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 2025-26 (For the batch admitted in 2023-24) (R-23)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

Phones: +91-40-23146020, 23146022

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.

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

B.E. (CSE) PROGRAM OUTCOMES (PO's) Engineering Graduates will be able to:	
PO1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
P1O	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
P11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
P12	**Lifelong learning:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

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

With effect from the Academic Year 2025-26

SCHEME OF INSTRUCTION AND EXAMINATION(R-23)
FOR B.E 2023-24 ADMITTED BATCH V SEMESTER (A.Y 2025-26)

B.E (CSE) V Semester								
Course Code	**Name of the Course**	**Scheme of Instruction**			**Scheme of Examination**			
		Hours per Week			**Duration in Hrs**	**Maximum Marks**		**Credits**
		L	**T**	**P/D**		**SEE**	**CIE**	
THEORY								
UI23PC510CS	Full Stack Web Development	3	-	-	3	60	40	3
UI23PC520CS	Computer Networks	3	-	-	3	60	40	3
UI23PC530CS	Artificial Intelligence	3	-	-	3	60	40	3
UI23PC540CS	Automata, Languages and Computation	3	-	-	3	60	40	3
U23HS040EH	Economics and Finance for Engineers	2	-		3	60	40	2
U23OE5XXXX	Open Elective-III	3	-	-	3	60	40	3
U23HS530EH	Design Thinking	1			2	40	30	1
U23HS510EH	Skill Development Course -V(Communication Skills-II)	1	-	-	2	40	30	1
UI23PE510CS	Skill Development Course -VI (Technical Skills –III)	1	-	-	2	40	30	1
PRACTICALS								
UI23PC511CS	Full Stack Web Development Lab	-	-	2	3	50	30	1
UI23PC521CS	Computer Networks Lab	-	-	2	3	50	30	1
UI23PC531CS	Artificial Intelligence and Machine Learning Lab	-	-	2	3	50	30	1
Library / Sports / Mentor Interaction		-	-	-	-	-	-	-
Extra-Curricular Activities – II		-	-	-	-	-	-	-
Co-Curricular Activities – III (Paper Presentation)		-	-	-	-	-	-	-
TOTAL		**20**	**-**	**6**		**630**	**420**	**23**
GRAND TOTAL		**26**				**1030**		
Student should acquire one NPTEL course certification of 8 weeks duration (2 credits) during I Sem to VI Sem								

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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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: **UI23PC510CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

	COURSE OBJECTIVES		**COURSE OUTCOMES** *On completion of the course, students will be able to*
1	Develop applications using web technologies.	1	Apply HTML and CSS to design web pages.
2	Develop and publish REST API.	2	Develop dynamic web front end using JavaScript.
		3	Design a component driven user interface using React.
		4	Develop back-end application using Node.js and MongoDB.
		5	Develop and deploy web services to integrate web applications.

CO-PO and CO-PSO mapping

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

UNIT-I:

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

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

UNIT-II:

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

UNIT-III:

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

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

UNIT-IV:

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

MongoDB

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

UNIT-V:

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

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

Learning Resources:

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

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2025-26

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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: **UI23PC520CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

UNIT-I:

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

Physical Layer: Guided transmission media, Wireless transmission media.

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

UNIT-II:

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

UNIT-III:

Network Layer: Network Layer Design Issues.

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

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

Internet Control Protocols: ICMP, ARP, DHCP.

UNIT-IV:

Transport Layer: The Transport Service, Elements of Transport Protocols

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

UNIT-V:

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

Learning Resources:

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

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2025-26

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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: **UI23PC530CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVE	**COURSE OUTCOMES** *On completion of the course, students will be able to*
Understand issues and techniques involved in the creation of intelligent systems.	1 Solve searching problems using A*. 2 Develop an algorithm for playing games. Represent the knowledge using propositional logic. 3 Create logical agents to do inference using first order logic. 4 Solve problem with constraints. 5 Perform planning for a given problem.

CO-PO and CO-PSO mapping

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

UNIT I:

Introduction: Introduction to AI

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

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

depth first search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* Search: Minimizing the total estimated solution cost, Heuristic Functions, Local Search Algorithms and Optimization Problems.

UNIT II:

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

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

UNIT III:

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

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

UNIT IV:

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

UNIT V:

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

Learning Resources:

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

5. Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, ThirdEdition(2009), Tata McGraw Hill
6. http://www.nptel.ac.in/courses/106105077
7. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-spring-2005
8. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-fall-2010/lecture-videos

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2025-26

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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 :**UI23PC540CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

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

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, 3rd edition (2009), Pearson Education.
2. John C.Martin, Introduction to Languages and the Theory of Computation, 4th Edition (2004) Tata McGraw Hill.
3. Bernard M.Moret, The Theory of Computation (2002), Pearson Education.
4. Michael Sipser, Introduction to Theory of Computation, 3rd Edition (2012), Course Technology.

5. Mishra and Chandrashekaran, 'Theory of computer science - Automata, Languages and Computation', 2nd Edition, PHI
6. ZviKohavi , Switching and finite Automata Theory,3rd Edition (1976), TMH.
7. http://www.nptelvideos.in/2012/11/theory-of-computation.html
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	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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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: **U23HS040EH**
Credits: 2	CIE Marks : 40	Duration of SEE : 03 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** At the end of the course the learner will be able to :
The course will enable the learners to: Understand the concepts and tools of economics, accounting and finance that will equip them for decision making.	1. Gain a conceptual understanding of economics as a discipline. 2. Construct a cost sheet and classify costs and make use of Marginal cost analysis in decision making. 3. Understand the accounting process and its importance. 4. Conceptual understanding of Financial Management and evaluate Long term investment decisions in business.

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

Unit I: Concepts in Economics: (6 Classes)

Definition of Managerial Economics - Scope of Managerial Economics - Relevance of Economics for Engineers - Demand function - Determinants of Demand - Law of Demand - assumptions and exceptions – Elasticity of demand (Price, Income and cross elasticity)- Numericals on price elasticity of demand - Application-oriented approach of Price Elasticity - Law of supply - Introduction to market structures.

Unit II: **Cost Analysis and Profit Planning : (6 Classes)**

Concept of Cost - Classification of Costs - Cost sheet (simple numericals) – Marginal Costing Analysis (simple numerical on Break-even analysis only) - Application oriented approach (Make or buy, continue or shutdown decisions – Theory only)

Unit III: **Conceptual Understanding of Accounting : (6 Classes)**

Accounting Cycle – Principles of Accounting - Journal - Subsidiary Books – Ledger - Trial Balance (Theory Only)

Preparation of Trading and Profit and Loss Account and Balance Sheet (Numericals with adjustments for closing stock, outstanding expenses, prepaid expenses, accrued incomes, incomes received in advance, depreciation, bad debts)

Unit IV: **Financial Management decisions: (6 Classes)**

Investment decisions - Long term – Capital budgeting – Traditional and DCF Techniques (Numericals on capital budgeting techniques namely PBP, ARR, NPV, and PI) – Short term - Introduction to working capital (gross and net working capital)

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, Numericals 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,Numericals 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	:	30
2	No. of assignments	:	3	Max. Marks	:	5
3	No. of Quizzes	:	3	Max. Marks	:	5

Duration of Internal Tests : 90 Minutes

With effect from the Academic Year 2025-26

OPEN ELECTIVES OFFERED IN B.E. V SEMESTER (2025-26)

Dept	Title (Open Elective-III)	Code	Credits
Civil	GEO Spatial Information Technology	U23OE510CE	3
ECE	Introduction to Biomedical Electronics (General Pool)	U23OE510EC	3
	Signal Engineering (General Pool)	U23OE530PH	3
	Introduction to Communication Systems (Communication Engineering - Stream)	U23OE540EC	3
EEE	Modelling and Simulation of Basic Photovoltaic Systems	U23OE510EE	3
Mech	Drives and Control Systems for Robotics (Stream: Robotics)	U23OE510ME	3
	Introduction to Robotics (General Pool)	U23OE520ME	3
H&SS	Marketing Management for Engineers (Stream: Management Courses for Engineers)	U23OE510EH	3
	Introduction to Financial Analytics (Stream: BFSI)	U23OE520EH	3
	Introduction to Philosophy (General Pool)	U23OE530EH	3
	Basics of Entrepreneurship (General Pool)	U23OE540EH	3
Maths	Transform Techniques	U23OE510MA	3
	Estimation Theory and Statistical Inference	U23OE520MA	3

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VASAVI COLLEGE OF ENGINEERING (Autonomous)

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DEPARTMENT OF CIVIL ENGINEERING

GEO SPATIAL INFORMATION TECHNOLOGY

(Open Elective-III)

SYLLABUS FOR B.E. V SEMESTER

L : T : P (Hrs./week):3:0: 0	SEE Marks:60	Course Code: **U23OE510CE**
Credits : 3	CIE Marks:40	Duration of SEE:3 Hrs

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

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

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

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

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

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

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

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

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

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

Learning Resources:

1. James B. Campbell & Randolph H. Wynne., Introduction to Remote Sensing, The Guilford Press, 2011
2. Lillesand, Kiefer, Chipman., Remote Sensing and Image Interpretation, Seventh Edition, 2015
3. Leick, A., GPS Satellite Survey, John Wiley: NJ, 2015
4. Hofmann, B., Lichtenegger H. and Collins J., Global Positioning System: Theory and Practice, Springer: Berlin, 2011.
5. BasudebBhatta, Remote Sensing and GIS, Oxford University Press, 2011.
6. Hofmann-Wellenh of, Bernhard, Lichtenegger, Herbert, Wasle, Elmar, GNSS – GPS, GLONASS, Galileo and more, 2013
7. ThanappanSubash., Geographical Information System, Lambert Academic Publishing, 2011.
8. Paul Longley., Geographic Information systems and Science, John Wiley & Sons, 2005
9. John E. Harmon & Steven J. Anderson., The design and implementation of Geographic Information Systems, John Wiley & Sons, 2003
10. ArcGIS 10.1 Manuals, 2013.
11. Kang Tsung Chang., Introduction to Geographic Information Systems, Tata McGraw Hill Publishing Company Ltd, New Delhi, 2008.
12. Burrough, P.A., Principles of GIS for Land Resource Assessment, Oxford Publications, 2005.
13. C.P.Lo& Albert K. W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice Hall India Pvt.Ltd, 2002.

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

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

Duration of Internal Tests : 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Biomedical Electronics
(General Pool)
(Open Elective - III)

SYLLABUS FOR B.E. V – SEMESTER

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

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U23OE510EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

UNIT - I :

Basics of Biomedical Electronics: Physiological systems of the body, sources of biomedical signals, basic medical instrumentation system,

performance requirements of medical instrumentation systems, Intelligent medical instrumentation systems, General constraints in design of medical instrumentation systems.

UNIT - II :

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

UNIT - III :

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

UNIT - IV :

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

UNIT - V :

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

Learning Resources:

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Signal Engineering

(General Pool)

(Open Elective - III)

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

L:T:P (Hrs./week) : 2:0:1	SEE Marks : 60	Course Code:**U23OE530PH**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

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

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

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

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

Working, Level Crossings, Station Working Rules.

UNIT – II: Railway Signaling (6 Hours)

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

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

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

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

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

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

Level Crossing Gates – Working, Circuit Progression, Safety features

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

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

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

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

<u>Practicals at IRISET Laboratory (12 Hours)</u>

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Communication Systems
(Communication Engineering Stream: Open Elective - III)

SYLLABUS FOR B.E. V – SEMESTER (CSE & IT branches)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U23OE540EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

UNIT - I :

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

Lab activity: Gain, Bandwidth, Attenuation calculations using MATLAB

UNIT - II :

Radio transmitters and Receivers: Classification of transmitters: High level and low level AM transmitters, FM transmitters.

Receiver characteristics: Sensitivity, Selectivity, Fedility.

Tuned radio frequency (TRF) and super heterodyne receivers, Intermediate frequency, AGC, Image frequency, IFRR.

Lab activity: Image frequency and IFRR calculations using MATLAB

UNIT - III :

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

Lab activity: Estimation of optical losses using MATLAB

UNIT - IV :

Microwave Engineering: Importance of Microwave Engineering in modern communication, Microwave frequency band designations, Different Microwave signal generators: Klystron, Magnetron, Gunn diode, Introduction to microwave transmission lines: wave guides, microstrip lines

Lab Activity: Determination of wavelength of a microwave signal in dominant mode, Characteristics of microstrip line using MATLAB

UNIT - V :

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

Lab Activity : Verification of Kepler's 2nd law using MATLAB

Learning Resources:

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MODELLING AND SIMULATION OF BASIC PHOTOVOLTAIC SYSTEMS

Open Elective-III

SYLLABUS FOR B.E. V SEMESTER

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code:**U23OE510EE**
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

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

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

Unit-1 Introduction to Photovoltaic Systems and PSpice

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

Unit-2 Spectral Response and Short-Circuit Current

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

Unit-3 Electrical Characteristics of the Solar Cell

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

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

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

Unit-5 Interfacing PV Modules to Loads and Battery Modelling

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

Learning Resources:

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

DRIVES AND CONTROL SYSTEMS FOR ROBOTICS
(Stream: Robotics)

(Open Elective-III)

SYLLABUS FOR B.E. V-SEMESTER

Instruction : 3Hours	SEE Marks : 60	Course Code : **U23OE510ME**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

INTRODUCTION TO ROBOTICS

(General Pool : (Open Elective-III)

SYLLABUS FOR B.E. V-SEMESTER

L:T:P(Hrs./week):3	SEE Marks : 60	Course Code: **U23OE520ME**
Credits : 3	CIE Marks: : 40	Duration of SEE: 3 Hours

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

CO-PO and CO-PSO mapping

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

UNIT-I ROBOT BASICS

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

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

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, Robot trajectories2D and 3D Transformation- Scaling, Rotation and Translation, Homogeneous transformation

UNIT-III ROBOT KINEMATICS AND CONTROL

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

Control of robot manipulators – Point to point and Continuous Path Control. Robot programming methods.

UNIT-IV ROBOT SENSORS

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

Introduction to Machine Vision and Artificial Intelligence.

UNIT-V
ROBOT APPLICATIONS

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

Applications of Micro and Nanorobots, Future Applications of robots.

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

MARKETING MANAGEMENT FOR ENGINEERS

(Stream: Management Courses for Engineers)

OPEN ELECTIVE-III - B.E. V Semester

L:T:P(Hrs/Week):3:0:0	SEE Marks:60	Course Code: **U23OE510EH**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

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

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

Unit-1: Introduction

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

Unit-2: Market Segmentation and Positioning

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

Unit-3: Buyer Behaviour

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

Unit-4: Advertisement and Promotion

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

Unit-5: Digital Marketing

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

Learning resources:-

Prescribed Text Books

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

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

INTRODUCTION TO FINANCIAL ANALYTICS

(Stream: BFSI)

OPEN ELECTIVE-III - B.E. V Semester

L:T:P(Hrs/Week):3:0:0	SEE Marks:60	Course Code: **U23OE520EH**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

COURSE OBJECTIVES	**COURSE OUTCOMES**
The course will enable the learners to:	**On completion of the course, students will be able to:**
1. To gain knowledge of tools of financial analysis	1. Differentiate effective rates of interest vs normal rates of interest. Understand time value of money
2. To understand valuation methodologies of Financial Debt instruments	2. Analyse financial statements of a company. Understand efficient usage of capital.
3. To understand corporate valuation methodologies	3. To understand the impact of debt on the capital structure and valuations of a company.
	4. Understand basis of financial projections, Valuation methods etc.

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

This course gives an overview of key inputs, covering time value of money, interest rates and others, required to take rational financial decisions. This course gives an insight of tools used to analyse and interpret financial statements of a company and thereby value a company's worth.

This is a theory cum numerical/case-study based paper. Provides exposure to students regarding Profit & Loss statement, Balance sheet & cash flow statement. Objectives of capital structure etc
Creates awareness about analysing a company from an investment perspective.

Unit 1 (5 hours)
introduction to Financial Management - Meaning - Financial Decisions- lnterrelation between Financial decisions - Time Value of Money - concept of Present Value and Future value - Effective Vs Nominal rates of interest - Amortization (including simple numerical problems)

Unit 2 (10 hours)
Financial statement Analysis - Financial statements- components of financial statements- Profit and Loss - Balance sheet - cashflow statement- building blocks of financial statements- sensitivity of various components on the profitability - lnter and lntra Company comparision - Ratio Analysis, common Size statements.(lncludingnumericals on lnter and lntra company comparison)

Unit 3 (8 hours)
Debt Securities - Types of Bonds - Bond lndenture -Valuation of Bonds - Bonds witirAnnual and Semi AnnuallnterestpaymentsCurrent Yield- Yield to Maturity and Yield to Call - Bond Duration importance and Computation - Bond Portfolio management

Unit 4 (5 hours)
Capital Structure - Concept - Sources of Finance - Determinants of capital Structure - EBlr - EPS Analysis - Effect of Taxation - consideration of Management control.

Unit 5 (15 hours)
Business Valuation - concept -purpose and Hindrances -Projected Financials- Methods of Valuation Discounted Free cash Flow Method- Net Assets Based - comparable company- Market multiples Business Valuation in Mergers- Real life Examples

Text Books Units 1,2,3,4 -Financial Management by M Y Khan

Unit 5 * lnstitute of Company Secretaries Study book
Websites: Wikipedia.com; Investopedia.com;
Newspaper: Business Standard; Economic Times

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

INTRODUCTION TO PHILOSOPHY

(Open Elective-III)

SYLLABUS FOR B.E V Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code: **U23OE530EH**
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

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

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

Unit 1: What Is Philosophy?

Definition and scope of philosophy

Branches of philosophy: metaphysics, epistemology, ethics, logic, aesthetics
Philosophical methods and the role of reasoning

Unit 2: Knowledge and Reality (Epistemology and Metaphysics)

What can we know? (Skepticism, rationalism, empiricism)
Appearance vs. reality
The mind-body problem

Unit 3: Ethics and Moral Philosophy

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

Unit 4: Political and Social Philosophy

The state and justice
Liberty, rights, and social contract theory
Civil disobedience and authority

Unit 5: Logic and Critical Thinking

Arguments, premises, and conclusions
Fallacies and sound reasoning
Introduction to symbolic logic

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

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

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEEING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

BASICS OF ENTREPRENEURSHIP

(Open Elective-III)

SYLLABUS FOR B.E V Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code: **U23OE540EH**
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

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

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

UNIT-I

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

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

Learning Resources:

1. 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: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MATHEMATICS

TRANSFORM TECHNIQUES

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: **U23OE510MA**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

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

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

UNIT – I: (8 Hours)

LAPLACE TRANSFORMS

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

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

UNIT – II: (8 Hours)

INVERSE LAPLACE TRANSFORMS

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

UNIT – III: (8 Hours)

APPLICATIONS OF LAPLACE TRANSFORMS

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

UNIT – IV: (8 Hours)

Z-TRANSFORMS

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

UNIT – V: (8 Hours)

INVERSE Z-TRANSFORMS

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

Text Books:

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

Reference Books:

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

Online Resources:

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

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

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

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MATHEMATICS

ESTIMATION THEORY AND STATISTICAL INFERENCE

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: **U23OE520MA**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

COURSE OBJECTIVES	**COURSE OUTCOMES**
The course will enable the students to:	*At the end of the course students will be able to:*
1. **Study** the concepts and application of sampling distribution 2. **Describe** the role of the point estimation, interval estimation and Bayesianestimation about a parameter. 3. **Study** various methods of testing large samples. 4. **Analyze** standard statistical tests employed for small samples. 5. **Study** the difference between non-parametric and parametric tests.	1. **Apply** Central Limit Theorem to the real-world problems and calculate and interpret, in testing one sample mean (σ known). 2. **Apply** various estimators for estimating the parameters of standard distributions. 3. **Infer** properties of population conducting tests on samples 4. **Interpret** planned and unplanned comparisons for the one-way ANOVA. 5. **Solve** problems on the Sign test, Wilcoxon Signed test, Mann-Whitney U-test.

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

UNIT – I: (8 Hours)
SAMPLING DISTRIBUTION

Sampling distribution of Mean (σ known)-Sampling distribution of Mean (σ unknown)-Sampling distribution of the Variance-Sampling distribution of differences and sums- Central Limit Theorem and its applications.

UNIT – II: (7 Hours)

ESTIMATION

Introduction- Point estimation- Interval estimation- Bayesian estimation.

UNIT – III: (7 Hours)

TESTING OF HYPOTHESIS FOR LARGE SAMPLES

Introduction -Test of significance for single proportion-Test of significance for two proportions-Standard deviation tests for two samples.

UNIT – IV: (7 Hours)

TESTING OF HYPOTHESIS FOR SMALL SAMPLES

Introduction- Paired Sample t-test- Chi- square test for independence of attributes- Analysis of Variance (ANOVA)

UNIT – V: (7 Hours)

NON-PARAMETRIC TESTS

The Sign test- Wilcoxon Signed Rank test- Mann-Whitney U- test.

Text Books:

1. Miller & Freund's Probability and Statistics for Engineers.
2. Fundamentals of Mathematical Statistics, Gupta & Kapoor, Sultan chand & sons, New Delhi.
3. Applied Statistics and Probability for Engineers by Douglas C. Montgomery and George C. N
Runger, International Student Version, 6th Edition, 1 January 2016.

Reference Books:

1 R.K. Jain & S.R.K. lyengar, Advanced Engineering Mathematics, Third Edition, Narosa Publications, 2007.
2 Higher Engineering Mathematics, Dr.B. S Grewal 40th Edition, Khanna Publishers.
3 Advanced Engineering Mathematics, Kreyszig E, 8th Edition, John Wiley & Sons Ltd, 2006.
4 A text book of Engineering Mathematics by N.P. Bali& Manish Goyal, Laxmi Publication.

Online Resources:

https://onlinecourses.nptel.ac.in/noc24_ma39/preview

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

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

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

DESIGN THINKING

SYLLABUS FOR B.E.V-SEMESTER

L:T:P(Hrs/Week):2:0:0	SEE Marks:40	Course Code: **U23HS530EH**
Credits: 1	CIE Marks:30	Duration of SEE:Hours:2

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

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

OVERVIEW:

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

UNIT 1: Introduction to Design Thinking

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

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

Learning Outcomes:

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

UNIT 2: Ideation and Problem Definition

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

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

Learning Outcomes:

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

UNIT 3: Prototyping and Feedback

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

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

Learning Outcomes:

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

UNIT 4: Real-World Applications

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

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

Learning Outcomes:

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

Suggested Books

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

LEARNING RESOURCES

learn.talentsprint.com

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Skill Development Course-V (Communication Skills-II)

SYLLABUS FOR B.E.V-SEMESTER

L:T:P (Hrs/Week): 2:0:0	SEE Marks: 40	Course Code: **U23HS510EH**
Credits: 1	CIE Marks: 30	Duration of SEE: 2 Hours

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

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

Unit 1: Delightful Discussions

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

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

Unit 2: Powerful Presentations

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

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

Unit 3: Fact, Observation and Inference

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

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

Unit 4: Effective Technical Writing

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

1.1 Report writing
1.2 Image Writing
1.3 Book Reviews
1.4 Movie Reviews

Learning Resources:

1. How to Win Friends and Influence People by Dale Carnegie. ...
2. Crucial Conversations: Tools for Talking When Stakes Are High by Kerry Patterson, Joseph Grenny, Ron McMillan, and Al Switzler. ...

3. Difficult Conversations: How to Have Conversations that Matter the Most by Douglas Stone, Bruce Patton, Sheila Heen, and Roger Fisher.

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

Skill Development Course-VI (Technical Skills-III)

Industry Standard Coding Practices – 2023

SYLLABUS FOR B.E.V-SEMESTER

L:T:P (Hrs/Week): 1:0:0	SEE Marks: 40	Course Code: **UI23PE510CS**
Credits: 1	CIE Marks: 30	Duration of SEE: 2 Hours

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

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

Problem Solving with Algorithms - backtracking Algorithms

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

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

Problem Solving Through Advanced backtracking Algorithms

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

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

Advanced Graph algorithms for Company Specific Problem Solving

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

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

Problem Solving Through String Algorithms

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

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

Problem Solving Through SQL Queries I

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

Problem Solving Through SQL Queries II

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

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

FULL STACK WEB DEVELOPMENT LAB

SYLLABUS FOR B.E. V - SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code : **UI23PC511CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

Programming Exercise:

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

8. Publishing and Consuming a Web Service using REST.
9. Develop a web application and deploy it to the cloud.
10. Upgradation of the software.
11. Develop a web application for a given problem statement.

Learning Resources:

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

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

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

COMPUTER NETWORKS LAB

SYLLABUS FOR B.E. V-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code: **UI23PC521CS**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

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

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

Programming Exercise:

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

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

Learning Resources:

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

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

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LAB

SYLLABUS FOR B.E. V-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks:50	Course Code: **UI23PC531CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

Programming Exercise:

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

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

Learning Resources:

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

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

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

With effect from the Academic Year 2025-26

SCHEME OF INSTRUCTION AND EXAMINATION(R-23)
FOR B.E 2023-24 ADMITTED BATCH VI SEMESTER (A.Y 2025-26)

B.E (CSE) VI Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			
		Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P/D		SEE	CIE	
THEORY								
UI23PC610CS	Internet of Things	3	-	-	3	60	40	3
UI23PC620CS	Software Engineering	3	-	-	3	60	40	3
UI23PC630CS	Compiler Construction	3	-	-	3	60	40	3
UI23PC640CS	Image Processing	3	-	-	3	60	40	3
U23OE6XXXX	Open Elective-IV	3	-	-	3	60	40	3
U23HS630EH	Skill Development Course -VII (Verbal Aptitude)	1	-	-	2	40	30	1
UI23PE610CS	Skill Development Course -VIII (Technical Skills –IV)	1	-	-	2	40	30	1
PRACTICALS								
UI23PC611CS	Internet of Things Lab	-	-	2	3	50	30	1
UI23PC621CS	Software Engineering Lab	-	-	2	3	50	30	1
UI23PC631CS	Compiler Construction Lab	-	-	2	3	50	30	1
UI23PW619CS	Theme Based Project	-	-	2	3	50	30	1
Library/ Sports/Mentor Interaction		-	-	-	-	-	-	-
	TOTAL	**17**	**-**	**8**		**580**	**380**	**21**
	GRAND TOTAL	**25**				**960**		
Student should acquire one NPTEL course certification of 8 weeks duration (2 credits) during I Sem to VI Sem								

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

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 : **UI23PC610CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

UNIT-I:

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

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

UNIT-II:

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

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2025-26

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:**UI23PC620CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Explain the concepts involved in the lifecycle of software development 2 Design Software Requirements Specifications, analyze risks and apply DevOps to develop, test and maintain software project	1 State the software process, compare prescriptive and evolutionary process models 2 Explain Agile software process methodology and design Software Requirements Specifications (SRS) document 3 Apply DevOps lifecycle for developing an application 4 Develop test cases and apply relevant testing strategies for various applications 5 Analyze security requirements of a given application and choose the appropriate product metric for quality assurance

CO-PO and CO-PSO mapping

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

UNIT-I:

Introduction to Software Engineering

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

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

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

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

UNIT-II:

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

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

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

UNIT-III:

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

UNIT-IV:

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

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

UNIT-V:

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

Product Metrics: Software quality, A frame work for Product metrics , Metric for the analysis model, Metrics for the Design Model , Metrics for Source code, Metrics for testing, Metrics for maintenance

Learning Resources:

1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, 8th Edition (2005), Tata McGrawHill.
2. Joakin Verona " Practical DevOps" , 2nd Edition, Ingram short Title; 2nd Edition, 2018
3. Deepak Gaikwad, Viral Thakkar, "DevOps Tools from Practioner's viewpoint" Wiley Publications, 2019.
4. Shari Lawrence Pfleeger, Software engineering Theory and Practices, 4th Edition (2011), Pearson Education, India.
5. Pankaj Jalote, An Integrated Approach to Software Engineering, 3rd Edition (2005), Narosa Publishing House.
6. http://nptel.ac.in/courses/106101061/
7. http://freevideolectures.com/Course/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	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	3	Max. Marks for each Assignment	:	5
3	No. of Quizzes	:	3	Max. Marks for each Quiz Test	:	5

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2025-26

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: **UI23PC630CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

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,2nd Edition(2022), Pearson Education.
2. Keith d Cooper & Linda Tarezon, Engineering a Compiler, 2nd Edition(2011), Morgan Kafman.
3. John R Levine, Tony Mason, Doug Brown Lex & Yacc, 3rd Edition(2007), Shroff Publisher .
4. Kenneth C Louden , Compiler Construction: Principles and Practice, 2nd 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

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

Duration of Internal Tests : 1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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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: **UI23PC640CS**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

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

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, 13th reprint (2014), McGraw Hill Education, New Delhi.
3. William K. Pratt, Digital Image Processing, 3rd 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

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

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2025-26

OPEN ELECTIVES OFFERED IN B.E. VI SEMESTER (2025-26)

Dept	Title Open Elective-IV	Code	Credits
Civil	Project Management	U23OE610CE	3
ECE	Internet of Things and Applications (General Pool)	U23OE610EC	3
	Automatic Train Protection System – Kavach (General Pool)	U23OE630PH	3
	Introduction to Mobile and Cellular Communications (Communication Engineering-Stream)	U23OE640EC	3
EEE	Introduction to Batteries and Battery management System	U23OE610EE	3
MECH.	Industry 4.O (Stream: Robotics)	U23OE610ME	3
	Additive Manufacturing and its Applications (General Pool)	U23OE620ME	3
HSS	Strategic Management for Engineers (Stream: Management Courses for Engineers)	U23OE610EH	3
	Business Intelligence (Stream: BFSI)	U23OE620EH	3
	Introduction to Psychology (General Pool)	U23OE630EH	3
	Advanced course in Entrepreneurship (General Pool)	U23OE640EH	3
Physics	Introduction to Nanotechnology	U23OE610PH	3
Maths	Advanced Probability &Statistical Methods	U230E610MA	3

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

PROJECT MANAGEMENT
(Open Elective-IV)

SYLLABUS FOR B.E. VI SEMESTER

L:T:P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code: **U23OE610CE**
Credits: 3	CIE Marks:40	Duration of SEE: 3 Hrs

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

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

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

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

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

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

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

Learning Resources:

1. Srinath L.S., PERT and CPM: Principles and Application, Vision IAS, 2020.
2. Peret, F, Construction Project Management an Integrated approach, Taylor and Francis, Taylor and Francis Group, London & New York, 2019
3. Punmia B.C., and Khandelwal, PERT and CPM, Laxmi Publications, 2022.
4. Gahloj. P.S. and Dhiv. B.M., Construction Planning and Management, Wiley Eastern Ltd., 2018.
5. Kumar NeerajJha., Construction Project Management: Theory and Practice, Pearson Education, India, 2015.
6. Seetharaman S., Construction Engineering and Management, Umesh Publications, 2017.

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

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

Duration of Internal Tests : 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Internet of Things and Applications
(Open Elective - IV)
SYLLABUS FOR B.E. VI - SEMESTER (EEE & IT)

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U23OE610EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

UNIT - I : OVERVIEW

Introduction to IoT – Improving Quality of life.
IoT-An Architectural Overview, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Introduction to cloud IOT platforms like MS Azure, AWS IOT, Google Cloud IOT, Thingworx, Business processes in IoT, IoT Enabling Technologies, IoT Levels & Deployment.

UNIT - II : Real-World Design Constraints

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

UNIT - III : IOT PROTOCOLS

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

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

UNIT - IV : Device for IoT

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

UNIT - V : IoT case studies

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

Learning Resources:

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Automatic Train Protection System - Kavach

SYLLABUS FOR B.E. VI – SEMESTER

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

L:T:P (Hrs./week) : 2:0:1	SEE Marks : 60	Course Code:**U23OE630PH**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

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

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

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

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

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

UNIT – II: (6 Hours)

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

UNIT – III: Design –Kavach: (8 Hours)

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

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

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

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

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

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

Practicals at IRISET Laboratory (12 Hours)

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

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

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

Duration of Internal Tests: 90 Minutes

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

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Mobile and Cellular Communications

(Communication Engineering Stream: Open Elective - IV)

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

L:T:P (Hrs./week) :3:0:0	SEE Marks : 60	Course Code: **U23OE640EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

UNIT - I:

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

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

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

UNIT - II:

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

Lab Activity: Path loss calculations using MATLAB

UNIT - III:

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

Lab Activity: Small scale fading parameter calculations using MATLAB

UNIT -IV:

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

Lab Activity: Demonstrating multiple access techniques using MATLAB.

UNIT -V:

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

Learning Resources:

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

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

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

Duration of Internal Tests: 90 Minutes

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

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

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

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code:**U23OE610EE**
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

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

CO-PO and CO-PSO mapping

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

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

UNIT -II: Battery Management System Requirement:
Introduction and BMS functionality, Battery pack topology, BMS Functionality, Voltage Sensing, Temperature Sensing, Current Sensing, High-voltage contactor control, Isolation sensing, Thermal control,

Protection, Communication Interface, Range estimation, State-of-charge estimation, Cell total energy and cell total power.

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

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

UNIT –IV: Modelling and Simulation:

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

UNIT -V: Design of battery BMS:

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

Learning Resources:

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

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

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

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

INDUSTRY 4.O
(Steam: Robotic) Open Elective-IV)

SYLLABUS FOR B.E VI Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : **U23OE610ME**
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

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

UNIT – I

Introduction

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

Basic principles and technologies of a Smart Factory

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

UNIT – II

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

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

Cyber-Physical Systems and new Business Models

How CPS can induce new Business Models, The Role of horizontal and vertical value streams, New Business Models for the Smart Factory, Characteristics of Business Models within the Smart Factory, Examples of new Business Models: Service provider, Data provider, Technology provider, Platform provider.

UNIT – III

Digital Twins in Production

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

Assistance systems for production

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

UNIT –IV

Human-Robot Collaboration

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

Safety and Security in networked Production Environments

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

UNIT – V

Cloud Manufacturing and the connected factory

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

The smart work piece

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

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

ADDITIVE MANUFACTURING AND ITS APPLICATIONS

(General Pool)

(Open Elective-IV)

SYLLABUS FOR B.E VI Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code: **U23OE620ME**
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

Unit-I

Introduction, Prototyping fundamentals, Historical development, Advantages of AMT, Commonly used terms, **Fundamental Automated Processes,** process chain, 3D modeling, Data Conversion, and transmission, Checking and preparing,

Building, Post processing, RP data formats, **Newly Proposed formats,** Classification of AMT process.

Unit-II

Liquid based systems: Stereo lithography apparatus (SLA): Models and specifications, process, working principle, photopolymers, photo polymerization, layering technology, laser and laser scanning, applications, advantages and disadvantages, case studies.

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

UNIT III

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

Fused Deposition Modeling (FDM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.

Unit-IV

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

Three dimensional printing (3DP): Models and specification, process, working principle, applications, advantages and disadvantages, case studies.

UNIT-V

Applications of AM systems: Applications in **Design,** aerospace industry, automotive industry, jewellery industry, coin industry, GIS Application, arts and architecture.

RP medical and bio engineering Application: planning and simulation of complex surgery, customized implant and prosthesis, design and production of medical devices, forensic science and anthropology, visualization of bio-molecules.

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD-31

Department of Humanities & Social Sciences

STRATEGIC MANAGEMENT FOR ENGINEERS

(Stream: Management Courses for Engineers)

(Open Elective-IV)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U23OE610EH**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

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

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

Unit-1 : Introduction to Strategic Management :
Strategic Planning, Planning Process, Strategy definition, Establishing Corporate direction, Vision, Mission And Objectives – Strategic Intent – Strategic Management & Process, A Model of Strategy and Elements used in strategic positioning – Strategic choice and Strategic action.

Unit-2 : Environmental Appraisal :
Demographic, Social and Cultural environment, Technological environment, Economic Environment, Political environment- Industry analysis - S W O T Analysis, Porter's Five Forces Model - Value chain Analysis – Core Competencies.

Unit-3 : Strategy Formulation :
Business Level Strategy, Strategy formulation, Situation Analysis, Growth Strategies, Offensive strategies, Defensive strategies, Generic Strategies, Industry Life Cycle Analysis -, Emerging Industries, Maturing Industry, Fragmented Industry, Strategy For Leaders, Challengers, Followers and Niches

Unit-4 : Alternative Strategies :
Strategy analysis and Choices, Strategy Alternatives - Creating Value through Intensive Growth strategies- Integration Strategies - Diversification Strategies, Mergers & Acquisitions – Strategic Alliances – Outsourcing Strategies,

Unit-5 : Strategy Implementation and Control :
Forms of Organizational Structures –Evaluation of Organization Structures –Leadership Styles - Corporate Governance - Mechanism for Evaluation - Key Performance Indicators –Difference between Operational and Strategic Controls

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

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

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

Duration of Internal Tests : 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD-31

Department of Humanities & Social Sciences

BUSINESS INTELLIGENCE

(Stream:BFSI)

(Open Elective-IV)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U23OE620EH**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

Course Objectives The objectives of this course are to	**Course Outcomes** On completion of the course the student will be able to
1. To introduce the concepts and architecture of Business Intelligence (BI) systems. 2. To familiarize students with data warehousing, data mining, and analytics tools. 3. To provide insights into BI implementation and its role in decision-making.	1. Define the architecture, evolution, and benefits of Business Intelligence. 2. Explain data warehousing and mining techniques, and apply them in real-time data environments. 3. Use Business Performance Measurement (BPM) tools and performance dashboards for managerial decision-making. 4. Employ Business Analytics and data visualization techniques in business contexts. 5. Discuss the challenges in BI implementation and emerging trends such as social BI and reality mining.

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

Unit-I: Introduction to Business Intelligence (BI)

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

Unit- II: Data ware housing and Data mining

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

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

Unit -III: Business Performance Measurement (BPM)

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

Unit-IV: Business Analytics and Data Visualization

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

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

Unit-V: Business Intelligence implementation and emerging trends

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

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

Suggested Readings:

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

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

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

Duration of Internal Tests : 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD-31

Department of Humanities & Social Sciences

INTRODUCTION TO PSYCHOLOGY

(Open Elective-IV)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U23OE630EH**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

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

CO-PO mapping

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

Course Description:

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

Unit 1: Foundations of Psychology

1. History of psychology (structuralism, functionalism, behaviourism, etc.)
2. Major perspectives (biological, cognitive, behavioural, humanistic, psychodynamic)
3. Research methods in psychology

Unit 2: Biological Bases of Behaviour

1. The nervous system and the brain
2. Neurotransmitters and hormones
3. Sleep and consciousness

Unit 3: Development across the Lifespan

1. Cognitive and emotional development (Piaget, Erikson)
2. Social development
3. Nature vs. nurture debate

Unit 4: Learning and Memory

1. Classical and operant conditioning
2. Observational learning
3. Memory processes and types

Unit 5: Social and Abnormal Psychology

1. Attitudes, conformity, and group behaviour
2. Psychological disorders and diagnosis (DSM overview)
3. Basic treatment approaches (CBT, psychotherapy)

Textbook:
"Psychology" by Saundra K. Ciccarelli& J. Noland White

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

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

Duration of Internal Test: 90 Minutes
Duration for SEE : 180 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD-31

Department of Humanities & Social Sciences

ADVANCED COURSE IN ENTREPRENEURSHIP

(Open Elective-IV)

SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U23OE640EH**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

Course Objectives	**Course Outcomes**
The objectives of this course are to	On completion of the course the student will be able to
1. Acquire additional knowledge and skills for developing early customer traction into a repeatable business. 2. 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.	1. Develop an A-team 2. Refine business models and expand customer segments, brand strategy and create digital presence, channel strategy for customer outreach 3. Develop strategies to grow revenues and markets, understand Advance Concepts of business finance, do Financial Planning, find Funding for growth 4. Leverage technologies and platforms for growth stage companies 5. Develop key metrics to track progress, understand Basics of registering a company.

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

Unit I: Pivoting and New Business Model

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

Unit II: Business Planning

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

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

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

Unit IV: Branding and Channel Strategy, Leveraging Technologies

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

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

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

Learning Resources:

1. Rajeev Roy, Entrepreneurship
2. Clancy, Ann L. & Binkert, Jacqueline, "Pivoting- A coach's guide to igniting substantial change" Palgrave Macmillan US 2017
3. Porter, Michael, E., "Competitive Advantage: Creating and Sustaining Superior Performance", Free press, 1st edi.

4. Schwetje, Gerald & Vaseghi Sam, "The Business Plan", Springer-Verlag Berlin Heidelberg.
5. LeMay, Matt, "Product Management in Practice", O'Reilly Media Inc.
6. Smart, Geoff & Randy, Street., "Who: The A method of hiring", Ballantine books, 2008.
7. Blokdyk, Gerardus., "Customer Lifecycle Management - A complete guide", 5starcooks, 2018

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

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

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF PHYSICS

INTRODUCTION TO NANOTECHNOLOGY
(Open Elective-IV)

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs/Week):3:0:0	SEE Marks:60	Course Code: **U23OE610PH**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

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

CO-PO and CO-PSO mapping

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

UNIT-I: INTRODUCTION TO NANOSCIENCE

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

UNIT-II: PROPERTIES OF NANO MATERIALS

Electrical properties: conductivity, ballistic transport, Magnetic properties: soft and permanent magnetic nano materials, Giant Magneto Resistance (GMR), chemical properties, optical properties and thermal properties.

UNIT-III: NANOMATERIALS PREPARATION TECHNIQUES

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

UNIT-IV: NANO MATERIAL CHARACTERIZATION TECHNIQUES

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

UNIT-V: CARBON NANO MATERIALS AND APPLICATIONS

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

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MATHEMATICS

ADVANCED PROBABILITY & STATISTICAL METHODS

OPEN ELECTIVE –IV, B.E. VI Semester

(for CSE, AI & ML and IT only)

L:T: P (Hrs/Week):3	SEE Marks:60	Course Code: **U23OE610MA**
Credits: 3	CIE Marks:40	Duration of SEE:Hours:03

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

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

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

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

UNIT – II: (8 Hours)
TIME SERIES
Time series and Forecasting: Introduction-Moving averages, weighted average method smoothening of curves forecasting models and Methods.

UNIT – III: (8 Hours)
DESIGN OF EXPERIMENTS
Introduction to Design of experiments - Aim of the Design of experiments - Randomized Block Design (R.B.D) - Latin Square Design (L.S.D) - Comparison of RBD and LSD - Related problems.

UNIT – IV: (8 Hours)
QUEUEING THEORY
Introduction- Input pattern - service pattern- queue discipline - Queue behavior- Kendal's notation, Pure Birth and Death Models - Traffic intensity; (M/M/1: ∞/FIFO)-Model: (M/M/1: N/FIFO)-Model.

UNIT – V: (8 Hours)
STATISTICAL QUALITY CONTROL
Introduction, Methods for preparing control charts, variable charts – mean and range charts, Attribute charts- np, p and c charts.

TEXT BOOKS:

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

REFERENCE BOOKS:

1. T.K.V. Iyengar et al, Probability and Statistics, S. Chand Publications, Revised edition.

2. Probability & Statistics for Engineers, Antony J. Hayter, CENGAGE Learning (India edition)

ONLINE SOURCES:

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

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

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

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING(Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Skill Development Course-VII (Verbal Aptitude)

SYLLABUS FOR B.E. VI-SEMESTER

L:T : P (Hrs/Week) : 2hrs	SEE Marks:40	Course Code:**U23HS630EH**
Credits: 1	CIE Marks :30	Duration of SEE : 2 Hours

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

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

Unit 1: Vocabulary- Reading for Content and Context

Overview:

This course is designed for students to not just understand the importance of vocabulary but also to build on it by using the appropriate

tools and methods. After which they will be able to solve vocabulary based questions and also use vocabulary as a tool to solve problems.

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

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

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

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

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

Unit 4: Critical Reading Skills
Overview:
Research shows that good reading skills can lead to well written assignments. In this unit, students will learn, develop and improve reading and study skills needed for college work. Building on these basic strategies, students will develop skills to critically analyze texts and then the ability to identify its theme.

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

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

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

METHODOLOGY	**ASSESSMENTS**
- Demonstration	- Online assignments
- Presentations	- Individual and Group
- Expert lectures	
- Writing and Audio-visual lessons	

Learning Resources:
learn.talentsprint.com

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

ACCREDITED BY NAAC WITH 'A++' GRADE

IBRAHIMBAGH, HYDERABAD – 500 031

Department of Computer Science & Engineering

Skill Development Course-VIII (Technical Skills-IV)

Industry Standard Coding Practices – 2024

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week): 1:0:0	SEE Marks : 40	Course Code: **UI23PE610CS**
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

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

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

Algorithms – Greedy Methods - II

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

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: **UI23PC611CS**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

Programming Exercise:

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

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

Learning Resources:

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

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

With effect from the Academic Year 2025-26

VASAVI COLLEGE OF ENGINEERING (Autonomous)

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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: **UI23PC621CS**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Apply software engineering principles for analyzing, visualizing, specifying, constructing for software intensive system. 2 Document the artifacts of software system.	1 Identity the functional and non functional requirements and estimate effort /cost for the given 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.

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

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.
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 Rumbagu, 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
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			

VASAVI COLLEGE OF ENGINEERING(Autonomous)

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IBRAHIMBAGH, HYDERABAD – 500 031

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**: UI23PC631CS**
Credits : 1	CIE Marks:30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
1 Implement 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

CO-PO and CO-PSO mapping

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

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 ,* 2nd Edition, Pearson Education 2007.
2. Keith d Cooper & Linda Tarezon, *Engineering a Compiler, Morgan Kafman*, 2nd Edition
3. John R Levine, Tony Mason, Doug Brown *Lex &Yacc*, 3rd Edition Shroff Publisher,2007
4. Kenneth C Louden , *Compiler Construction: Principles and Practice*, 2nd Edition ,Cengage Learning, 2005
5. John R Levine ,*Lex&Yacc*, Oreilly Publishers,2nd 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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Department of Computer Science & Engineering

THEME BASED PROJECT

SYLLABUS FOR B.E. VI-SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code:**UI23PW619CS**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hours

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

CO-PO and CO-PSO mapping

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

The students are required to carry out a theme based project by selecting any one of themes like 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.