation of clutch, gear mechanism and brakes.</li><li>know the pollutants from automobile and pollution control techniques and identify the types of wheels, tyres.</li></ol>

#### UNIT-I

**Introduction:** Types of automobiles: Hybrid Vehicles, Electrical, gas and Fuel cell vehicles. Chassis and body, Lay out of transmission system, Engine components: cylinder block, cylinder head, crankcase, crank shaft and cam shaft. Types and working of IC Engines: SI and CI engines, two stroke and four stroke engines.

#### UNIT-II

**Fuel system:** Fuel supply system for SI engines and CI engines. Simple carburettor, Introduction to Multipoint fuel injection system (**MPFI**) of petrol engines, Introduction to **CRDI** system for diesel engines.

**Cooling system:** air cooling, water cooling: Thermo syphon, pump circulation system.

**Lubrication system:** Petroil System, splash system, pressure lubrication: Wet sump and Dry Sump.

**Ignition system:** Battery Ignition System, Magneto Ignition System and Electronic Ignition System.

### **UNIT-III**

**Suspension system:** Rigid axle, Independent suspension system: Double wish bone type, Macpherson strut system, Air suspension system.

**Steering system:** wheel alignment, Ackermann steering mechanism, steering geometry: camber, caster, toe-in, toe-out, steering linkage for vehicle with rigid axle front suspension, steering linkage for vehicle with independent front suspension.

### **UNIT –IV**

**Power Train:** Single plate clutch, Multi plate clutch. Manual Gear Box: sliding mesh gear box, constant mesh gear box, synchromesh gear box and Automatic Gear Box. Working principle of Differential.

**Brakes:** Types: Drum and Disc brakes, Mechanical and Hydraulic Brakes, **ABS** system.

### **UNIT –V**

**Wheels and Tyres:** Types of Wheels: wire wheels, disc wheels, alloy wheels. Types of tyres: Tube type, tubeless type.

**Automobile Emissions and control:** Automobile pollutants and sources of pollution. Pollution Control Techniques: Catalytic Converters, EGR and PCV. Bharath emission Norms.

### **Learning Resources:**

1. Crouse & Anglin, "Automobile Engineering", 10<sup>th</sup> Edition, Tata McGraw Hill Publishing Co. Ltd., New Delhi, 2007.
2. Kirpal Singh, "Automobile Engineering", Vol.I& II, 13<sup>th</sup> Edition, Standard Publishers, New Delhi 2013.
3. R.B Gupta, "Automobile Engineering" 7<sup>th</sup> Edition, Satya Prakashan, New Delhi, 2015.
4. Joseph Heitner, "Automotive Mechanics", 2<sup>nd</sup> Edition, Affiliated East West Pvt. Ltd., 2013.
5. C.P. Nakra, "Basic Automobile Engineering", 7<sup>th</sup> Edition, Dhanpat Rai Publishing C (P) Ltd., 2016.

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

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

Duration of Internal Test: **1 Hour 30 Minutes**

With effect from the Academic Year 2023-24

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

ACCREDITED BY NAAC WITH 'A++' GRADE

**IBRAHIMBAGH, HYDERABAD – 500 031**

**DEPARTMENT OF MATHEMATICS**

**INTEGRAL TRANSFORMS**

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

L:T: P (Hrs/Week):3	SEE Marks:60	Course Code: <b>U21OE510MA</b>
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b>
<i>The course will enable the students to:</i>	<i>At the end of the course students will be able to:</i>
<ol style="list-style-type: none"><li>1. Understand the Definition of Laplace and its Properties.</li><li>2. Understand the Definition of inverse Laplace Transforms- Properties</li><li>3. Understand the applications of Laplace Transforms.</li><li>4. Study the Definition of Z- Transforms and its properties</li><li>5. Understand the applications of Z- Transforms</li></ol>	<ol style="list-style-type: none"><li>1. Evaluate Laplace transforms of functions.</li><li>2. Evaluate Inverse Laplace transforms of functions.</li><li>3. Apply Laplace transforms to evaluate integrals and to solve ordinary differential equations arising in engineering problems.</li><li>4. Evaluate Z- transforms of Sequences</li><li>5. Apply Z-transforms to solve ordinary difference equations arising in engineering problems.</li></ol>

**UNIT-I (10 Hours)**

**Laplace Transforms**

Introduction to Laplace transforms - Sufficient Condition for 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 (10 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  $s^n$  - Division by  $s$  - Convolution Theorem (without proof).

## **UNIT –III (10 Hours)**

### **Applications of Laplace Transforms**

Application of Laplace transforms to solve Initial Value Problems with constant coefficients and with variable coefficients – Laplace transform of periodic functions – Triangular wave – Square wave – Saw tooth wave.

## **UNIT –IV (10 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 R.K. Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Third Edition, Narosa Publications, 2007.
- 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 :**

- 1 <http://mathworld.wolfram.com/topics>
- 2 <http://www.nptel.ac.in/course.php>

With effect from the Academic Year 2023-24

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 2023-24

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

**DEPARTMENT OF PHYSICS**

**THIN FILM TECHNOLOGY AND APPLICATIONS**

**(Open Elective-III)**

SYLLABUS FOR B.E. V-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks:60	Course Code: <b>U21OE510PH</b>
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

<b>Course Objectives</b>	<b>Course Outcomes</b>
<b>Students are able to</b> <ol style="list-style-type: none"><li>1. Learn the fundamental atomistic mechanisms.</li><li>2. Narrate thin film deposition techniques</li><li>3. Acquire knowledge on thin film devices</li><li>4. Appreciate applications of thin films</li></ol>	<b>The students acquire the ability to</b> <ol style="list-style-type: none"><li>1. State fundamental definitions of thin film technology</li><li>2. Describe thin film deposition techniques</li><li>3. Illustrate thin film devices and their use</li><li>4. Apply thin films coatings for a variety industrial applications</li></ol>

**UNIT-I: THIN FILM GROWTH**

Classification of films- formation of thin films- Condensation and nucleation, growth and coalescence of islands, -nucleation theories: capillarity and atomistic models, sticking coefficient, adhesion, substrate effect, film thickness effect.

**UNIT-II: DEPOSITION TECHNIQUES**

Thin film deposition techniques- simple thermal evaporation- Chemical vapor deposition technique-Advantages and disadvantages of Chemical Vapor deposition (CVD), physical vapour deposition electron beam evaporation- RF sputtering, Laser ablation- spin coating- molecular beam epitaxy (MBE), Film thickness measurement-ellipsometry, quartz crystal oscillator techniques.

### **UNIT-III: THIN FILM 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).

### **UNIT-IV: PROPERTIES OF THIN FILMS**

Electrical conduction in continuous and discontinuous metallic thin films. Transport and optical properties of metallic, semiconducting and dielectric films.

### **UNIT-V: THIN FILM DEVICES AND APPLICATIONS**

Anti-reflection coatings, fabrication of thin film gas sensors and temperature sensors. Thin film solar cells, Quantum well and Quantum dot solar cells. Application of thin films in different areas such as electronics, medical, defense, sports, automobiles, applications of thin films in various fields etc.

#### **Learning resources:**

- Kasturi Chopra Thin Film Device Applications, Mac Graw Hill, New York, 2012
- A. Goswami, thin film fundamentals, New age international, 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 2023-24

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

**DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES**

**BASICS OF ENTREPRENEURSHIP**

**Syllabus For B.E V Semester**

**(Open Elective-III)**

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : <b>U210E540EH</b>
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

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

**UNIT-I**

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

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

**UNIT-II**

**Business Model and its Validation:** Types of Business Models, Lean Approach, the Problem-Solution Test, Solution Interview Method, Difference between Start-up Venture and small Business, Industry

With effect from the Academic Year 2023-24

Analysis, Identify Minimum Viable Product (MVP), Build-Measure-Learn Feedback Loop, Product-market fit test.

### **UNIT-III**

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

### **UNIT-IV**

**Team Building and Project Management:** Leadership Styles, Team Building in Venture, Role of good team in Venture, Roles and Respondents, Explore Collaboration Tools and Techniques-brainstorming, Mind Mapping. Importance of Project Management, Time Management, Work Flow, Network Analysis Techniques.

### **UNIT-V**

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

### **Learning Resources:**

1. 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

**Web Resource:** <http://www.learnwise.org>

### **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:	<b>1 Hour 30 Minutes</b>		

With effect from the Academic Year 2023-24

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**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

**DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES**

**DESIGN THINKING**

OPEN ELECTIVE-III - B.E. V Semester

(Common to all branches)

L:T:P(Hrs/Week):3:0:0	SEE Marks:60	Course Code: <b>U21OE530EH</b>
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

<p><b>COURSE OBJECTIVES</b> <b>The course will enable the learners to:</b></p> <ol style="list-style-type: none"><li>1. Understand the critical design thinking skills needed to either improve an existing product or thinking design a new product.</li><li>2. Learn to identify customer needs and draft customer needs statements as your first step toward user innovations.</li><li>3. Learn how to translate user needs into product specifications quantitatively, and how establishing product metrics can help to define those specifications.</li><li>4. Learn to apply creativity, brainstorming, and concept generation process in designing needs solutions.</li><li>5. Learn to select and implement a product development process that's aligned with your project needs. Explore prototyping methods, strategies, and real-life examples where these have been applied to create a design that represents customer needs and product specifications.</li></ol>	<p><b>COURSE OUTCOMES</b> <b>At the end of the course the learners will be able to: -</b></p> <ol style="list-style-type: none"><li>1. Learn the concepts that drive design thinking.</li><li>2. Submit project ideas around user Innovations.</li><li>3. Identify prospective customer needs and user groups.</li><li>4. Translate needs into product specifications</li><li>5. Build out the product architecture, Create a prototype and present the prototype.</li></ol>
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### **Unit 1: Design Thinking Skills**

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

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

### **Unit 2: Identifying Customer Needs**

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

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

### **Unit 3: Product Specifications**

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

- 3.1 Creating a Design Brief Template
- 3.2 Stakeholder map template
- 3.3 Customer journey template
- 3.4 Context map template
- 3.5 Opportunity map template

### **Unit 4: Applied Creativity**

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

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

### **Unit 5: Product Development Processes and Prototyping**

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

- 5.1 The need for a prototype
- 5.2 The Need to Test and how to conduct a structured test

### 5.3 How to conduct the observers' debrief

#### **METHODOLOGY**

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

#### **ASSESSMENTS**

- Online assignments
- Individual and Group

#### **Suggested Books**

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

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

1	No. of Internal Tests:	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		

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**DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES**

**TECHNICAL WRITING AND PROFESSIONAL PRESENTATIONS**

(Open Elective-III)

SYLLABUS FOR B.E. - V Semester

Instruction : 3 Hours	SEE : 60	Course code : <b>U22OE020EH</b>
Credits : 3	CIE : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b>
<p><b>The course will enable the learners to:</b></p> <ol style="list-style-type: none"><li>1. Understand the principles and mechanics of technical writing for students of engineering.</li><li>2. Identify different kinds of business correspondences and the dos and don'ts for each of them.</li><li>3. Make effective presentations as part of today's workplace demands.</li><li>4. Recognize the need for Video and Written CVs with focus on specific elements.</li><li>5. Comprehend skills associated with technical writing and understand different papers ranging from process description and feasibility reports to research projects, project proposals, and SOPs</li></ol>	<p><b>At the end of the course the learners will be able to: -</b></p> <ol style="list-style-type: none"><li>1. Write effective reports.</li><li>2. Articulate business correspondences based on need.</li><li>3. Make persuasive presentations.</li><li>4. Design their videos CVs.</li><li>5. Write papers ranging from process description and feasibility reports to research projects, project proposals, and statement of purpose</li></ol>

**UNIT 1: FORMAL & INFORMAL TECHNICAL REPORTS**

- 1.1 Informal Report Formats
- 1.2 Project and Research Reports
- 1.3 Formal Report Components, Feasibility Reports, Evaluation reports
- 1.4 Analytical and Informational reports
- 1.5 Executive summaries.

## **UNIT 2: BUSINESS CORRESPONDENCE**

- 2.1 Electronic communication
- 2.2 Effective emails
- 2.3 Instant and text messaging guidelines

## **UNIT 3: PROFESSIONAL PRESENTATIONS**

- 3.1 Paper presentations & Poster presentations
- 3.2 PowerPoint presentations
- 3.3 Storyboard writing

## **UNIT 4: RESUME & CVs**

- 4.1 Technical Resume
- 4.2 Cover letter, resume format
- 4.3 Video CVs

## **UNIT 5: WRITING PROPOSALS & SOPs**

- 5.1 Types of proposals
- 5.2 Request for proposals
- 5.3 Stating your objective.

## **METHODOLOGY**

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

## **ASSESSMENTS**

- Online assignments
- Individual and Group

## **LEARNING RESOURCES**

[learn.talentsprint.com](https://www.talentsprint.com)

1. Read Me First!: A Style Guide for the Computer Industry by Sun Technical Publications
2. Eats, Shoots and Leaves Paperback – 18 February 2010 by Lynne Truss
3. Don't Make Me Think, Revisited: A Common Sense Approach to Web & Mobile Usability | Third Edition | By Pearson Paperback –
4. The Design of Everyday Things: Revised and Expanded Edition Paperback – Illustrated, 5 November 2013 by Don Norman (Author)

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

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

Duration of Internal Test: 90 Minutes

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**DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES**

**Skill Development Course-V (Communication Skills in English II)**

SYLLABUS FOR B.E.V-SEMESTER

L:T:P (Hrs/Week): 2:0:0	SEE Marks: 40	Course Code: <b>U21HS510EH</b>
Credits: 1	CIE Marks: 30	Duration of SEE: 3 Hours

<b>COURSE OBJECTIVES</b> <b>The course will enable the learners to:</b>	<b>COURSE OUTCOMES</b> <b>At the end of the course the learners will be able to: -</b>
<ol style="list-style-type: none"><li>1. Get students proficient in both receptive and productive skills</li><li>2. Enable students to build strategies for effective group interaction and help them in developing decisive awareness and personality while maintaining emotional balance.</li><li>3. To introduce students to an ideal structure for a presentation</li><li>4. To develop and improve writing and study skills needed for college work.</li></ol>	<ol style="list-style-type: none"><li>1. Participate in group and forum discussions by providing factual information, possible solutions, and examples</li><li>2. Present a topic by picking up the key points from the arguments placed.</li><li>3. Read between the lines and write informed opinions.</li><li>4. Prepare, present, and analyze reports</li></ol>

**Unit 1: Delightful Discussions**

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

**Unit 2: Powerful Presentations**

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

### Unit 3: Fact, Observation and Inference

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

### Unit 4: Effective Technical Writing

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

### Learning Resources:

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

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

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**DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES**

**Skill Development Course-VI (Technical Skills-II)**

**Industry Standard Coding Practices - 2023**

SYLLABUS FOR B.E.V-SEMESTER

L:T:P (Hrs/Week): 1:0:0	SEE Marks: 40	Course Code: <b>UI21PE510CS</b>
Credits: 1	CIE Marks: 30	Duration of SEE: 2 Hours

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

**Review of Abstract Data structures (theory + practice)**

Coding implementation of stacks using array and linked list, Problem Solving using stack data structure, coding implementation of queues using array and linked list, Problem Solving using queue data structure

**Sorting Algorithms(theory + practice)**

Coding solutions for Search operations implementing linear/binary search. Problem solving using Sorting algorithms: Bubble Sort, Selection Sort, Insertion Sort, Evaluation of sorting Algorithms. Problem solving using

With effect from the Academic Year 2023-24

Quick Sort, Merge Sort,  $O(n \log n)$  algorithms. Scenario based problem solving using sorting techniques

**Non-linear Data structures: Binary Trees**(theory + practice)

Problem solving approaches using Non-linear data structures, Coding problems on the height of a binary tree, Size of a binary tree, Tree order traversals, Formation of binary trees, problem solving using Binary trees

**Non-linear Data structures: Binary Search Trees**(theory + practice)

Problems solving on key search on binary search trees, Time comparison and analysis on Binary Search Trees, Coding on a binary search tree problems, Search/probe sequence validation, Significance of height balancing the tree, Balancing by rotations

**Tree Algorithms**(theory + practice)

Problem solving using Tree algorithms, right view of a tree, top view of a tree, mirror tree, tree comparison

**Algorithms – Greedy Methods -1**(theory + practice)

Greedy Strategy, Problem solving on greedy problems: coin change, Activity selection problem, Examples

**Technical Aptitude**(theory + practice)

Company Specific Technical Aptitude questions on:

1. Debugging Skills on Language
2. Pseudo code Questions
3. Data Structures

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

1 No. of Internal Tests :  Max. Marks for each Internal Test :

Duration of Internal Tests : 1 Hour 30 Minutes



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**VASAVI COLLEGE OF ENGINEERING(Autonomous)**

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**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 : <b>UI21PC511CS</b>
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
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.

**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			

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**VASAVI COLLEGE OF ENGINEERING(Autonomous)**

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**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: <b>UI21PC521CS</b>
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

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

**Programming Exercise:**

1. Understanding and using the following commands: ifconfig, netstat, ping, arp, telnet, 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).

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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			

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**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

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**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: <b>UI21PC531CS</b>
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>		<b>COURSE OUTCOMES</b>
		<i>On completion of the course, students will be able to</i>
1	Understand issues and techniques involved in the creation of intelligent systems	<ol style="list-style-type: none"><li>1 Design python programs for various learning algorithms.</li><li>2 Identify and apply machine learning algorithms to solve real world problems.</li><li>3 Implement uninformed and informed search to solve the search problems.</li><li>4 Implement the Game playing algorithm such as Minimax and AlphaBeta pruning</li><li>5 Build Neural network to solve classification problems.</li></ol>

**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.

**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			

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**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

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**Department of Computer Science & Engineering**

**MINI PROJECT**

SYLLABUS FOR B.E. V-SEMESTER

L:T:P(Hrs./week):0:0:2	SEE Marks:50	Course Code: <b>UI21PW519CS</b>
Credits : 1	CIE Marks:30	Duration of SEE : --

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b>
	<i>On completion of the course, students will be able to</i>
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.

The students are required to carry out mini projects in any areas such as Data Structures, Microprocessors & interfacing, Database Management Systems, Operating Systems and Design & Analysis of Algorithms.

Project coordinator will coordinate the following:

Grouping of students (maximum of 2 in a group)

Allotment of projects

Project monitoring at regular intervals

All projects will be monitored twice in a semester through student presentation for the award of sessional marks. Sessional marks are awarded by a monitoring committee comprising of faculty members as well the supervisor. The first review of projects for 15 marks is conducted after

With effect from the Academic Year 2023-24 completion of five weeks. The second review for another 35 marks is conducted after 14 weeks of instruction.

The students are required to submit copies of their project report following IEEE standards one week before the last instruction date.



**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)  
SCHEME OF INSTRUCTION AND EXAMINATION(R-21)  
FOR B.E 2021-22 ADMITTED BATCH VI SEMESTER (A.Y 2023-24)**

B.E (CSE) VI Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			Credits
		Hours per Week			Duration in Hrs	Maximum Marks		
		L	T	P/D		SEE	CIE	
<b>THEORY</b>								
UI21PC610CS	Internet of Things	3	-	-	3	60	40	3
UI21PC620CS	Software Engineering	3	-	-	3	60	40	3
UI21PC630CS	Compiler Construction	3	-	-	3	60	40	3
UI21PC640CS	Image Processing	3	-	-	3	60	40	3
U21OE6XXXX	Open Elective-IV	3	-	-	3	60	40	3
U21HS630EH	Skill Development Course-VII - Verbal Aptitude	1	-	-	2	40	30	1
UI21PE610CS	Skill Development Course -VIII (Technical Skills –III)	1	-	-	2	40	30	1
<b>PRACTICALS</b>								
UI21PC611CS	Internet of Things Lab	-	-	2	3	50	30	1
UI21PC621CS	Software Engineering Lab	-	-	2	3	50	30	1
UI21PC631CS	Compiler Construction Lab	-	-	2	3	50	30	1
UI21PW619CS	Theme Based Project	-	-	2	3	50	30	1
	NPTEL Course	-	-	-	-	-	-	2
<b>TOTAL</b>		<b>17</b>	<b>0</b>	<b>8</b>		<b>580</b>	<b>380</b>	<b>23</b>
<b>GRAND TOTAL</b>		<b>25</b>				<b>960</b>		
<b>Student should acquire one online course certification equivalent to two credits during I Sem to VI Sem</b>								
<b>Left over hours are allocated for Co-Curricular Activities , Sports / Library / Mentor Interaction / CC /RC / TC</b>								

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**Department of Computer Science & Engineering**

**INTERNET OF THINGS**

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : <b>UI21PC610CS</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
1 Explore IoT technologies, architectures and standards.	1 Describe IoT architecture.
2 Develop IoT solutions for a given problem	2 Develop applications using Raspberry Pi.
	3 Apply wireless protocols to develop an IoT solution
	4 Integrate IoT application with Cloud.
	5 Recognize IoT opportunities in the industry.

**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:**

**Raspberry Pi**: Board Components, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python. Arduino Uno Platform, Interfacing with Uno.

**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 Madiseti, “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”, 1<sup>st</sup> Edition, Academic Press, 2014.
4. Srinivasa K.G., Siddesh G.M., Hanumantha Raju R., “Internet of Things”, 1<sup>st</sup> Edition, Cengage, 2018.

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

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2023-24

**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: <b>UI21PC620CS</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
1 Explain the concepts involved in the lifecycle of software development	1 State the software process, compare prescriptive and evolutionary process models
2 Design Software Requirements Specifications, analyze risks and apply DevOps to develop, test and maintain software project	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

**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

**Learning Resources:**

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, 8<sup>th</sup> Edition (2005), Tata McGrawHill.
2. Joakin Verona " Practical DevOps" , 2<sup>nd</sup> Edition, Ingram short Title; 2<sup>nd</sup> 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://freevidelectures.com/Course/2318/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	:	<input type="text" value="2"/>	Max. Marks for each Internal Test	:	<input type="text" value="30"/>
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3	No. of Quizzes	:	<input type="text" value="3"/>	Max. Marks for each Quiz Test	:	<input type="text" value="5"/>

Duration of Internal Tests : 1 Hour 30 Minutes

**VASAVI COLLEGE OF ENGINEERING(Autonomous)**

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IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

**COMPILER CONSTRUCTION**  
SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: <b>UI21PC630CS</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
1 Analyze various phases of compiler and design a compiler for a generic machine	1 Compare different language Processors and design Lexical Analyzer for a given language
2 Build efficient target code applying various code optimization techniques	2 Design Parser using top down and bottom up parsing techniques 3 Generate Intermediate code for a given set of instructions 4 Choose a data structures for symbol table organization and dynamic memory management 5 Apply various code optimization techniques to generate efficient target code

**UNIT-I**

**Introduction:** Language Processors, The structure of the compiler, The science of building compiler, Applications of compiler technology, Programming language basics

**Lexical analysis:** The role of Lexical Analyzer, Input Buffering, Specification of Tokens. Recognition of Tokens, The Lexical-Analyzer Generator LEX.



## UNIT-II

**Syntax Analysis:** Introduction, Context free grammars, Writing a grammar, Top-Down parsing- Bottom-Up parsing, More powerful LR parsers, Using ambiguous grammars, Parser Generators .

## UNIT-III

**Syntax Directed Translation:** Syntax Directed Definitions, Evaluation Orders for SDDs, Applications of Syntax Directed Translation.

**Intermediate code generation:** Introduction, Variants of syntax trees, Three-Address Code, Types and Declarations, Translation of Expressions, Type Checking. Control Flow.

## UNIT-IV

**Run-time Environments:** Storage Organization, Stack Allocation of Space, Access to Non local Data on the Stack. Heap Management, Introduction to Garbage Collection

**Symbol Table Organization:** Structure of Symbol table, Symbol Table organization for Block Structured and non block Structure languages, Data Structures of symbol Table.

## UNIT-V

**Code Generation:** Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code Basic Blocks and Flow Graphs.

**Code Optimization:** Optimization of Basic Blocks. Peephole Optimization, Register Allocation and Assignment, Machine Independent Optimizations – The Principal Sources of Optimizations, Introduction to data flow analysis.

### Learning Resources:

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman, Compilers: Principles, Techniques & Tools, 2<sup>nd</sup> Edition (2022), Pearson Education.
2. Keith d Cooper & Linda Tarezon, Engineering a Compiler, 2<sup>nd</sup> Edition (2011), Morgan Kaufman.
3. John R Levine, Tony Mason, Doug Brown Lex & Yacc, 3<sup>rd</sup> Edition (2007), Shroff Publisher .

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4. Kenneth C Louden , Compiler Construction: Principles and Practice, 2<sup>nd</sup>Edition(2005) ,Cengage Learning,
5. John R Levine ,Lex&Yacc, 2ndEdition(2009), Oreilly Publishers.
6. <http://nptel.ac.in/courses/106108052/1>
7. <http://freevideolectures.com/Course/3051/Compiler-Design>

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

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Duration of Internal Tests : 1 Hour 30 Minutes

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**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

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IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

**IMAGE PROCESSING**  
SYLLABUS FOR B.E. VI-SEMESTER

L:T:P(Hrs./week):3:0:0	SEE Marks : 60	Course Code: <b>UI21PC640CS</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
1 Understand the fundamentals of image processing algorithms. 2 Apply image processing algorithms to solve real problems.	1 Distinguish sampling and quantization processes in obtaining digital images from continuously sensed data and describe the steps in image processing. 2 Apply techniques in spatial domain to enhance and segment digital images. 3 Apply Fourier transformation and other transformation techniques to enhance digital image. 4 Describe methods to encode raw image data into standard compressed image format. 5 Demonstrate most commonly applied image restoration and color models and their use in basic image processing.

**UNIT-I:**

Introduction to Digital Image Processing, Origins and Applications of Digital Image Processing. Fundamental Steps in Digital Image Processing, Components of Digital Image Processing System. Elements of Visual Perception, Light and the Electromagnetic Spectrum, Image Sensing and Acquisition, Image Sampling and Quantization.

**UNIT-II:**

**Intensity Transformations and Spatial Filtering:** Histogram Processing, Fundamental of Spatial Filtering, Smoothing and Sharpening Spatial Filters.

**Image Segmentation:** Point, Line and Edge Detection, Thresholding, Region-Based Segmentation.

**UNIT-III: Filtering in the Frequency Domain:**

Preliminary Concepts, Sampling and the Fourier Transform of Sampled Functions, The Discrete Fourier Transform (DFT) of One Variable, Extension to Function of Two Variables, Image Smoothing and Sharpening using Frequency Domain Filters.

**UNIT-IV:**

**Image Compression:** Fidelity Criteria, Image Compression Models, Image Formats, Containers and Compression Standards, Compression Methods: Huffman Coding, Golomb Coding, Arithmetic Coding, LZW Coding, Run-Length Coding.

**UNIT-V:**

**Restoration:** Noise Models, Inverse filtering, Least squares filtering.

**Color Image Processing:** Color fundamentals, Color models, Pseudocolor Image Processing, Basics of full color image processing.

**Learning Resources:**

1. Gonzalez R.C., Woods R.E, Digital Image Processing, Third Edition (2007), Prentice Hall, USA.
2. Jayaraman S, Esakkirajan S, Veerakumar T, Digital image processing, 13<sup>th</sup> reprint (2014), McGraw Hill Education, New Delhi.
3. William K. Pratt, Digital Image Processing, 3<sup>rd</sup> Edition (2001) , John Wiley & Sons Inc, UK.
4. McAndrew, Introduction to Digital Image Processing, (2004), Cengage Learning.
5. Sonka, Hlavac, Boyle, Digital Image Processing and Computer Vision, (2008), Cengage Learning.
6. Rosenfeld A. Kak AC, Digital Picture Processing Vol.I & II Acad, Press, 2nd Edition.
7. <https://ocw.mit.edu/resources/res-6-008-digital-signal-processing- spring-2011/introduction/>.
8. <http://freevideolectures.com/Course/2316/Digital-Image-Processing-IIT-Kharagpur>

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

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	Duration of Internal Tests	:	1 Hour 30 Minutes			

With effect from the Academic Year 2023-24

**OPEN ELECTIVES OFFERED IN B.E. VI SEMESTER (2023-24)**

Dept	Title Open Elective -IV	Code	Credits
Civil	Project Management	U21OE610CE	3
ECE	Internet of Things and Applications	U21OE610EC	3
	Introduction to Wireless Communications	U21OE620EC	3
EEE	Mathematical Programming for Numerical Computation	U21OE610EE	3
Mech.	Additive Manufacturing and its Applications	U21OE610ME	3
	Alternative Fuels and Energy Systems	U21OE620ME	3
	Industrial Administration and Financial Management	U21OE630ME	3
H&SS	Advanced Course in Entrepreneurship	U21OE630EH	3

With effect from the Academic Year 2023-24

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

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**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: <b>U21OE610CE</b>
Credits: 3	CIE Marks:40	Duration of SEE: 3 Hrs

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b>
Objectives of this course are to:	Upon the completion of this course the students will be expected to:
<ol style="list-style-type: none"><li>1. Learn the concept of project management along with function and objectives.</li><li>2. Understand the various techniques used for project planning such as bar charts, CPM, PERT and crashing of networks.</li><li>3. Acquire knowledge on various types of contracts, tenders.</li></ol>	<ol style="list-style-type: none"><li>1. Understand the objectives, functions and principles of management in projects.</li><li>2. Practice the network techniques like CPM and PERT for better planning and scheduling of engineering works.</li><li>3. Analyse the importance of cost and time in network analysis and planning the work accordingly.</li><li>4. Knowledge on Contracts, Tenders, and Work orders related to the projects.</li><li>5. Interpret the concept of Linear Programming and solve problems by Graphical and Simplex methods.</li></ol>

**UNIT-I: Significance of Project Management:** Importance of Project Management, Types of projects, Project Management Cycle, Objectives and functions of project 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.

**Lender:** Lender form, Lender documents, Lender notice, work order.

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

### **Learning Resources:**

1. Srinath L.S., PERT and CPM., Principles and Application, East – West Press, 2001.
2. Peret, F., Construction Project Management an Integrated Approach, Taylor and Francis, Taylor and Francis Group, London & New York, 2009.
3. Punmia B.C. and Khandelwal, PERT and CPM, Laxmi Publications, 2006
4. Gahloj. P.S. and Dhiv. B.M., Construction Planning and Management, Wiley Eastern Ltd., 2018.
5. Kumar Neeraj Jha., Construction Project Management: Theory and Practice, Pearson Education, India, 2015.
6. Seetharaman S., Construction Engineering and Management, Umesh Publications, 2012.

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

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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 2023-24

**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 & Mechanical)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: <b>U21OE610EC</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b>
<ol style="list-style-type: none"><li>1. The purpose of this course is to impart knowledge on IoT Architecture, practical constraints.</li><li>2. To study various protocols And to study their implementations</li></ol>	<p>On completion of the course, students will be able to</p> <ol style="list-style-type: none"><li>1. Understand the Architectural Overview of IoT</li><li>2. Enumerate the need and the challenges in Real World Design Constraints</li><li>3. Compare various IoT Protocols.</li><li>4. Build basic IoT applications using Raspberry Pi.</li><li>5. Understand IoT usage in various applications.</li></ol>

**UNIT - I : OVERVIEW**

Introduction to IoT – Improving Quality of life.

IoT-An Architectural Overview, M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT.

**UNIT - II : Real-World Design Constraints**

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



### **UNIT - III : IOT PROTOCOLS**

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

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

### **UNIT - IV : Device for IoT**

Choice of Microcontroller, Introduction to Raspberry Pi, Features of Pi, Programming platform, Python 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, Vlasios Tsiatsis, 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.
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

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Duration of Internal Tests: 90 Minutes

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)**

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**IBRAHIMBAGH, HYDERABAD – 500 031**

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION  
ENGINEERING**

**Introduction to Wireless Communications  
(Open Elective - IV)**

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

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: <b>U21OE620EC</b>
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b>
<ol style="list-style-type: none"><li>1. To understand the technology trends changing from generation to generation.</li><li>2. To have an insight into the various propagation models and the effects of fading.</li><li>3. To understand the multiple access techniques and Mobile communication system specifications.</li></ol>	<p>On completion of the course, students will be able to</p> <ol style="list-style-type: none"><li>1. Identify key concepts related to frequency reuse, handoff strategies, and channel assignment in cellular networks.</li><li>2. Explain the architecture, services, and features of 2G wireless systems, specifically the Global System for Mobile (GSM)</li><li>3. Analyze the benefits of MIMO and OFDM in enhancing data rates and spectral efficiency in 4G and beyond.</li><li>4. Compare and contrast the evolution of 3G, 4G, and 5G technologies, highlighting their advancements and implications.</li><li>5. comprehend the architecture of 5G networks, including the New Radio (NR) standard, standalone and non-standalone modes, massive MIMO</li></ol>

**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.

## UNIT - II:

**2G Wireless Systems and Standards:** Global System for Mobile (GSM) – Services and features, System architecture, GSM Radio subsystem, channel types, Frame structure for GSM.

## UNIT - III:

**Evolution from 3G to 4G:** 3G UMTS, W-CDMA, HSPA, HSPA+, 3G services and data rates; IMT advanced: 4G, LTE, VoLTE, OFDM, MIMO, LTE Advanced Pro (3GPP release 12+); IMT2020: 5G enhancements in comparison to IMT advanced.

## UNIT -IV:

**Basics of 5G:** 5G potential and applications; Usage scenarios: enhanced mobile broadband (eMBB), ultra reliable low latency communications (URLLC), massive machine type communications (MMTC), D2D communications, V2X communications; Spectrum for 5G, spectrum access/sharing; millimeter Wave communication, channels and signals/waveforms in 5G, carrier aggregation, small cells, dual connectivity.

## UNIT -V:

**5G Network:** New Radio (NR), Standalone and non-standalone mode; non-orthogonal multiple access (NOMA); massive MIMO, beam formation, FAPI: PHY API specification, flexible frame structure, Service Data Adaptation Protocol (SDAP); centralized RAN, open RAN; multi-access edge computing (MEC); software defined networking (SDN), network function virtualization (NFV); network slicing; restful API for service-based interface; private networks.

### Learning Resources:

1. Theodore S. Rappaport, Wireless Communications Principles and Practices, 2<sup>nd</sup> edition, Pearson Education.
2. 4G, LTE-Advanced Pro and The Road to 5G by Erik Dahlman.
3. Fundamentals of 5G Mobile Networks Hardcover, by Jonathan Rodriguez, Wiley.
4. 5G NR: Architecture, Technology, Implementation, and Operation of 3GPP New Radio.
5. Introduction to Wireless and Cellular Communications  
Course url: [https://swayam.gov.in/nd1\\_noc19\\_ee48/preview](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)**

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**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

**MATHEMATICAL PROGRAMMING FOR NUMERICAL COMPUTATION**

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

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: <b>U210E610EE</b>
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

<b>COURSE OBJECTIVES</b> The course will enable the students to:	<b>COURSE OUTCOMES</b> On completion of the course, students will be able to
To provide fundamental knowledge of programming language for solving problems.	<ol style="list-style-type: none"><li>1.Generate arrays and matrices for numerical problems solving.</li><li>2.Represent data and solution in graphical display.</li><li>3.Write scripts and functions to easily execute series of tasks in problem solving.</li><li>4. Use arrays, matrices and functions in Engineering applications</li><li>5.Design GUI for basic mathematical applications.</li></ol>

**UNIT - I : Introduction:**

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

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

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

## **UNIT - II : Scripts and Functions**

Script Files, Function Files, Debugging methods in MATLAB. **Graphics:** **Basic 2D plots:** Printing labels- grid and axes box- Entering text in a box- Axis control-Style options-Multiple plots- subplots-specialized 2D plots: stem-,bar, hist, pi, stairs, loglog , semilog ,polar ,comet 3D plots: Mesh,Contour,Surf,Stem3,ezplot.

## **UNIT - III : Numerical Methods Using MATLAB**

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

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

## **UNIT - IV : Nonlinear Equations**

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

## **UNIT - V :**

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

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

## **Learning Resources:**

1. Getting started with MATLAB "A quick introduction for scientist and engineers by RudraPratap, Oxford publications.
2. Advanced Guide to MATLAB-Practical Examples in Science and Engineering by S.N.Alam, S.Islam, S.K. Patel-I.K. International Publishing House Pvt.Ltd.
3. Stephen J. Chapman-"MATLAB Programming for Engineers"- 5th

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Edition- Cengage Learning- 2015. Getting started with MATLAB (Version 9) The Mathworks.

4. An Introduction to MATLAB® Programming and Numerical Methods for Engineers 1st Edition by Timmy Siau and Alexandre Bayen, Elsevier-18th April 2014.
5. <https://nptel.ac.in/courses/103106118/2>

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

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

With effect from the Academic Year 2023-24

## VASAVI COLLEGE OF ENGINEERING (Autonomous)

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

### DEPARTMENT OF MECHANICAL ENGINEERING

#### Additive Manufacturing and its Applications (Open Elective-IV)

#### SYLLABUS FOR B.E VI Semester

L:T: P(Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : <b>U21OE610ME</b>
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

Course objectives	Course Outcomes
<p><b>The objectives of this course are to:</b></p> <p>understand the fundamentals of various additive manufacturing technologies and their applications in Engineering Industry.</p>	<p><b>On completion of the course the student will be able to:</b></p> <ol style="list-style-type: none"><li>1. Understand the fundamentals of prototyping and the various data formats used in Additive Manufacturing.</li><li>2. Study the principle, process, advantages, limitations and case studies of liquid based AM systems.</li><li>3. Study the principle, process, advantages, limitations and case studies of solid based AM systems.</li><li>4. Study the principle, process, advantages, limitations and case studies of powder based AM systems.</li><li>5. Study the applications of AM in various engineering industries as well as the medical field.</li></ol>

#### 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 and Applications, World Scientific publications, 3rdEd., 2010
2. D.T. Pham and S.S. Dimov, "Rapid Manufacturing", Springer, 2001
3. Terry Wohlers, " Wohlers 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:	<b>1 Hour 30 Minutes</b>		

## VASAVI COLLEGE OF ENGINEERING (Autonomous)

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### DEPARTMENT OF MECHANICAL ENGINEERING

#### Alternative Fuels and Energy Systems (Open Elective-IV) SYLLABUS FOR B.E VI Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : <b>U21OE620ME</b>
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

<b>Course objectives</b>	<b>Course Out comes</b>
<p><b>The objectives of this Course are:</b></p> <p>To broaden the knowledge of alternate fuels and energy system and to understand the manufacturing and operating characteristics of alternative fuels.</p>	<p><b>On completion of the Course, the student will be able to:</b></p> <ol style="list-style-type: none"><li>1. Identify the need for alternative fuels.</li><li>2. Explain the characteristic features of bio-fuels.</li><li>3. Elucidate the properties of biogas, LPG &amp; CNG.</li><li>4. Identify the merits and challenges of hydrogen and fuel cell based vehicles.</li><li>5. Explain the characteristics of electric and hybrid vehicles.</li></ol>

#### **UNIT – I**

##### **Need for Alternative Fuels:**

Working of I.C. Engine; Properties of Fuels; Fuel Rating; Study of various performance parameters related to properties of different types of fuels; Fossil Fuels: Sources, scope of availability; Need for Alternative Fuels; Effects of constituents of Exhaust gas emission on environment; Green house effect, Factors affecting green house effect.

#### **UNIT – II**

##### **Alcohols:**

Sources of Methanol and Ethanol, methods of its production. Properties of methanol & ethanol as engine fuels, Use of alcohols in S.I. and C.I. engines, performance of blending methanol with gasoline. Emulsification of alcohol and diesel. Dual fuel systems. Improvement / Change in emission characteristics with respect to % blending of Alcohol.

### **Bio-diesels:**

Base materials used for production of Bio-diesel; Properties of Diesel blended with vegetable oils and difference in performance characteristics of Engine.

**Synthetic Alternative Fuels:** Di-Methyl Ether (DME), P-Series, Eco-friendly Plastic fuels (EPF).

### **UNIT – III**

#### **Biogas:**

Introduction to Biogas system; Extraction process; Factors affecting biogas formation; Usage of Biogas in SI engine & CI engine;

**LPG & CNG:** Properties of LPG & CNG as engine fuels, fuel metering systems, combustion characteristics, effect on performance, emission, cost and safety.

### **UNIT – IV**

#### **Hydrogen:**

Hydrogen as a substitute fuel; Properties, Sources and methods of Production of Hydrogen; Storage and Transportation of hydrogen; Advantages of hydrogen (Liquid hydrogen) as fuel for IC engine/ hydrogen car; Layout of a hydrogen car;

**Fuel Cells:** Concept of fuel cells based on usage of Hydrogen and Methanol; Power rating and performance; Layout of fuel cell vehicle.

### **UNIT – V**

#### **Electric & Hybrid Vehicles:**

Layout of an electric vehicle; Systems and components; electronic controlled systems; high energy and power density batteries; Types of hybrid vehicles; advantages & limitations.

#### **Solar Powered Vehicles:**

Solar cells for energy collection, Storage batteries; Layout of solar powered automobiles; Advantages and limitations.

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

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

Duration of Internal Test: **1 Hour 30 Minutes**

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

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IBRAHIMBAGH, HYDERABAD – 500 031

**DEPARTMENT OF MECHANICAL ENGINEERING**

**Industrial Administration and Financial Management  
(Open Elective-IV)  
SYLLABUS FOR B.E VI Semester**

Instruction: 3 Hrs / week	SEE Marks:60	Course Code : <b>U21OE630ME</b>
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

<b>Course objectives</b>	<b>Course Out comes</b>
<p>The objectives of this course are to:</p> <ol style="list-style-type: none"> <li>1. aware about types of business forms, organization structures, plant layouts, merits, demerits and applications.</li> <li>2. understand method study procedure, PME, time study techniques and wage incentives.</li> <li>3. importance of PPC and improving quality by control charts and sampling plants.</li> <li>4. optimization of inventory to minimize total cost and other optimization techniques like LPP, project management techniques.</li> <li>5. estimate selling price of a product, TVM and budgeting techniques, depreciation methods.</li> </ol>	<p><i>On completion of the course, the student will be able to:</i></p> <ol style="list-style-type: none"> <li>1. understand business forms, organization structures and plant layouts.</li> <li>2. implementation of method study and estimation of standard time.</li> <li>3. understand types of production, functions of PPC, quality control by charts and sampling.</li> <li>4. implement optimization techniques like LPP, assignment and project management techniques.</li> <li>5. understand BEA, estimation of depreciation, selling price of a product and capital budgeting techniques.</li> </ol>

**UNIT – I**

Industrial Organization: Types of various business organisations. Organisation structures and their relative merits and demerits. Functions of management.

Plant location and layouts: Factors affecting the location of plant and layout. Types of layouts and their merits and demerits.

## **UNIT – II**

Work study: Definitions, Objectives of method study and time study. Steps in conducting method study. Symbols and charts used in method study. Principles of motion economy. Calculation of standard time, by time study and work sampling. Performance rating factor. Types of ratings. Jobs evaluation and performance appraisal. Wages, incentives, bonus, wage payment plans.

## **UNIT – III**

Inspection and quality control: Kinds and Types, objectives of inspection, Sampling inspection quality control by chart for variables and attributes and sampling plans. Quality circles.

Production planning and control: Types of manufacture. Types of production. Principles of PPC and its functions.

## **UNIT – IV**

Optimisation: Introduction to linear programming and graphical solutions. Assignment problems.

Project Management: Introduction to CPM and PERT. Determination of critical path.

Material Management: Classification of materials. Materials planning. Purchasing procedure of a material for an industry, Duties of purchase manager and Stores department. Determination of economic order quantities. Types of materials purchase.

## **UNIT – V**

Cost accounting: elements of cost, Various costs, Types of overheads, calculation of selling price. Break even analysis and its applications. Depreciation. Methods of calculating depreciation fund. Nature of financial management. Time value of money. Techniques of capital budgeting and methods.

### **Learning Resources:**

1. Pandey I.M., "Elements of Financial Management", Vikas Publ. House, New Delhi, 1994
2. Khanna O.P., "Industrial Engineering and Management", Dhanapat Rai & Sons.
3. Everrette E Admaa & Ronald J Ebert , "production and Operations Management", 5<sup>th</sup> Ed. , PHI , 2005
4. S N Chary, "Production and Operations Management", 3<sup>rd</sup> Ed. , Tata McGraw Hill, , 2006

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5. Pannerselvam, "production and Operations Management", Pearson Education, 2007

**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:	<b>1 Hour 30 Minutes</b>		

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**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

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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: <b>U20OE630EH</b>
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

<b>Course objectives</b> <b>The objectives of this course</b>	<b>Course Outcomes</b> <b>On completion of the course the</b>
<ol style="list-style-type: none"><li>1. Acquire additional knowledge and skills for developing early customer traction into a repeatable business.</li><li>2. They will learn the tools and methods for achieving sustainable growth, such as refining the product or service and business models, building brand strategy, making a sales and financial plan etc.</li></ol>	<ol style="list-style-type: none"><li>1. Develop an A-team</li><li>2. Refine business models and expand customer segments, brand strategy and create digital presence, channel strategy for customer outreach</li><li>3. Develop strategies to grow revenues and markets, understand Advance Concepts of business finance, do Financial Planning, find Funding for growth</li><li>4. Leverage technologies and platforms for growth stage companies</li><li>5. Develop key metrics to track progress, understand Basics of registering a company.</li></ol>

**Unit I: Pivoting and New Business Model**

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

## **Unit II: Business Planning**

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

## **Unit III: Customer Life cycle and Building the A-team**

Customer life cycle; identifying secondary revenue streams; Funding Landscape: Funding options for an entrepreneur; Investor hunt: Creating funding plan and designing the pitch deck; Attracting right talent – I: Intro to building the A-team; Examples; Setting the team for success.

## **Unit IV: Branding and Channel Strategy, Leveraging Technologies**

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

## **Unit V: Measuring Progress, Legal Matters and Role of Mentors & Advisors**

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

## **Learning Resources:**

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



With effect from the Academic Year 2023-24

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

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

Duration of Internal Test: **1 Hour 30 Minutes**

**VASAVI COLLEGE OF ENGINEERING(Autonomous)**

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**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:U21HS630EH
Credits: 1	CIE Marks :30	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b>
<b>The course will enable the learners to:</b>	<b>At the end of the course the learners will be able to:</b>
<ol style="list-style-type: none"> <li>1. Introduce students to higher order thinking and problem solving via vocabulary and its various components</li> <li>2. Train students to understand context &amp; theme and use it to complete sentences.</li> <li>3. Train students to identify the structure of sentences &amp; paragraphs</li> <li>4. Train students to analyze text, e.g., simple outlining and note taking, summarize, draw conclusions, and apply information to personal experiences</li> <li>5. Train students to improve the quality of sentences by fixing errors</li> </ol>	<ol style="list-style-type: none"> <li>1. Use vocabulary as a tool to solve questions in verbal ability</li> <li>2. Identify meanings of words using theme and context</li> <li>3. Solve questions based on jumbles- sentences and paragraphs</li> <li>4. Develop skills to critically analyze texts and then the ability to identify its theme</li> <li>5. Improve the quality of their writing by being aware of the common errors</li> </ol>

**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 Parajumbles

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

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

### ASSESSMENTS

- Online assignments
- Individual and Group

### Learning Resources:

[learn.talentsprint.com](https://learn.talentsprint.com)

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

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**Department of Computer Science & Engineering**

**Skill Development Course-VIII (Technical Skills-III)**

**Industry Standard Coding Practices – 2023**

**SYLLABUS FOR B.E. VI-SEMESTER**

L:T:P (Hrs./week): 1:0:0	SEE Marks : 40	Course Code: <b>UI21PE610CS</b>
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
<ol style="list-style-type: none"><li>1.Understand importance of problem solving approaches for programming complex data structure problems.</li><li>2.Understand importance of optimized solutions for problems solving and its relevance to industry.</li><li>3.Implement mathematical and logical understanding approaches to implement test driven development practices.</li><li>4.Start participating in global coding competitions relevant to the syllabus</li><li>5.Write Efficient coding solutions using appropriate algorithm</li></ol>	<ol style="list-style-type: none"><li>1. Choose the right data structure based on the requirements of the problem.</li><li>2. Design algorithm for a given problem by choosing appropriate design technique and provide optimal solution.</li></ol>

**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 :  Max. Marks for each Internal Test :

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2023-24

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

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**Department of Computer Science & Engineering**

**INTERNET OF THINGS LAB**  
SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: <b>UI21PC611CS</b>
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
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

**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. ArshdeepBahga, Vijay Madiseti, "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			

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

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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: <b>UI21PC621CS</b>
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
1 Apply software engineering principles for analyzing, visualizing, specifying, constructing for software intensive system.	1 Identify the functional and non functional requirements and estimate effort /cost for the given system.
2 Document the artifacts of software system.	2 Design the Data/Work/Control flow in the modules of the intended system. 3 Construct the Structural, Behavioural, Interaction & State aspects for the intended system. 4 Develop the artifacts of the intended system through forward and reverse engineering. 5 Build test cases and evaluate the software project quality.

**Programming Exercise:**

**Select one large information system/Approach and device the following using CASE TOOL.**

1. Systems software Requirements and related analysis documents as per the guidance in ANSI/IEEE Std 830-1984.
2. Design documents representing the complete design of the software system using Data flow diagram.
3. Functional Decomposition and structure.

With effect from the Academic Year 2023-24

4. Behavioral Modeling- use case diagram demonstration using UML.
5. Behavioral Modeling- Interaction diagram demonstration using UML.
6. Behavioral Modeling- State machine diagram demonstration using UML.
7. Structural Modeling- Class diagram demonstration using UML.
8. Familiarization of Forward and reverse engineering the class diagram using tools.
9. Architectural Modeling-component and deployment diagram demonstration using UML.
10. Git installation and create a repository and perform fetch, pull, branching operations.
11. Jenkins Installation and implement continues Integration and Continues deployment, build a job using Jenkins.
12. Demonstration on functional testing using RFT.
13. Build a design model for a given application.

### **Learning Resources:**

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, 6th Edition, (2005) Tata McGrawHill.
2. Grady Booch, James Rumbaugh, Ivor Jacobson, The Unified Modeling Language-User guide , 2nd Edition, (2007), Pearson Education, India.
3. Joakim Verona. "Practical Devops", Second Edition. Ingram short title; 2nd edition, 2018.
4. Deepak Gaikwad, Viral Thakkar, "DevOps Tools from Practitioner's Viewpoint". Wiley publications, 2019.
5. [http://www.nyu.edu/classes/jcf/g22.2440-001\\_sp09/handouts/UMLBasics.pdf](http://www.nyu.edu/classes/jcf/g22.2440-001_sp09/handouts/UMLBasics.pdf)
6. <https://courses.cs.washington.edu/courses/cse403/11sp/lectures/lecture08-uml1.pdf>
7. <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			

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**Department of Computer Science & Engineering**

**COMPILER CONSTRUCTION LAB**

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P(Hrs./week):0:0:2	SEE Marks:50	Course Code: <b>UI21PC631CS</b>
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
1 Implement phases of a compiler using YACC, LEX tools	1 Implement lexical analyzer
2 Apply Various code optimization techniques to develop efficient target code	2 Develop first and follow set for a given grammar 3 Design top down and bottom up parsers 4 Implement code generator 5 Implement code optimization

**Programming Exercise:**

1. Scanner programs using C
2. Scanner programs using LEX
3. Find first set and follow set
4. Implementation of Recursive decent parser
5. Implementation of LL(1) parser.
6. Implementation of SLR parser.
7. Implementation of CLR parser.
8. Implementation of LALR Parser using ANTLR
9. Construct dependency graph for the given SDD
10. Intermediate Code generation using YACC
11. Construct the DAG for given three address code
12. Build a Tiny compiler for the C language using LEX and YAAC

**Learning Resources:**

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D Ullman – *Compilers: Principles, Techniques & Tools*, 2<sup>nd</sup> Edition, Pearson Education 2007.
2. Keith d Cooper & Linda Tarezon, *Engineering a Compiler*, Morgan Kafman, 2<sup>nd</sup> Edition
3. John R Levine, Tony Mason, Doug Brown *Lex & Yacc*, 3<sup>rd</sup> Edition Shroff Publisher, 2007
4. Kenneth C Loudon , *Compiler Construction: Principles and Practice*, 2<sup>nd</sup> Edition ,Cengage Learning, 2005
5. John R Levine ,*Lex&Yacc*, Oreilly Publishers, 2<sup>nd</sup> Edition, 2009.
6. <http://nptel.ac.in/courses/106108052/1>
7. <http://freevideolectures.com/Course/3051/Compiler-Design>

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			

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**THEME BASED PROJECT**  
SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: <b>UI21PW619CS</b>
Credits : 1	CIE Marks : 30	Duration of SEE : -

<b>COURSE OBJECTIVES</b>	<b>COURSE OUTCOMES</b> <i>On completion of the course, students will be able to</i>
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.

The students are required to carry out a theme based project by selecting any one of themes like Smart Home, Smart Parking, Smart Transport, Smart Waste Management, Smart Healthcare, Smart Agriculture, Smart Lighting, Smart Logistics and Smart Security in the area of Internet of Things 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.