# 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. (AI & ML) V and VI Semesters
## With effect from 2024-25
## (For the batch admitted in 2022-23)
## (R-22)

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

## Institute Vision

Striving for a symbiosis of technological excellence and human values

## Institute Mission

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

## Department Vision

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

## Department Mission

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

.

| **B.E (CSE) Program Educational Objectives (PEO's)** | |
|---|---|
| Graduates should be able to utilize the knowledge gained from their academic program to: | |
| **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 algorithms to develop solutions for engineering problems pertaining to AI&ML. |
| **PSO II** | Graduates will be able to develop models in Machine Learning, Deep Learning using knowledge of AI and modern tools. |
| **PSO III** | Graduates will apply AI&ML techniques for real world applications in the areas of Cyber Security, Image processing, Natural Language Processing and IoT. |

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)**
**SCHEME OF INSTRUCTION AND EXAMINATION(R-22)**
**FOR B.E 2022-23 AD MITTED BATCH V SEMESTER (A.Y. 2024-25)**

| B.E CSE ( AI & ML ) 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** | | | | | | | | |
| UII22PC510CS | Full Stack Web Development | 3 | - | - | 3 | 60 | 40 | 3 |
| UII22PC520CS | Computer Networks | 3 | - | - | 3 | 60 | 40 | 3 |
| UII22PC530CS | Artificial Intelligence | 3 | - | - | 3 | 60 | 40 | 3 |
| UII22PC540CS | Automata, Languages and Computation | 3 | - | - | 3 | 60 | 40 | 3 |
| U22HS040EH | Economics and Finance for Engineers | 2 | - | - | 3 | 60 | 40 | 2 |
| UII22OE5XXXX | Open Elective-III | 3 | - | - | 3 | 60 | 40 | 3 |
| U22HS510EH | Skill Development Course -V (Communication Skills-II) | 1 | - | - | 2 | 40 | 30 | 1 |
| UII22PE510CS | Skill Development Course -VI (Technical Skills –III) | 1 | - | - | 2 | 40 | 30 | 1 |
| **PRACTICALS** | | | | | | | | |
| UII22PC511CS | Full Stack Web Development Lab | - | - | 2 | 3 | 50 | 30 | 1 |
| UII22PC521CS | Computer Networks Lab | - | - | 2 | 3 | 50 | 30 | 1 |
| UII22PC531CS | Artificial Intelligence and Machine Learning Lab | - | - | 2 | 3 | 50 | 30 | 1 |
| UII22PW519CS | Mini project | - | - | 2 | 3 | 50 | 30 | 1 |
| | **TOTAL** | **19** | **0** | **8** | | **640** | **420** | **23** |
| | **GRAND TOTAL** | **27** | | | | **1060** | | |
| **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 2024-25

**VASAVI COLLEGE OF ENGINEERING(Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

# FULL STACK WEB DEVELOPMENT

SYLLABUS FOR B.E. V-SEMESTER

| | | |
|---|---|---|
| L:T:P (Hrs./week): 3:0:0 | SEE Marks : 60 | Course Code : **UII22PC510CS** |
| 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.<br>2 Develop and publish REST API. | 1 Apply HTML and CSS to design web pages.<br>2 Develop dynamic web front end using JavaScript.<br>3 Design a component driven user interface using React.<br>4 Develop back-end application using Node.js and MongoDB.<br>5 Develop and deploy web services to integrate web applications. |

**UNIT-I:**

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

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

**UNIT-II:**

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

**UNIT-III:**

**React:** React Module, Code Sandbox, Templating with JSX, Babel, ES6 Literals, Expressions in JSX, JSX attributes and Styling React Elements, React Components, States and Props, Life Cycle of Components, Stateless Component, Event Handling, Rendering List, Error Handling, Routers, Single Page Application.

**UNIT-IV:**

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

**MongoDB**

SQL and NoSQL Concepts, Create and Manage MongoDB, 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 2024-25

# VASAVI COLLEGE OF ENGINEERING(Autonomous)

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

## Department of Computer Science & Engineering

## COMPUTER NETWORKS

SYLLABUS FOR B.E. V-SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs./week):3:0:0 | SEE Marks : 60 | Course Code: **UII22PC520CS** |
| 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<br>2 Explain MAC protocols and networking devices.<br>3 Analyze the design issues of network layer<br>4 Describe the services of transport layer<br>5 Apply application layer protocols for providing network services to the end user |

**UNIT-I:**

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

**Physical Layer:** Guided transmission media, Wireless transmission media.

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

**UNIT-II:**

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

**UNIT-III:**

**Network Layer:** Network Layer Design Issues.

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

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

**Internet Control Protocols:** ICMP, ARP, DHCP.

**UNIT-IV:**

**Transport Layer:** The Transport Service, Elements of Transport Protocols

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

**UNIT-V:**

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

**Learning Resources:**


1. Andrew S. Tanenbaum, David J. Wetherall, Computer Networks, 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 2024-25

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

# ARTIFICIAL INTELLIGENCE

SYLLABUS FOR B.E. V-SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs./week):3:0:0 | SEE Marks : 60 | Course Code: **UII22PC530CS** |
| 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*.<br>2 Develop an algorithm for playing games. Represent the knowledge using propositional logic.<br>3 Create logical agents to do inference using first order logic.<br>4 Perform planning and solve problem with constraints.<br>5 Explain Bayesian Networks to do probabilistic reasoning |

**UNIT I:**

**Introduction**: Introduction to AI

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

**Solving Problems By Search**: Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Depth-first search, Depth limited search, Iterative deepening depth first search, Informed (Heuristic) Search Strategies: Greedy best-first search, A* Search: Minimizing the total estimated solution cost, Heuristic Functions, Local Search Algorithms and Optimization Problems.

**UNIT II:**

**Adversarial Search**: Games, Optimal decisions in games, Alpha-BetaPruning.

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

**UNIT III:**

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

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

**UNIT IV:**

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

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

**UNIT V:**

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

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

**Learning Resources:**

1. Stuart Russell, Peter Norvig, Artificial Intelligence – A Modern Approach, Third Edition (2019), Pearson
2. Nils J. Nilsson, Artificial Intelligence: A New Synthesis, (1998),Elsevier
3. Daniela Witten, Gareth James, Robert Tibshirani, and Trevor Hastie, An Introduction to Statistical Learning with Applications in R (Springer Texts in Statistics)
4. George F Luger, Artificial Intelligence, Structures and strategies for ComplexProblem Solving, Sixth Edition,(2009), Pearson
5. Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, ThirdEdition(2009), Tata McGraw Hill
6. http://www.nptel.ac.in/courses/106105077

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

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**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 :**UII22PC540CS** |
| 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.<br>2 Design abstract models for formal languages.<br>3 Determine the decidability of computational problems. | 1 Design Finite Automata for Regular Languages.<br>2 Apply formal mathematical methods to prove properties of languages, grammars and Automata.<br>3 Analyze the language and Design pushdown automata.<br>4 Design Turing machines for simple problems.<br>5 Describe and determine the Undecidability of a problem. |

**UNIT-I:**

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

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

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

**UNIT – II:**

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

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

**UNIT – III:**

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

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

**UNIT – IV:**

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

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

**UNIT – V:**

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

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

**Learning Resources:**


1. John. E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation, 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

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**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: **U22HS040EH** |
| Credits: 2 | CIE Marks : 40 | Duration of SEE : 03 Hours |

| **COURSE OBJECTIVES** | **COURSE OUTCOMES** *On completion of the course, students will be able to* |
|---|---|
| 1. The course will enable the learners to: Understand the concepts and tools of economics, cost and finance that will equip them for decision making. | 1. Gain a conceptual understanding economics as a discipline.<br>2. Construct a cost sheet and classify costs and make use of break-even analysis in decision making.<br>3. Evaluate the accounting cycle and explain its importance in recording business transactions<br>4. Interpret the ratios and dissect comparative and common size statements<br>5. Compare the sources of finance and evaluate them |

## Unit I: Concepts in Economics

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

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

## Unit II: Cost Analysis and Profit Planning

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

–Breakeven Analysis(Application-oriented approach)

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

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

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

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

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

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

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

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

**Learning Resources for students**:

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

**Reference books:**

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

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

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

Duration of Internal Tests : 1 Hour 20 Minutes

## OPEN ELECTIVES OFFERED IN B.E. V SEMESTER (2024-25)

| Dept | Title (Open Elective-III) | Code | Credits |
|---|---|---|---|
| Civil | Spatial Information Technology | U22OE510CE | 3 |
| ECE | Introduction to Biomedical Electronics (General Pool) | U22OE510EC | 3 |
| | Signal Engineering (General Pool) | U22OE530PH | 3 |
| | Introduction to Communication Systems (Communication Engineering - Stream) | U22OE540EC | 3 |
| EEE | Modelling and Simulation of Basic Photovoltaic Systems | U22OE510EE | 3 |
| Mech | Drives and Control Systems for Robotics (Stream: Robotics) | U22OE510ME | 3 |
| | Introduction to Robotics (General Pool) | U22OE520ME | 3 |
| H&SS | Design Thinking | U22OE530EH | 3 |
| | Basics of Entrepreneurship | U22OE540EH | 3 |
| Physics | Fundamentals of Thin Film Technology and Applications (FTFA) | U22OE510PH | 3 |
| | Fundamentals of Vacuum Technology and Applications (FVTA) | U22OE520PH | 3 |
| Maths | Transform Techniques | U22OE510MA | 3 |
| | Theory of Estimation and Inference Theory | U22OE520MA | 3 |

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

DEPARTMENT OF CIVIL ENGINEERING

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

SYLLABUS FOR B.E. V SEMESTER

| | | |
|---|---|---|
| L : T : P (Hrs./week):3:0: 0 | SEE Marks:60 | Course Code: **U22OE510CE** |
| Credits : 3 | CIE Marks:40 | Duration of SEE:3 Hrs |

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

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

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

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

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

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

**Learning Resources:**

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

6. Hofmann-Wellenh of, Bernhard, Lichtenegger, Herbert, Wasle, Elmar, GNSS – GPS, GLONASS, Galileo and more, 2013
7. Thanappan Subash., Geographical Information System, Lambert Academic Publishing, 2011.
8. Paul Longley., Geographic Information systems and Science, John Wiley & Sons, 2005
9. John E. Harmon & Steven J. Anderson., The design and implementation of Geographic Information Systems, John Wiley & Sons, 2003
10. ArcGIS 10.1 Manuals, 2013.
11. Kang Tsung Chang., Introduction to Geographic Information Systems, Tata Mc Graw Hill Publishing Company Ltd, New Delhi, 2008.
12. Burrough, P.A., Principles of GIS for Land Resource Assessment, Oxford Publications, 2005.
13. C.P.Lo & Albert K. W.Yeung, Concepts and Techniques of Geographic Information Systems, Prentice Hall India Pvt.Ltd, 2002.

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

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

Duration of Internal Tests : 90 Minutes

**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: **U22OE510EC** |
| Credits : 3 | CIE Marks : 40 | Duration of SEE : 3 Hours |

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

**UNIT - I :**

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

**UNIT - II :**

**Bioelectric Signals, Electrodes, Transducers:** Origin of bioelectrical signals, recording electrodes, electrodes for ECG, EEG, EMG, micro-

electrodes. Transducer: Introduction, classification of transducers, performance characteristics of transducers, displacement position and motion transducers, pressure transducers, photoelectric transducer.

**UNIT - III :**

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

**UNIT - IV :**

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

**UNIT - V :**

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

**Learning Resources:**

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

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

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

Duration of Internal Tests: 90 Minutes

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

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

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

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

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

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

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

### UNIT – II: Railway Signaling (6 Hours)

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

**Signaling Elements:** Track Circuits & Axle Counters, Block Instruments, point machines, Relays, Relay Interlocking and Electronic Interlocking, Requirement of Signaling in 25KV AC Electrified Area.
**Signaling Interlocking Plan:** Essentials of Interlocking, Train Detection, Point Switching, Signal, Block Control, Aspect Control Chart.

**UNIT – III: Signaling Equipment – I (8 Hours)**
Details of Relays, Signal Cables. Signals, Control Panel & Operation – Safety features, Working.
**Details of Point Machines –** Components, Working, Circuit Progression, Testing, Safety features,
**Level Crossing Gates –** Working, Circuit Progression, Safety features
**Details of Track Circuits, Axle Counters -** Single section, Multi-section, Subsystems; Working and Application.

**UNIT – IV: Signaling Equipment – II (8 Hours)**
**Details about Block Instruments –** Types, Working, Circuit Progression, safety features Data Acquisition System – Interfaces, Fault Logic.
**Details of Integrated Power Supply**, CLS Panel, Lightning and Surge Protection.

**Practicals at IRISET Laboratory (12 Hours)**
1. Relays, Signal Cables. Signals, Control Panel & Operation.
2. Point Machines - Components, Working, Circuit Progression, Testing.
3. Level Crossing Gates - Working, Circuit Progression.
4. Track Circuits, Axle Counters - Single section, Multi-section, Subsystems; Working and Application.
5. Block Instruments - Types, Working, Circuit Progression.
6. Data Acquisition System - Interfaces, Fault Logic.
7. Integrated Power Supply, CLS Panel, Lightning and Surge Protection.

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

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

Duration of Internal Tests: 90 Minutes

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)**
**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 be able to<br>1. Identify the Radio frequency spectrum and the bands of different types of radio systems.<br>2. Determine the specifications of a radio receiver.<br>3. Estimate the signal degradation in optical fiber cable.<br>4. Describe the characteristics of microwave signal.<br>5. Apply Kepler's law to find satellite orbital parameters. |

**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, 5$^{Th}$ edition.
2. Wayne Tomasi, Electronic Communications Systems, 5$^{th}$ 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

**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:**U22OE510EE** |
| Credits:3 | CIE Marks: 40 | Duration of SEE: 3Hours |

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

**Unit-1 Introduction to Photovoltaic Systems and PSpice**
Photovoltaic system: Introduction, Important definitions: irradiance and solar radiation, Learning some of PSpice basics, Using PSpice subcircuits to simplify portability, PSpice piecewise linear (PWL) sources and controlled voltage sources, Energy input to the PV system: solar radiation availability, Problems

**Unit-2 Spectral Response and Short-Circuit Current**
Introduction: Absorption coefficient and Reflectance, Analytical solar cell model, PSpice model for the short-circuit spectral current density, Short-circuit current, Effects of solar cell material, DC sweep plots and I(V) solar cell characteristics, Ideal circuit model: series and shunt resistances and recombination terms, Problems

**Unit-3 Electrical Characteristics of the Solar Cell**
Ideal equivalent circuit, PSpice model of the ideal solar cell, Open circuit voltage, Maximum power point, Fill factor (FF) and power conversion efficiency, Generalized model of a solar cell, Effects of the series resistance on the short-circuit current

and the open-circuit voltage, Effects of the shunt resistance, Effects of the recombination diode, Temperature effects, Problems

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

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

**Unit-5 Interfacing PV Modules to Loads and Battery Modelling**

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

**Learning Resources:**


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


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

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

Duration of Internal Tests: 90 Minutes

# VASAVI COLLEGE OF ENGINEERING (Autonomous)

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

## DEPARTMENT OF MECHANICAL ENGINEERING

## DRIVES AND CONTROL SYSTEMS FOR ROBOTICS
## (Stream: Robotics)

(Open Elective-III)

## SYLLABUS FOR B.E. V-SEMESTER

| | | |
|---|---|---|
| Instruction : 3Hours | SEE Marks : 60 | Course Code **: U22OE510ME** |
| Credits : 3 | CIE Marks : 40 | Duration of SEE : 3 Hours |

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

### UNIT-I

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

### UNIT-II

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

**UNIT-III**

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

**UNIT-IV**

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

**UNIT-V**

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

**Learning Resources:**

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

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

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

Duration of Internal Test: 90 Minutes

# VASAVI COLLEGE OF ENGINEERING (Autonomous)

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

## DEPARTMENT OF MECHANICAL ENGINEERING

## INTRODUCTION TO ROBOTICS
## (General Pool: Open Elective-III)

SYLLABUS FOR B.E. V-SEMESTER

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

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

### UNIT-I
### ROBOT BASICS

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

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

Robot wrist mechanism, Precision and accuracy of robot.

### UNIT-II
### ROBOT ELEMENTS

End effectors-Classification, Robot drive system types: Electrical, pneumatic and hydraulic. Robot joints and links-Types, Motion

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

**UNIT-III**
**ROBOT KINEMATICS AND CONTROL**

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

**UNIT-IV**
**ROBOT SENSORS**

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

**UNIT-V**
**ROBOT APPLICATIONS**

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

**Learning Resources:**

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

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

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

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

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

**DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES**

# DESIGN THINKING

OPEN ELECTIVE-III - B.E. V Semester
(Common to all branches)

| | | |
|---|---|---|
| L:T:P(Hrs/Week):3:0:0 | SEE Marks:60 | Course Code: **U22OE530EH** |
| Credits: 3 | CIE Marks:40 | Duration of SEE:Hours:03 |

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

**Unit 1: Design Thinking Skills**

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

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

**Unit 2: Identifying Customer Needs**

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

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

**Unit 3: Product Specifications**

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

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

**Unit 4: Applied Creativity**

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

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

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

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

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

**METHODOLOGY**

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

**ASSESSMENTS**

- Online assignments
- Individual and Group

**Suggested Books**

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

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

| | | | | |
|---|---|---|---|---|
| 1 | No. of Internal Tests: | 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

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES**

# BASICS OF ENTREPRENEURSHIP
## Syllabus For B.E V Semester
## (Open Elective-III)

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

| Course objectives | Course Outcomes |
|---|---|
| The objectives of this course are to:<br>1. Deeply understand and discover entrepreneurship<br>2. Build a strong foundation for the students to start, build, and grow a viable and sustainable venture<br>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:<br>1. Take-up entrepreneurship as a career choice<br>2. Create and Validate business models. Build a Minimum Viable Product (MVP).<br>3. Identify various costs and revenue streams for a venture.<br>4. Build successful teams and acquire sales skills.<br>5. Understand the business regulations and various Government schemes available. |

**UNIT-I**

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

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

**UNIT-II**

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

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

**UNIT-III**

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

**UNIT-IV**

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

**UNIT-V**

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

**Learning Resources:**


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


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

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

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

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**DEPARTMENT OF PHYSICS**

# FUNDAMENTALS OF THIN FILM TECHNOLOGY AND APPLICATIONS
## (Open Elective-III)

SYLLABUS FOR B.E. V-SEMESTER

| | | |
|---|---|---|
| L:T:P (Hrs/Week):3:0:0 | SEE Marks:60 | Course Code: **U22OE510PH** |
| Credits: 3 | CIE Marks:40 | Duration of SEE:Hours:03 |

| Course Objectives | Course Outcomes |
|---|---|
| **Students are able to**<br>1. Learn the fundamental atomistic mechanisms.<br>2. Narrate thin film deposition techniques<br>3. Acquire knowledge on thin film devices<br>4. Appreciate applications of thin films | **The students acquire the ability to**<br>1. State fundamental definitions of thin film technology<br>2. Describe thin film deposition techniques<br>3. Illustrate thin film devices and their use<br>4. Apply thin films coatings for a variety industrial applications |

### UNIT-I: THIN FILM GROWTH

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

### UNIT-II: DEPOSITION TECHNIQUES

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

**UNIT-III: THIN FILM MATERIAL CHARACTERIZATION TECHNIQUES**

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

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

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

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

Anti-reflection coatings, fabrication of thin film gas and temperature sensors, Thin film solar cells, Quantum dot solar cells, Applications of thin films in electronics, medical, defense, automobiles.

**Learning resources:**

1. Kasturi Chopra Thin Film Device Applications, Mac Graw Hill, New York, 2012
2. A. Goswami, thin film fundamentals, New age international, 2006
3. NPTEL: Fundamentals of Material Processing - Part 2, IIT Kanpur Prof. Shashank Shekhar, Prof. Jitesh J Thakkar

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 PHYSICS**

# FUNDAMENTALS OF VACUUM TECHNOLOGY AND APPLICATIONS (Open Elective-III)

SYLLABUS FOR B.E. V-SEMESTER

| | | |
|---|---|---|
| L:T:P (Hrs/Week):3:0:0 | SEE Marks:60 | Course Code: **U22OE520PH** |
| Credits: 3 | CIE Marks:40 | Duration of SEE:Hours:03 |

| Course Objectives | Course Outcomes |
|---|---|
| **Students are able to** | **The students acquire the ability to** |
| 1. Learn basics definitions of vacuum technology.<br>2. Acquire principles of vacuum pump parameters.<br>3. Gain insight of vacuum production methods<br>4. Learn measurement of vacuum<br>5. Known various applications of vacuum. | 1. Define various vacuum ranges and terms related to vacuum technology.<br>2. List out vacuum pump parameters.<br>3. Narrate working of various types of vacuum pumps.<br>4. Explain working of different vacuum measuring devices.<br>5. List applications of vacuum in various fields. |

## UNIT-I: FUNDAMENTALS OF VACUUM

Vacuum Nomenclature and Definitions, units of vacuum, Vacuum ranges, Types of flow: turbulent flow, viscous or laminar flow, molecular flow, Knudsen flow, out gassing, Mean free path of the molecules, adsorption, desorption, evaporation theory-rate of evaporation, Hertz- Knudsen equation, types of evaporation.

## UNIT-II: VACUUM TERMINOLOGY

Methods of production of vacuum, vacuum pump function basics, throughput, pumping speed, conductance, evacuation rate, fore vacuum and high-vacuum pumping, Pump Choice, valve less, valved pumping system, Positive Displacement Vacuum Pumps, Momentum Transfer Vacuum Pumps, Entrapment Pumps, traps and baffles. Function of the oil in oil-sealed vacuum pumps. Effects of condensable vapours on mechanical pump performance, Water vapour tolerance of a pump, Back-streaming

**UNIT-III: VACUUM PUMPS**

Systems construction and working of vacuum pumps: Roots vacuum pumps, Rotary vane pump, multistage rotary pumps, diffusion pump, Turbomolecular pumps, cryo-pump, ion getter pumps,

**UNIT-IV: VACUUM MEASUREMENT**

Overview of gauges, direct reading and indirect reading gauges, classification of pressure gauge, Vacuum gauges: thermocouple gauge, Pirani gauge, cold cathode and hot cathode ionization gauge, Penning gauge, leak detection, Leak detection methods-leak rate.

**UNIT-V: VACUUM APPLICATIONS**

Deposition of thin films, Vacuum technology in the semiconductor industry, Vacuum technology in metallurgical processes, Vacuum technology in the chemical industry,

**SUGGESTED BOOKS:**

1. Dorothy M. Hoffman and Bawa Singh, Handbook of Vacuum Science and Technology, Academic Press, 1998
2. M. N. Avadhanulu and P.G. Kshirsagar, Textbook of Engineering Physics, Revised Edition, S.Chand, 2015
3. John F. O'HanlonA User's Guide to Vacuum Technology, Jhon Willey and sons, 2006

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

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

Duration of Internal Test: 90 Minutes

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

**DEPARTMENT OF MATHEMATICS**

# TRANSFORM TECHNIQUES

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

| | | |
|---|---|---|
| L:T: P (Hrs/Week):3 | SEE Marks:60 | Course Code: **U22OE510MA** |
| 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. | 1. **Evaluate** Laplace transforms of functions. |
| 2. **Understand** the Definition of inverse Laplace Transforms- Properties | 2. **Evaluate** Inverse Laplace transforms of functions. |
| 3 **Understand** the applications of Laplace Transforms. | 3. **Apply** Laplace transforms to evaluate integrals and to solve ordinary differential equations arising in engineering problems. |
| 4 **Study** the Definition of Z- Transforms and its properties | 4. **Evaluate** Z- transforms of Sequences |
| 5 **Understand** the applications of Z-Transform | 5. **Apply** Z-transforms to solve ordinary difference equations arising in engineering problems |

## UNIT-I (08 Hours)
## Laplace Transforms

Introduction to Laplace transforms - Sufficient Condition for Existence of Laplace Transform – Properties of Laplace Transform - First shifting theorem - Second shifting theorem - Change of scale property – Differentiation of Laplace transform – Integration of Laplace Transform – Laplace Transform of Derivatives - Laplace Transform of Integrals

## UNIT-II (08 Hours)
## Inverse Laplace Transforms

Introduction to Inverse Laplace transforms - Properties of Inverse Laplace Transform - First shifting theorem - Second shifting theorem - Change of

scale property - Multiplication with $s^n$ - Division by s – Convolution Theorem (without proof).

**UNIT –III (08 Hours)**
**Applications of Laplace Transforms**
Application of Laplace transforms to solve Initial Value Problems with constant coefficients and with variable coefficients – Laplace transform of periodic functions – Triangular wave – Square wave – Saw tooth wave.

**UNIT –IV (08 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 (08 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:**
1. 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

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

**DEPARTMENT OF MATHEMATICS**

# THEORY OF ESTIMATION AND INFERENCE THEORY

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: **U22OE520MA** |
| 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<br>2. **Describe** the role of the point estimation, interval estimation and Bayesian estimation about a parameter.<br>3. **Study** various methods of testing large samples.<br>4. **Analyze** standard statistical tests employed for small samples.<br>5. **Study** the difference between non-parametric and parametric tests. | 6. **Apply Central** Limit Theorem to the real-world problems and calculate and interpret, in testing one sample mean (σ known).<br>7. **Apply** various estimators for estimating the parameters of standard distributions.<br>8. **Infer** properties of population conducting tests on samples<br>9. **Interpret** planned and unplanned comparisons for the one-way ANOVA.<br>10. **Solve** problems on the Sign test, Wilcoxon Signed test, Mann-Whitney U-test. |

**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- Using the Central Limit Theorem to Calculate the Probability of paint coverage.

**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. Iyengar, 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:**

1 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

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES**

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

SYLLABUS FOR B.E.V-SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs/Week): 2:0:0 | SEE Marks: 40 | Course Code: **U22HS510EH** |
| Credits: 1 | CIE Marks: 30 | Duration of SEE: 3 Hours |

| **COURSE OBJECTIVES**<br>**The course will enable the learners to:** | **COURSE OUTCOMES**<br>**At the end of the course the learners will be able to: -** |
|---|---|
| 1. Get students proficient in both receptive and productive skills<br>2. Enable students to build strategies for effective group interaction and help them in developing decisive awareness and personality while maintaining emotional balance.<br>3. To introduce students to an ideal structure for a presentation<br>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<br>2. Present a topic by picking up the key points from the arguments placed.<br>3. Read between the lines and write informed opinions.<br>4. Prepare, present, and analyze reports |

**Unit 1: Delightful Discussions**

1.1 Six Thinking Hats

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

1.3 Case Study Based Group Discussions

**Unit 2: Powerful Presentations**

2.1 Concise Cogent Presentation

2.2 Persuasion skills

2.3 Toulmin Model

2.4 BikerB - JAM and Extempore

**Unit 3: Fact, Observation and Inference**

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

**Unit 4: Effective Technical Writing**

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

**Learning Resources:**

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

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

| | | | | | | |
|---|---|---|---|---|---|---|
| 1 | No. of Internal Tests | : | 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

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES**

**Skill Development Course-VI (Technical Skills-III)**
**Industry Standard Coding Practices - 2024**

SYLLABUS FOR B.E.V-SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs/Week): 1:0:0 | SEE Marks: 40 | Course Code: **UII22PE510CS** |
| 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.<br>2. Understand importance of optimized solutions for problems solving and its relevance to industry.<br>3. Implement mathematical and logical understanding approaches to implement test driven development practices.<br>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.<br>2. Able to identify and implement appropriate algorithm for a given problem.<br>3. Able to learn and apply string algorithms to optimize solutions to problems relevant to industry<br>4. Able to solve scenario based problems using trees<br>5. Able to code efficiently implementing the sorting algorithms for quick search operations |

**Review of Abstract Data structures** (theory + practice)
Coding implementation of stacks using array and linked list, Problem Solving using stack data structure, coding implementation of queues using array and linked list, Problem Solving using queue data structure

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

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

**Non-linear Data structures: Binary Trees**(theory + practice)
Problem solving approaches using Non-linear data structures, Coding problems on the height of a binary tree, Size of a binary tree, Tree order traversals, Formation of binary trees, problem solving using Binary trees

**Non-linear Data structures: Binary Search Trees**(theory + practice)
Problems solving on key search on binary search trees, Time comparison and analysis on Binary Search Trees, Coding on a binary search tree problems, Search/probe sequence validation, Significance of height balancing the tree, Balancing by rotations

**Tree Algorithms**(theory + practice)
Problem solving using Tree algorithms, right view of a tree, top view of a tree, mirror tree, tree comparison

**Algorithms – Greedy Methods -1**(theory + practice)
Greedy Strategy, Problem solving on greedy problems: coin change, Activity selection problem, Examples

**Technical Aptitude**(theory + practice)
Company Specific Technical Aptitude questions on:

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

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

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | No. of Internal Tests | : | 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

**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: **UII22PC511CS** |
| 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.<br>2 Publish web services. | 1 Design a website using HTML and CSS.<br>2 Design interactive web pages using Java script.<br>3 Develop component driven user interface using React.<br>4 Develop dynamic web applications using Node.js and Mongo DB.<br>5 Create and publish Web Services. |

## Programming Exercise:

1. Creation of Static Web Site using HTML.
2. Creation of Static Web Site using HTML Forms.
3. Apply CSS to the Static Web Site.
4. Validation of Static Website using JavaScript.
5. Creation of Web Site using React.
6. Creation of web app using Node JS.
7. Providing data store support using Mongo DB.
8. Publishing and Consuming a Web Service using REST.
9. Develop a web application and deploy it to the cloud.
10. Upgradation of the software.
11. Develop a web application for a given problem statement.

## Learning Resources:


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


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

**VASAVI COLLEGE OF ENGINEERING(Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

# COMPUTER NETWORKS LAB

SYLLABUS FOR B.E. V-SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs./week): 0:0:2 | SEE Marks : 50 | Course Code: **UII22PC521CS** |
| 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.<br>2 Develop client server application using socket API. | 1 Implement functionalities of TCP/IP protocol stack<br>2 Develop iterative and concurrent echo server using socket API.<br>3 Design wired and wireless topologies using NS3<br>4 Simulate networking protocols using NS3. |

## 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 | | | |

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

**Department of Computer Science & Engineering**

**ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING LAB**
SYLLABUS FOR B.E. V-SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs./week):0:0:2 | SEE Marks:50 | Course Code: **UII22PC531CS** |
| 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.<br>2 Identify and apply machine learning algorithms to solve real world problems.<br>3 Implement uninformed and informed search to solve the search problems.<br>4 Implement the Game playing algorithm such as Minimax and AlphaBeta pruning<br>5 Build Neural network to solve classification problems. |

**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 | | | |

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

**MINI PROJECT**

SYLLABUS FOR B.E. V-SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs./week):0:0:2 | SEE Marks:50 | Course Code: **UII22PW519CS** |
| 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.<br>2 Learn contemporary technologies. | 1 Review the literature survey to identify the problem.<br>2 Design a model to address the proposed problem.<br>3 Develop and test the solution.<br>4 Demonstrate the work done in the project through presentation and documentation.<br>5 Adapt to contemporary technologies. |

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

Project coordinator will coordinate the following:

Grouping of students (maximum of 2 in a group)
Allotment of projects
Project monitoring at regular intervals

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

completion of five weeks. The second review for another 35 marks is conducted after 14 weeks of instruction.

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

**VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)**
**SCHEME OF INSTRUCTION AND EXAMINATION(R-22)**
**FOR B.E 2022-23 ADMITTED BATCH VI SEMESTER (A.Y 2024-25)**

| B.E CSE ( AI&ML ) 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** | | | | | | | | |
| UII22PC610CS | Internet of Things | 3 | - | - | 3 | 60 | 40 | 3 |
| UII22PC620CS | Software Engineering | 3 | - | - | 3 | 60 | 40 | 3 |
| UII22PC630CS | Deep Learning | 3 | - | - | 3 | 60 | 40 | 3 |
| UII22PC640CS | Computer Vision | 3 | - | - | 3 | 60 | 40 | 3 |
| UII22OE6XXXX | Open Elective-IV | 3 | - | - | 3 | 60 | 40 | 3 |
| U22HS630EH | Skill Development Course-VII (Verbal Aptitude) | 1 | - | - | 2 | 40 | 30 | 1 |
| UII22PE610CS | Skill Development Course-VIII (Technical Skills –IV) | 1 | - | - | 2 | 40 | 30 | 1 |
| **PRACTICALS** | | | | | | | | |
| UII22PC611CS | Internet of Things Lab | - | - | 2 | 3 | 50 | 30 | 1 |
| UII22PC621CS | Software Engineering Lab | - | - | 2 | 3 | 50 | 30 | 1 |
| UII22PC631CS | Deep Learning Lab | - | - | 2 | 3 | 50 | 30 | 1 |
| UII22PW619CS | Theme Based Project | - | - | 2 | 3 | 50 | 30 | 1 |
| | NPTEL Course | - | - | - | - | - | - | 2 |
| | **TOTAL** | **17** | **0** | **8** | | **580** | **380** | **23** |
| | **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 2024-25

**VASAVI COLLEGE OF ENGINEERING(Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

# INTERNET OF THINGS

SYLLABUS FOR B.E. VI - SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs./week):3:0:0 | SEE Marks : 60 | Course Code: **UII22PC610CS** |
| 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.<br>2 Develop IoT solutions for a given problem | 1 Describe IoT architecture.<br>2 Develop applications using Raspberry PI.<br>3 Apply wireless protocols to develop an IoT solution<br>4 Integrate IoT application with Cloud.<br>5 Recognize IoT opportunities in the industry. |

**UNIT-I:**

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

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

**UNIT-II:**

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

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

**UNIT-III: Infrastructure and Service Discovery Protocols for the IoT Ecosystem :** Layered Architecture for IoT, Protocol Architecture of IoT, IEEE 802.15.4, IPv6 over Low-Power Wireless Personal Area Networks (6LoWPAN), 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.

**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 2024-25

**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:**UII22PC620CS** |
| 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<br>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<br>2 Explain Agile software process methodology and design Software Requirements Specifications (SRS) document<br>3 Apply DevOps lifecycle for developing an application<br>4 Develop test cases and apply relevant testing strategies for various applications<br>5 Analyze security requirements of a given application and choose the appropriate product metric for quality assurance |

**UNIT-I:**

**Introduction to Software Engineering**

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

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

**The Software Process:** Defining framework activities, Identifying a task set, Process patterns, Process Assessment and improvement
**Process Models:** Prescriptive models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, The Unified Process, personal software process, Team Software Process.

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

**Requirements Engineering:** Establishing the ground work, Eliciting requirements, Developing use cases, Building the Analysis model, Negotiating Requirements, Requirement Monitoring, Validating Requirements.
**Design concepts**: The Design Process, Design Concepts, The Design Model.

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

**UNIT-IV:**
**Testing Strategies:** A Strategic approach to software testing ,Strategic issues, Test strategies for Object Oriented Software, Test strategies for WebApps, Test strategies for MobileApps, Validation testing, System testing, the art of debugging.
**Testing Conventional Applications:** Software testing fundamentals, Black box and White box testing, Basis path testing, Control Structure, O-O testing methods, Class level testing methods, Inter class test case design, Testing for specialized environments, architectures and Applications testing patterns.

**UNIT-V:**
**Software Configuration Management :** Software Configuration Management, The SCM Repository, The SCM process, Configuration Management for Web and Mobile Apps
**Product Metrics:** Software quality, A frame work for Product metrics , Metric for the analysis model, Metrics for the Design Model , Metrics for Source code, Metrics for testing, Metrics for maintenance

## Learning Resources:


1. Roger S. Pressman, Software Engineering: A Practitioner's Approach, 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 2024-25

# VASAVI COLLEGE OF ENGINEERING(Autonomous)

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

## Department of Computer Science & Engineering

## DEEP LEARNING

SYLLABUS FOR B.E. VI-SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs./week):3:0:0 | SEE Marks : 60 | Course Code:**UII22PC630CS** |
| Credits : 3 | CIE Marks : 40 | Duration of SEE : 3 Hours |

| **COURSE OBJECTIVE** | **COURSE OUTCOMES** *On completion of the course, students will be able to* |
|---|---|
| 1. Understand issues and Techniques involved in the creation of Deep Learning Models. | 1. Identify the deep learning algorithms which are appropriate for various types of learning tasks in various domains. Apply regularization technique to generalize the model.<br>2. Design deep learning systems by applying convolution, pooling operations in convolution neural network.<br>3. Implement sequence modelling algorithms to solve real-world problems.<br>4. Ability to apply Optimization strategies for large scale applications, GAN's<br>5. Understand Transformer Architecture and apply the transformer models using deep learning framework. |

**UNIT I:**

**Introduction**: Introduction to DL, **Regularization for Deep Learning**: Parameter Norm Penalties, Norm Penalties as constrained optimization, Regularization and under Constrained problem, Dataset Augmentation, Noise Robustness, Semi Supervised Learning, Multi Task Learning, Early stopping, Bagging and other ensemble methods, Dropouts.

**UNIT II:**

**Convolutional Networks:** The Convolution Operations, Motivation, Pooling, Convolution and Pooling as an infinitely strong prior, Variants of Basic Convolution Function, Structured outputs, Data Types, Efficient Convolution Algorithms, Random or unsupervised features.

**UNIT III:**

**Sequence Modelling**: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder Decoder

Sequence-to –Sequence Architecture, Deep Recurrent Networks, Recursive Neural Network, The Long-Term short memory (LSTM).

**UNIT IV:**

**Optimization for Learning Deep Models**: How learning Differs from pure optimization, Challenges in Neural Network Optimization, Basic Algorithms-SGD, Momentum, Nesterov Momentum, Parameter initialization strategy, Algorithm with adaptive Learning Rates- AdaGrad, RMSProp, Adam.

**Introduction to Generative Adversarial Network(GAN'S)**

**UNIT V:**

**Transformers**- A Self-Attention, Network parameters, scaled Self attention, Multi-head Attention, Transformer Layers, Transformer Language Models, Decoder Transformer, Sampling Strategies, Encoder Transformer, Sequence to sequence transformer, Large Language Models.

## Learning Resources:


1. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning: Adaptive Computations and Machine Learning Series, 2016 edition, An MIT Press Book
2. Eugene Charniak, Introduction to Deep Learning, 2019 Edition.
3. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006
4. Raúl Rojas, Neural Networks : A Systematic Introduction, Springer, 1996
5. Michael Nielsen, Neural Networks and Deep Learning, Determination Press , 2015
6. https://www.bishopbook.com-Deep Learning Foundations and Concepts
7. https://nptel.ac.in/courses/106106184
8. https://www.deeplearning.ai/program/deep-learning-specialization/
9. https://www.coursera.org/specializations/deeplearning?action=enroll&utm_campaign=WebsiteCoursesDLSTopButton&utm_medium=institutions&utm_source=deeplearningai
10. https://www.udemy.com/course/basics-of-deep-learning/
11. https://www.udemy.com/course/tensorflow-20-recurrent-neural-networks-lstms-grus/
12. http://neuralnetworksanddeeplearning.com/


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

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

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2024-25

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

# COMPUTER VISION

SYLLABUS FOR B.E. VI-SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs./week):3:0:0 | SEE Marks : 60 | Course Code: **UII22PC640CS** |
| Credits : 3 | CIE Marks : 40 | Duration of SEE : 3 Hours |

| **COURSE OBJECTIVES** | **COURSE OUTCOMES** On Successful completion of this course, student will be able to |
|---|---|
| 1 To introduce the fundamentals of image formation, Image Processing | 1 Recognize the basic fundamentals of computer vision and image processing. |
| 2 To gain knowledge on major ideas, methods, and techniques of computer vision and object recognition. To understand | 2 Develop algorithms to analyze feature detection and feature alignment.<br>3 Analyze images and videos for problems such as tracking and structure from motion.<br>4 Explain Image stitching and computational photography methods. |
| 3 Morphological operations, Computational photography. | 5 Analyze image-based rendering, object detection and recognition methods |

**UNIT-I:**

**Introduction to Computer Vision and Image Formation**: Introduction, Geometric primitives and transformations, Photometric image formation, the Digital Camera.

**Image Processing:** Point operators, Linear filtering, More neighborhood operators, Fourier transforms, Pyramids and wavelets, Geometric transformations.

**UNIT-II:**

**Feature detection and matching:** Points and patches, Edges, Lines.

**Segmentation:** Active contours, Split and merge, Mean shift and mode finding, Normalized cuts.

**Feature-based alignment:** 2D and 3D feature-based alignment, Pose estimation.

**UNIT-III:**

**Structure from motion:** Triangulation, Two-frame structure from motion, Factorization, Bundle adjustment, constrained structure, and motion.

**Dense motion estimation:** Translational alignment, parametric motion, spline-based motion, optical flow, Layered motion.

**UNIT-IV:**

**Image stitching:** Motion Models, Global alignment, Compositing.

**Computational photography:** Photometric calibration, High dynamic range imaging, super-resolution and blur removal, image matting and compositing.

**UNIT-V:**

**Image-based rendering:** View interpolation, layered depth images, Light fields and Lumigraphs, Environment mattes, Video-based rendering.

**Recognition:** Object detection, Face recognition, Instance recognition, category recognition, context and scene understanding.

## Learning Resources:


1. Richard Szeliski “Computer Vision: Algorithms and Applications”, Springer-Verlag London Limited, 2011.
2. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”; Addison Wesley, 2008.
3. Justin Solomon, “Numerical Methods for Computer Vision, Machine learning, and Graphics”, CRC Press, 2020
4. Robert J. Schallkoff, “Pattern Recognition: Statistical. Structural and Neural Approaches”, John Wiley and Sons; 1991.
5. D. A. Forsyth and J. Ponce, “Computer Vision: A Modern Approach”, Pearson Education, 2003.
6. R. Hartley and A. Zisserman, “Multiple View geometry”, Cambridge University Press, 2002.
7. Richard Hartley and Andrew Zisserman, “Multiple View Geometry in Computer Vision”, Second Edition, CambridgeUniversity Press, March 2004.
8. K. Fukunaga; “Introduction to Statistical Pattern Recognition”, Second Edition, Academic Press, Morgan Kaufmann,1990.

With effect from the Academic Year 2024-25

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 2024-25

## OPEN ELECTIVES OFFERED IN B.E. VI SEMESTER (2024-25)

| Dept | Title<br>Open Elective -IV | Code | Credits |
|---|---|---|---|
| Civil | Project Management | U22OE610CE | 3 |
| ECE | Internet of Things and Applications (General Pool) | U22OE610EC | 3 |
| | Automatic Train Protection System – Kavach (General Pool) | U22OE630PH | 3 |
| | Introduction to Mobile and Cellular Communications (Communication Engineering - Stream) | U22OE640EC | 3 |
| EEE | Introduction to Batteries and Battery management System | U22OE610EE | 3 |
| Mech. | Industry 4.O (Stream : Robotics) | U22PE610ME | 3 |
| | Additive Manufacturing and its Applications (General Pool) | U22OE620ME | 3 |
| H&SS | Advanced Course in Entrepreneurship | U22OE630EH | 3 |
| Physics | Introduction to nanotechnology | U22OE610PH | 3 |
| Maths | Advanced Probability &Statistical Methods | U230E610MA | 3 |

With effect from the Academic Year 2024-25

**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: **U22OE610CE** |
| 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.<br>2. Understand the various techniques used for project planning such as bar charts, CPM, PERT and crashing of networks.<br>3. Acquire knowledge on various types of contracts, tenders. | 1. Understand the objectives, functions and principles of management in projects.<br>2. Practice the network techniques like CPM and PERT for better planning and scheduling of engineering works.<br>3. Analyse the importance of cost and time in network analysis and planning the work accordingly.<br>4. Knowledge on Contracts, Tenders, and Work orders related to the projects.<br>5. Interpret the concept of Linear Programming and solve problems by Graphical and Simplex methods. |

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

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

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

**UNIT-IV: Contracts:** Introduction, types of contracts and their advantages and disadvantages, conditions of contracts, Introduction to Indian contract act.
**Lender:** Lender form, Lender documents, Lender notice, work order.

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

**Learning Resources:**


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


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

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

Duration of Internal Tests : 90 Minutes

With effect from the Academic Year 2024-25

**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
## (General Pool : Open Elective - IV)

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

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

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

### UNIT - I : OVERVIEW

Introduction to IoT – Improving Quality of life.

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

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

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

**UNIT - III : IOT PROTOCOLS**

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

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

**UNIT - IV : Device for IoT**

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

**UNIT - V : IoT case studies**

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

**Learning Resources:**

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 2024-25

**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

**(General Pool : Open Elective - IV)**

SYLLABUS FOR B.E. VI – SEMESTER

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

| | | |
|---|---|---|
| L:T:P (Hrs./week) : 2:0:1 | SEE Marks : 60 | Course Code:**U22OE630PH** |
| Credits : 3 | CIE Marks : 40 | Duration of SEE : 3 Hours |

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

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

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

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

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

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

**UNIT – II: (6 Hours)**

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

**UNIT – III: Design –Kavach: (8 Hours)**

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

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

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

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

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

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

**Practicals at IRISET Laboratory (12 Hours)**

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from the Academic Year 2024-25

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

**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

With effect from the Academic Year 2024-25

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

| **COURSE OBJECTIVES**<br>**The course will enable the students to:** | **COURSE OUTCOMES**<br>**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.<br>2. Identify the requirements of Battery Management System.<br>3. Interpret the concept associated with battery charging / discharging process.<br>4. Calculate the various parameters of battery and battery pack.<br>5. Design the model of battery pack |

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

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

**UNIT –III: Battery State of Charge and State of Health Estimation, Cell Balancing:**
Battery state of charge estimation (SOC), voltage-based methods to estimate SOC, Model-based state estimation, Battery Health Estimation,

Lithium-ionaging: Negative electrode, Lithium-ion aging: Positive electrode, Cell Balancing, Causes of imbalance, Circuits for balancing.

**UNIT –IV: Modelling and Simulation:**

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

**UNIT -V: Design of battery BMS:**

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

**Learning Resources:**

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

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

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

Duration of Internal Tests : 90 Minutes

With effect from the Academic Year 2024-25

# VASAVI COLLEGE OF ENGINEEING (Autonomous)

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

## DEPARTMENT OF MECHANICAL ENGINEERING

## INDUSTRY 4.O
## (Stream: Robotics)

(Open Elective-IV)

SYLLABUS FOR B.E VI Semester

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

| **COURSE OBJECTIVES**<br>The objectives of the course is to | **COURSE OUTCOMES**<br>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.<br>2. evaluate the concepts of Cyber-Physical Systems (CPS) and Cyber-Physical Production Systems (CPPS) and their role in creating new business models.<br>3. apply the concepts of Digital Twins and Assistance Systems in production processes and their benefits.<br>4. develop strategies for ensuring safety and security in networked production environments and analyse the challenges and opportunities of Human-Robot Collaboration (HRC).<br>5. analyse the benefits and challenges of Cloud Manufacturing and the Connected Factory and develop strategies for implementing smart work pieces. |

### UNIT – I
### Introduction to Industry 4.0

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

**Basic principles and technologies of a Smart Factory**

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

**UNIT – II**

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

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

**Cyber-Physical Systems and new Business Models**

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

**UNIT – III**

**Digital Twins in Production**

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

**Assistance systems for production**

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

**UNIT –IV**

**Human-Robot Collaboration**

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

**Safety and Security in networked Production Environments**

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

**UNIT – V**

**Cloud Manufacturing and the connected factory**

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

**The smart workpiece**

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

**Learning Resources:**

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

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

| | | | | |
|---|---|---|---|---|
| 1 | No. of Internal Tests: | 02 | Max. Marks for each Internal Test: | 30 |
| 2 | No. of Assignments: | 03 | Max. Marks for each Assignment: | 10 |
| 3 | No. of Quizzes: | 0 | Max. Marks for each Quiz Test: | -- |

Duration of Internal Test: 90 Minutes

With effect from the Academic Year 2024-25

# VASAVI COLLEGE OF ENGINEEING (Autonomous)

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

## DEPARTMENT OF MECHANICAL ENGINEERING

## ADDITIVE MANUFACTURING AND ITS APPLICATIONS
## (General Pool)
## (Open Elective-IV)

## SYLLABUS FOR B.E VI Semester

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

| Course objectives | Course Outcomes |
|---|---|
| **The objectives of this course are to:**<br><br>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:**<br>1. Understand the fundamentals of prototyping and the various data formats used in Additive Manufacturing.<br>2. Study the principle, process, advantages, limitations and case studies of liquid based AM systems.<br>3. Study the principle, process, advantages, limitations and case studies of solid based AM systems.<br>4. Study the principle, process, advantages, limitations and case studies of powder based AM systems.<br>5. Study the applications of AM in various engineering industries as well as the medical field. |

**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: **1 Hour 30 Minutes**

With effect from the Academic Year 2024-25

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

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: **U22OE630EH** |
| Credits :03 | CIE Marks:40 | Duration of SEE: 03Hours |

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

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

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

**Unit II: Business Planning**

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

financial planning and revisiting business model; Creating a procurement plan; Negotiation.

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

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

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

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

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

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

**Learning Resources:**

1. Rajeev Roy, Entrepreneurship, 3E 3rd Edition, Oxford University Press, India, 2020
2. Clancy, Ann L. & Binkert, Jacqueline, "Pivoting- A coach's guide to igniting substantial change" Palgrave Macmillan US 2017.
3. Porter, Michael, E., "Competitive Advantage: Creating and Sustaining Superior Performance", Free press, 1st edi.
4. Schwetje, Gerald & Vaseghi Sam, "The Business Plan", Springer-Verlag Berlin Heidelberg.
5. LeMay, Matt, "Product Management in Practice", O'Reilly Media Inc.
6. Smart, Geoff & Randy, Street., "Who: The A method of hiring", Ballantine books, 2008.
7. Blokdyk, Gerardus., "Customer Lifecycle Management - A complete guide", 5starcooks, 2018

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

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

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

With effect from the Academic Year 2024-25

# 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: **U22OE610PH** |
| Credits: 3 | CIE Marks:40 | Duration of SEE:Hours:03 |

| Course Objectives | Course Outcomes |
|---|---|
| **Students are able to** | **The students acquire the ability to** |
| 1. Learn bulk, thin and nano structures.<br>2. Acquire knowledge on properties of nano materials.<br>3. Appreciate fabrication techniques of nano materials.<br>4. Learn nanomaterial characterization techniques. | 1. Distinguish bulk, thin and nano materials from the point of view of size effects.<br>2. List various properties of nano materials.<br>3. Narrate various nanomaterial preparation techniques.<br>4. Describe characterization techniques of nano materials.<br>5. Write various applications of CNTs & nano structures. |

### UNIT-I: INTRODUCTION TO NANOSCIENCE

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

### UNIT-II: PROPERTIES OF NANO MATERIALS

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

**UNIT-III: NANOMATERIALS PREPARATION TECHNIQUES**

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

**UNIT-IV: NANO MATERIAL CHARACTERIZATION TECHNIQUES**

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

**UNIT-V: CARBON NANO MATERIALS AND APPLICATIONS**

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

**Learning Resources:**

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

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 2024-25

**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: **U22OE610MA** |
| 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.<br>2. **Study** the concepts and application of Time series.<br>3. **Distinguish** the various methods of Designs of Experiments<br>4. **Provide** the knowledge to the students about Prediction and control by statistical methods Regression and SQC.<br>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.<br>2. **Apply** concept of Time series to solve the real time problems.<br>3. **Apply** the methods of Designs of Experiments<br>4. **Evaluate** the performance measures of the systems in networks, transportation systems, production lines.<br>5. **Apply** the comprehensive levels of Queuing theory for calculating service time, traffic intensity, queue length etc. in special and general queues. |

## Unit-I (8 Classes)

## Correlation & Regression Analysis:

Correlation –Scatter diagrams-Spearman's Rank of Correlation-Curve fitting by the Method of Least Squares - Fitting of Straight line - Second degreeparabolas – Regression - Lines of Regression - Multiple Regression-Curvilinear regression.

**Unit-II (8 Classes)**
**Time series:**
Time series and Forecasting: Introduction-Moving averages, weighted average method smoothening of curves forecasting models and Methods.

**Unit-III (8 Classes)**
**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 Classes)**
**Queuing 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/: N/FIFO)-Model.

**Unit-V (8 Classes)**
**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):2 | SEE Marks:40 | Course Code: **U22HS630EH** |
| Credits: 1 | CIE Marks :30 | Duration of SEE : 3 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<br>2. Train students to understand context & theme and use it to complete sentences.<br>3. Train students to identify the structure of sentences & paragraphs<br>4. Train students to analyze text, e.g., simple outlining and note taking, summarize, draw conclusions, and apply information to personal experiences<br>5. Train students to improve the quality of sentences by fixing errors | 1. Use vocabulary as a tool to solve questions in verbal ability<br>2. Identify meanings of words using theme and context<br>3. Solve questions based on jumbles- sentences and paragraphs<br>4. Develop skills to critically analyze texts and then the ability to identify its theme<br>5. Improve the quality of their writing by being aware of the common errors |

## Unit 1: Vocabulary- Reading for Content and Context

**Overview:**

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

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

**Unit 2: Fill in the Blanks- Applying Content and Context**
**Overview:**
This course is designed for students to identify the clue/ theme words in sentences, then understand the context in which the words are used and finally apply concepts like collocation, antonyms, and synonyms to solve questions.
2.1 Concepts & Rules: Single Fill in the Blanks
2.2 Double/ Triple Fill in the Blanks
2.3 Cloze Test

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

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

**Unit 5: Spotting the Errors**

**Overview:**

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

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

**METHODOLOGY**

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

**ASSESSMENTS**

- Online assignments
- Individual and Group

**Learning Resources:**

learn.talentsprint.com

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 2024-25

**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:**UII22PE610CS** |
| 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.<br>2. Understand importance of optimized solutions for problems solving and its relevance to industry.<br>3. Implement mathematical and logical understanding approaches to implement test driven development practices.<br>4. Start participating in global coding competitions relevant to the syllabus<br>5. Write Efficient coding solutions using appropriate algorithm | 1. Choose the right data structure based on the requirements of the problem.<br>2. Design algorithm for a given problem by choosing appropriate design technique and provide optimal solution. |

**Algorithms – Greedy Methods - II**

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

**Algorithms - Dynamic Programming - I**

Introduction to Dynamic programming, Coding solutions to form Sub structures, Problem solving on Dynamic Knapsack, Trip optimization

problem, Scenario based problem solving using Dynamic Programming approaches, Coding solutions on Coin-change sub structure, Comparison of Greedy Vs DP for Coin change, Sum of sub sets problem

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

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

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

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

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

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

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

**Introduction to Java and Expressions and control Statements**

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

**Object Oriented Programming Through Java - 1**

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

**Object Oriented Programming Through Java - 2**

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

**Exception Handling through Java**

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

**Strings through Java**

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

**DBMS**

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

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

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

Duration of Internal Tests : 1 Hour 30 Minutes

With effect from the Academic Year 2024-25

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

# INTERNET OF THINGS LAB

SYLLABUS FOR B.E. VI-SEMESTER

| | | |
|---|---|---|
| L:T:P (Hrs./week): 0:0:2 | SEE Marks:50 | Course Code: **UII22PC611CS** |
| 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<br>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<br>4 Develop applications to publish data on to the cloud<br>5 Build an IoT prototype |

## Programming Exercise:

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

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

**Learning Resources:**

1. ArshdeepBahga, Vijay 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 2024-25

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

# SOFTWARE ENGINEERING LAB

SYLLABUS FOR B.E. VI-SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs./week):0:0:2 | SEE Marks :50 | Course Code: **UII22PC621CS** |
| 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.<br>2 Document the artifacts of software system. | 1 Identity the functional and non functional requirements and estimate effort /cost for the given system.<br>2 Design the Data/Work/Control flow in the modules of the intended system.<br>3 Construct the Structural, Behavioural, Interaction & State aspects for the intended system.<br>4 Develop the artifacts of the intended system through forward and reverse engineering.<br>5 Build test cases and evaluate the software project quality. |

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

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

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. 2. 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)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**Department of Computer Science & Engineering**

# DEEP LEARNING LAB

SYLLABUS FOR B.E. VI - SEMESTER

| | | |
|---|---|---|
| L:T:P(Hrs./week):0:0:2 | SEE Marks:50 | Course Code : **UII22PC631CS** |
| 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 Understanding basics of Deep Learning Libraries<br>2 Implement the real time applications.<br>3 Build a model for Classification.<br>4 Build a model to predict the real world applications using CNN.<br>5 Develop a model for prediction using RNN. |

**Programming Exercise:**

1. Install and work on simple operations on python libraries like Tensorflow, Keras, PyTorch.
2. Human Face Recognition on Real Time(Video) and Image(JPEG) using OpenCV and Haarcascade.
3. Data preprocessing techniques for training a deep learning model.
   Reading the Dataset, Handling Missing Data, Conversion to the Tensor Format
4. Building Python GUI Application with Tkinter.
5. Build a Model to binary classify a given image using deep learning model.
6. Apply dimensionality reduction techniques using PCA on dataset.
7. Develop a CNN for MNIST Handwritten Digit Classification.
8. Build a Model to classify the images of Clothing using Fashion MNIST Dataset.

9. Build a Model for Multi Class Classification for CIFAR-10 Dataset.
10. Build a Model to predict Stock Price Predictions using LSTM.

## Learning Resources:


1. Ian Goodfellow, YoshuaBengio, Aaron Courville, Deep Learning: Adaptive Computations and Machine Learning Series, 2016 edition, An MIT Press Book
2. Nikhil Buduma, Nicholas Locascio, “Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithms”, O'Reilly Media, 2017
3. Eugene Charniak, Introduction to Deep Learning, 2019 Edition.
4. Michael Nielsen,“Neural Networks and Deep Learning”, Determination Press 2015
5. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006
6. Raúl Rojas, Neural Networks : A Systematic Introduction, Springer, 1996
7. https://nptel.ac.in/courses/106106184
8. https://www.deeplearning.ai/program/deep-learning-specialization/
9. https://www.coursera.org/specializations/deeplearning?action=enroll&utm_campaign=WebsiteCoursesDLSTopButton&utm_medium=institutions&utm_source=deeplearningai
10. https://www.udemy.com/course/basics-of-deep-learning/
11. https://www.udemy.com/course/tensorflow-20-recurrent-neural-networks-lstms-grus/


| | | | |
|---|---|---|---|
| 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 2024-25

**VASAVI COLLEGE OF ENGINEERING (Autonomous)**

**ACCREDITED BY NAAC WITH 'A++' GRADE**

IBRAHIMBAGH, HYDERABAD – 500 031

**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:**UII22PW619CS** |
| 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.<br>3 Develop and test the solution.<br>4 Demonstrate the work done in the project through presentation and documentation.<br>5 Adapt to contemporary technologies. |

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

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