VASAVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

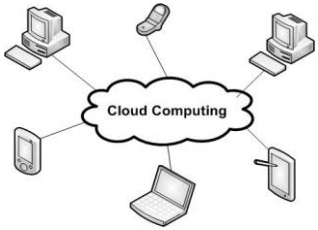
IBRAHIMBAGH, HYDERABAD-500 031

ACCREDITED BY NAAC WITH A++ GRADE

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. (IT) V and VI Semesters with effect from 2026-2027
(For the batch admitted in 2024-25)
(R-24)



DEPARTMENT OF INFORMATION TECHNOLOGY
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VASAVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

ACCREDITED BY NAAC WITH A++ GRADE

IBRAHIMBAGH, HYDERABAD-500 031

Vision

Striving for a symbiosis of technological excellence and human values.

Mission

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

Quality Policy

Education without quality is like a flower without fragrance. It is our earnest resolve to strive towards imparting high standards of teaching, training and developing human resources.

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(AUTONOMOUS)

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IBRAHIMBAGH, HYDERABAD-500 031

DEPARTMENT OF INFORMATION TECHNOLOGY

Vision

To be a center of excellence in the emerging areas of Information Technology.

Mission

- Provide a comprehensive learning experience on the latest technologies and applications.
- Equip the stakeholders with latest technical knowledge and leadership skills with collaboration to become competent professionals.
- Motivate innovation and contribute to the societal issues with human values and professional ethics.

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IBRAHIMBAGH, HYDERABAD-500 031

Programme Educational Objectives (PEOs) for IT Program

A Graduate of Information Technology will be able to:

PEO1: Pursue higher studies in multidisciplinary areas with research orientation.

PEO2: Develop core IT competencies aligned with emerging industry trends to become global leaders with ethical values.

PEO3: Engage in continuous learning and address the societal problems with sustainable solutions.

Program Specific Outcomes (PSOs) for IT Program

Our students, upon graduation from the program, will be able to

PSO1: Identify and develop software solutions using programming languages, tools and AI/ML concepts.

PSO2: Design, develop and maintain secure stand-alone, embedded and networked systems.

PSO3: Analyze the architectures of autonomous or semi-autonomous intelligent systems and apply to real-time scenarios.

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Program Outcomes (POs) for IT Program

At the end of the program, the graduates will demonstrate

1. **Engineering knowledge**: Apply math, science, and engineering fundamentals to complex engineering problems.
2. **Problem analysis**: Formulate and analyze complex engineering problems using first principles.
3. **Design/development of solutions**: Design solutions for complex problems keeping public health, safety, and cultural needs in mind.
4. **Conduct investigations of complex problems**: Use research-based knowledge and design experiments to provide valid conclusions.
5. **Engineering Tool Usage**: Create, select, and apply modern engineering and IT tools.
6. **The Engineer and the world**: Understand and evaluate sustainable societal, economic, and environmental impacts (merged from old PO6 and PO7).
7. **Ethics**: Apply ethical principles and commit to professional ethics, responsibilities, and diversity norms.
8. **Individual and Collaborative work**: Function effectively as an individual or leader in diverse teams.
9. Communication: Communicate effectively on complex engineering activities.
10. **Project management and finance**: Demonstrate knowledge and management principles in project and financial work.
11. **Life-long learning**: Recognize the need for and engage in independent, life-long learning.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-24)
B.E. – INFORMATION TECHNOLOGY : FIFTH SEMESTER (2026 - 2027)

SEMESTER - V

S No.	Course Code	Course Name	Scheme of Instruction			Scheme of Examination			
			Hours per week			Duration in Hrs	Maximum Marks		Credits
			L	T	P/D		SEE	CIE	
THEORY									
1	U24PC510IT	Computer Networks	3	-	-	3	60	40	3
2	U24PC520IT	Artificial Intelligence and Machine Learning	3	-	-	3	60	40	3
3	U24PC530IT	Software Engineering	3	-	-	3	60	40	3
4	U24PC540IT	Operating Systems	3	-	-	3	60	40	3
5	U24OE5XXXX	Open Elective - III	3	-	-	3	60	40	3
6	U24HS510EH	Skill Development – V (Communication Skills – II)	1	-	-	2	40	30	1
7	U24PE510IT	Skill Development – VI (Technical Skills – III)	1	-	-	2	40	30	1
PRACTICALS									
9	U24PC511IT	Computer Networks Lab	-	-	2	3	50	30	1
10	U24PC521IT	Artificial Intelligence and Machine Learning Lab	-	-	2	3	50	30	1
11	U24PC531IT	Software Engineering Lab	-	-	2	3	50	30	1
12	U24PC541IT	Operating Systems Lab	-	-	2	3	50	30	1
13	U24PW519IT	**Theme Based Project**			2	3	50	30	1
		Extra-Curricular Activities-II	-	-	-	-	-	-	-
		Library / Sports / Mentor Interaction	-	-	-	-	-	-	-
• Student should acquire one NPTEL Certification Course equivalent to 2 credits (8 weeks) by the end of VI Semester.									
Total			**17**	**-**	**10**	**-**	**630**	**410**	**22**
Grand Total			**17 + 10 = 27**			**-**	**1040**		

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER NETWORKS

Syllabus for B.E V-SEMESTER

L:T:P(Hrs./week): 3:0:0	SEE Marks :60	Course Code:**U24PC510IT**
Credits : 3	CIE Marks :40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
The Objectives of the course:	*On completion of the course, students will be able to*
1. To Introduce the fundamental concepts of Data communications and computer networks. 2. Describe the layers, protocols and services in ISO-OSI and TCP/IP Models.	1. Compare ISO-OSI with TCP/IP models and understand data transmission in physical layer. 2. Examine various techniques and protocols of data link layer to enable node to node delivery. 3. Analyze different routing protocols and algorithms to enable end-to-end connectivity. 4. Analyze different transport layer protocols and congestion control mechanisms to enable process to process delivery. 5. Illustrate different application layer protocols including DNS, EMAIL, FTP, HTTP and SNMP.

Unit-I: Data Communications: Components, Transmission media, analog and digital signals, Transmission impairments, Manchester encoding, and Modems.
Switching: Circuit Switching, Message Switching and Packet Switching.
Network types, Topologies, Concept of layering, Protocols and Standards, ISO / OSI model, TCP/IP.

Unit-II: Data Link Layer: Error Control: Error detection and correction (CRC and Hamming code for single bit correction).
Flow Control: stop and wait protocol, sliding window protocols- Go Back-N ARQ, selective repeat ARQ, Efficiency calculation.
MAC LAYER: ALOHA, CSMA/CD, CSMA/CA. LAN Standards: IEEE 802.3, IEEE 802.11.

Unit-III: Network Layer : Network Layer design issues, Internetworks – virtual circuit and Datagram approach, **Routing** – Distance Vector Routing ,Link State Routing , OSPF and BGP, IPv4 , addressing, Subnetting, CIDR, NAT,IPv6,ARP,RARP,ICMP and IGMP, DHCP protocols.

Unit-IV: Transport Layer: Services of transport layer, Multiplexing and crash recovery. User Datagram Protocol.
Transmission Control Protocol (TCP) – TCP window management, TCP Congestion Control, timer management.
Congestion Control Algorithms, Quality of service.

Unit-V: Application Layer: Domain Name Space (DNS), SMTP, FTP , WWW, HTTP,SNMP.
Introduction to network security: Elements of network security.

Learning Resources:

1.Data Communication and Networking, 4th Edition, Behrouz A. Forouzan, McGrawHill.
2. Andrew S Tanenbaum, David J. Wetherall, Computer Networks, 5th Edition, Pearson, 2012.
3. James F. Kurose, Keith W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet", Sixth Edition, Pearson Education, 2012.
4. Larry L. Peterson and Bruce S. Davie, " Computer Networks a systems approach". Fifth Edition.Elsevier
5. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India
6. https://nptel.ac.in/courses/106105183/25
7.http://www.nptelvideos.in/2012/11/computer-networks.html
8. https://nptel.ac.in/courses/106105183/3

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

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

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

SYLLABUS FOR B.E V - SEMESTER

L:T:P (Hrs./week):: 3:0:0	SEE Marks : 60	Course Code: **U24PC520IT**
Credits : 3	CIE Marks: 40	Duration of SEE : 3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	*At the end of the course student will be able to:*
1. Introduce the fundamental concepts of logic programming, searching strategies in Artificial Intelligence. 2. Discuss supervised and unsupervised Machine Learning algorithms and evaluation metrics to validate the performance. 3. Introduce the basics of deep learning and reinforcement learning.	1. Apply appropriate search strategies for solving a given search problem. 2. Apply logic concepts to prove inferences from the given premises. 3. Apply appropriate parametric, non-parametric ML algorithm and ensemble learning for a given classification problem and validate. 4. Understand the fundamentals of deep learning and reinforcement learning and develop a multi-layer neural network to solve a classification problem. 5. Identify clusters from unlabelled data and validate.

UNIT-I:

Introduction to AI: Introduction, Intelligent Systems, Foundations of AI, Sub Areas of AI, Applications.

Problem solving - State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive Searches- BFS, DFS, DFID, Bidirectional. Heuristic Search Techniques- BB, Hill climbing, Beam search, Best first search, A*, Iterative-Deepening A*.

UNIT-II:

Logic Concepts and Logic Programming: Introduction, Propositional Calculus, Propositional Logic, Resolution Refutation in Propositional Logic, Predicate Logic, Logic Programming.

Introduction to Machine Learning: Types of Learning: Supervised Learning, Unsupervised Learning, Reinforcement Learning, Applications of ML.

Supervised Learning: Linear Regression, Logistic Regression, Bias-Variance Trade-Off, Data preprocessing– cleaning, integration, reduction, transformations.

Evaluation Metrics – MSE, RMSE. R-Squared, log-loss, Confusion matrix, Accuracy, Precision, Recall, F1-score, PR curve, ROC curve, AUC curve.

UNIT-III:

Supervised-Nonparametric Learning: Introduction to Decision Trees, The Basic Decision Tree Learning Algorithm-ID3, Overfitting in Decision Trees, k-Nearest Neighbor Learning,

Supervised-Parametric Learning: Support Vector Machine, The Dual Formulation, Nonlinear SVM and Kernel Functions.

Feature Selection – sequential, univariate, elimination. Feature Extraction- text features (tf, tf-idf), image features (patches, connectivity graph), Dimensionality reduction - PCA. Recommendation systems – Content based, Collaborative Filtering.

UNIT-IV:

Artificial Neural Networks: Introduction, The Perceptron, Learning Boolean Functions, Multilayer Perceptrons, Backpropagation. Model selection - cross validation, k-fold, stratified k-fold. Intro to deep learning.

Supervised-Parametric Bayesian Learning: Probability Basics and Bayes Theorem, MAP, Maximum likelihood, Naive Bayes Classifier, Bayesian Belief Networks.

UNIT-V:

Ensemble Learning: Bagging, Boosting-Ada Boost, Random Forests.

Unsupervised Leaning: Clustering, k-Means Clustering, Density-based Clustering-DBSCAN, Hierarchical Clustering.

Evaluation metrics – Rand, Adjusted rand, Completeness, Homogeneity, V-measure, mutual info, normalized mutual info.

Reinforcement Learning: Introduction, The Learning Task, Q Learning.

Learning Resources:

1. Saroj Kaushik, Artificial Intelligence, Cengage Learning, 2011.
2. Russell, Norvig, Artificial intelligence, A Modern Approach, Pearson Education, Second Edition, 2004
3. Tom Mitchell, Machine Learning , First Edition, McGraw-Hill, 1997
4. Christopher Bishop. Pattern Recognition and Machine Learning. Second Edition.
5. Ethem Alpaydin , Introduction to Machine Learning, Second Edition
6. T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning, 2e, 2008.
7. http://nptel.ac.in/courses/106106139/
8. https://nptel.ac.in/courses/106/105/106105152/

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

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

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

SOFTWARE ENGINEERING

SYLLABUS FOR B.E V-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U24PC530IT**
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	*At the end of the course student will be able to:*
1. Understand the various SDLC models and stages in Software design lifecycle. 2. Understand the different types of Software Testing.	1. Select the most suitable software process model out of several, for the development of a given software project. 2. Develop the ability to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project. 3. Apply the software design principles. 4. Compare software quality techniques 5. Apply various testing techniques.

UNIT-I

Introduction to Software Engineering: Definition ofSoftware Engineering, application areas of software engineering, Process Framework, Process Patterns, Process Assessment, Personal and Team P**ro**cess Models, Process Technology, Product and Process. CMMI, ISO 9000 Quality Standards

Process Models: Prescriptive Models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, and the Unified Process.

Agile view of Process: What is Agility. What is an Agile Process, and Agile Process Models.

UNIT-II

Understanding Requirements, Requirements Engineering. Components of SRS. Cost estimation.

Data Modeling Concepts, Scenario-Based Modeling, Flow-Oriented Modeling, Class-Oriented Modeling, Creating a Behavioral Modeling.

Design Engineering: Design within the context of SE, Design Process, Design Concepts, and the Design Model.

UNIT-III

Architectural Design: Software Architecture, Architecture Genres, Architecture Styles, Architectural Design.

Component level Design: What is a Component, Designing Class-Based Components, Conducting Component-Level Design, Component-Based development and Object Constraint Language.
Performing User Interface Design: The Golden rules, User Interface Analysis and Design, Interface Design Steps, and design Evaluation.

UNIT-IV

Software Quality Assurance(SQA) . Elements of SQA
Software Testing Concepts:Error,Fault and Failure
Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Validation Testing, System Testing, Levels of Testing, Types of Testing .
Testing Process-Test Plan, Test Case Design, Test Scripts, Test case Execution.

UNIT-V

Black-box Testing – Equivalence class Partitioning, Boundary Value Analysis, Pair-Wise Testing
White-box testing, Control flow based Criteria, Test case generation and Tool support.
Risk Management: Software Risks, Reactive Vs Proactive Risk Strategies, Risk Mitigation, Monitoring and management.
Emerging Trends in Software Engineering, Introduction to DevOps, DevOps lifecycle

Learning Resources:

1. Roger S.Pressman, Software Engineering: A Practitioners Approach, Seventh Edition, McGraHill, 2009.
2. Pankaj Jalote "An Integrated Approach to Software Engineering, Third Edition, Narosa Publishing house, 2008.
3. James F.Peters, WitoldPedrycz, Software Engineering-An engineering Approach, John Wiley Inc., 2000.
4. Ali Behforoz and Frederic J.Hadson, Software Engineering Fundamentals, Oxford University Press, 1997.
5. Salman Abdul Moiz, Software Engineering,AICTE, February2024.
6. Software Testing Techniques by Bories Beizer,Second Edition, Dream Tech Press
7. https://www.atlassian.com/devops
8. https://onlinecourses.nptel.ac.in/noc20_cs68/preview
9. https://onlinecourses.nptel.ac.in/noc22_cs61/preview

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

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

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

OPERATING SYSTEMS

Syllabus for B.E V- SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code:**U24PC540IT**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
The Objectives of the course:	*On completion of the course, students will be able to:*
1. Demonstrate the principles of modern operating systems and functionalities. 2. Discuss the services of major operating systems such as Windows and Linux.	1. Understand the functionalities of Operating System, Process, threads and evaluate CPU scheduling algorithms. 2. Apply contiguous & non- contiguous techniques for main memory management. 3. Design solutions for classical problems of synchronization and strategies for deadlock handling. 4. Implement techniques for file organization, I/O operation, and system protection. 5. Compare and contrast key features and functionalities of Windows and LINUX, Android OS.

UNIT-I:

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

UNIT-II:

Memory Management: Background, Swapping, Contiguous Memory Allocation, Paging, Segmentation. Virtual Memory Management: Demand Paging, Page replacement algorithms, Thrashing, Allocating Kernel Memory.

UNIT-III:

Process Synchronization: Inter Process Communication, Process Synchronization - Peterson's Solution, Bakery Algorithm, Semaphores, Critical Section, Monitors. Classical problems of synchronization. Deadlocks: Deadlock prevention, deadlock avoidance and Deadlock Detection and Recovery - Bankers Algorithm.

UNIT-IV:

Storage and I/O Management: File System-Basic Concepts, File System Structure, File System Mounting, Directory Structure, Allocation Methods, Free Space Management. I/O Management: Disk Structure, RAID Structure, Disk

Scheduling, Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix.

UNIT-V

Case Study: Windows 10: Design Principles, System Components, Terminal Services & Fast User Switching, File System, Networking, Programmer Interface.

Case Study: The Linux System: Design Principles, Kernel Modules, Process Management, Scheduling, Memory Management, File System, Input Output, Inter Process Communication.

Case Study: Introduction to Android OS, Android Stack, Android application structure, Activity Life Cycle, Understanding implicit and explicit intents. User Interface in Android: User Input Controls, Menus, Screen Navigation, Drawables, Themes and Styles, Material Design**.**

Learning Resources:

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

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

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

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

SKILL DEVELOPMENT COURSE-V – COMMUNICATION SKILLS IN ENGLISH-II

(Common to all branches)
SYLLABUS FOR B.E. - V SEMESTER

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

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

Unit 1: Delightful Discussions

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

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

Unit 2: Powerful Presentations

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

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

Unit 3: Fact, Observation and Inference

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

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

Unit 4: Effective Technical Writing

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

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

Learning Resources:

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

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

1	No. of Internal tests	:	2	Max. Marks	:	20
2	No. of assignments	:	2	Max. Marks	:	5
3	No. of Quizzes	:	2	Max. Marks	:	5

Duration of Internal Tests : 90 Minutes

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DEPARTMENT OF INFORMATION TECHNOLOGY

SKILL DEVELOPMENT COURSE-VI – TECHNICAL SKILLS-III
SYLLABUS FOR B.E V - SEMESTER

L:T:P (Hrs./week):: 1:0:0	SEE Marks : 40	Course Code: **U24PE510IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

Course Objectives	**Course Outcomes**
The main objective of this course is to:	**At the end of the course student will be able to:**
❖ Understand various methods in applying algorithms. ❖ Prepare the students for the contests relative to the concepts learnt. ❖ Build confidence in coding using Graphs and String Algorithms	❖ Learn techniques used in computer science to solve problems by breaking them down into smaller subproblems and solving each subproblem only once, storing its solution in a table to avoid redundantcomputation. ❖ Learn to solve problems related to graphs, which are mathematical structures composed of nodes (vertices) connected by edges. ❖ Learn to solve methods used to solve problems related to manipulating and analyzing strings of characters.

Phase III

#13: Problem Solving with Algorithms – Dynamic Programming I

Dynamic programming features, the overlapping sub-problems, Exponentialtime Vs Polynomial Time, Exponential time illustration using staircase example, Formation of the substructure, Substructure using greedy coin change, Substructure for cloth cutting problem, Ways to translate, Longest Increasing Sub-sequence, Examples, Practice problems.

#14: Problem Solving with Algorithms – Dynamic Programming II

Problem solving on grids: 0/1 Knapsack, Trip Organization, Longest Common Sub-string, Longest Common Sub-sequence, Minimum Edit Distance, Examples, Sum of max sub square on a binary grid, Examples, Practice problems.

#15: Problem Solving implementing Backtracking Algorithms

The backtrack view, Applications of the backtracking, Iterative approach Vs Loop free approach, State Space tree illustration using 3-bit number problem, finding triplets exactly equal to a given sum, finding triplets less than or equal to a given sum, Grid Solution: N-Queens/Maze problems, Examples, Practice problems.

#16: Problem Solving using Graph Algorithms I

Graph Terminology, types of graphs, Storage and retrieval of graph data, adjacency matrix, incidence matrix, Handshaking Lemma, Algorithm to find a simple graph for a given input sequence, Graph Traversal Algorithms: Breadth First Search - Traversal – Examples, Graph Algorithms: Depth First Search - Traversal – Examples, Min Sum Path Matrix, Examples, Practice problems.

#17: Problem Solving implementing Graph Algorithms II

Spanning Trees, Minimum cost spanning trees, Connected Components in the graph, strongly connected points, Directed Acyclic Graphs, Kahn's Algorithm, Examples, Practice problems.

#18: Problem Solving implementing String Algorithms

Problem Solving implementing TRIE Data structure, Pattern matching algorithm, KMP algorithm, Examples, Practice problems.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER NETWORKS LAB

SYLLABUS FOR B.E. V SEMESTER

L:T:P(Hrs./week): 0:0:2	SEE Marks :50	Course Code:**U24PC511IT**
Credits : 1	CIE Marks :30	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course:	*On completion of the course, students will be able to*
1. Demonstrate various tools and algorithms of various networking protocols. 2. Discuss the client/server application development using socket API.	1. Examine the packets captured using packet sniffer. 2. Implement algorithms used in networking protocols 3. Develop Client Server applications using socket API, RPC 4. Implement various application layer services.

1. Understanding and using the following commands: ifconfig, netstat, ping, arp, telnet, tftp, ftp, traceroute, nslookup, and dig.
2. Using Wireshark capture the packets when browsing internet and Examine the structure of packets: the various layers, protocols, headers and payload.
3. Implementation of bit stuffing, byte stuffing.
4. Implementation of CRC.
5. Implementation of flow control and loss recovery using sliding window protocol.
6. Implementation of a Distance Vector Routing Algorithm for obtaining routing tables at each node.
7. Implementation of Echo Server using TCP (Iterative and Concurrent service).
8. Implementation of Echo Server using UDP (Iterative and Concurrent service).
9. Implementation of Time service and Date service using RPC.
10. Implementation of ping service.
11. Implementation of DNS Service.
12. Implementation of SMTP Service.

Virtual Lab:

13. Measuring Network Performance: http://vlabs.iitkgp.ac.in/ant/3/exercise/:

Note: Implement programs in C.

Content Beyond Syllabus:

1. Simulation of network topologies and evaluate performance under various conditions using network simulators like NS-2/NS-3/ OMNeT++/Cisco Packet Tracer.

Learning Resources:

1. W. Richard Stevens, "Unix Network Programming", Prentice Hall, PearsonEducation,2009.
2. Douglas E.Comer, "Hands-on Networking with Internet Technologies", Pearson Education.
3. https://www.isi.edu/websites/nsnam/ns/tutorial/
4. https://www.wireshark.org/download/docs/Wireshark%20User%27s%20Guide.pdf
5. https://nptel.ac.in/courses/106105183/25
6. http://www.nptelvideos.in/2012/11/computer-networks.html
7. https://nptel.ac.in/courses/106105183/3

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2Hours			

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

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 : **U24PC521IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	*At the end of the course student will be able to:*
1. Introduce NumPy arrays, Matplotlib Scikit-Learn packages. 2. Analyse the performance of ML algorithms on benchmark datasets.	1. Implement python programs for storing and manipulating data using NumPy arrays, SciPy and Matplotlib. 2. Perform data prepossessing, analysis and visualizations using Pandas. 3. Apply supervised and unsupervised ML algorithms to real world problems. 4. Evaluate and compare the performance ML algorithms. 5. Choose an appropriate ML algorithm and design a solution for a given problem.

1. Python basics for ML using NumPy, Matplotlib and Scikit-Learn packages.
2. Data pre-processing, train, test splits and model evaluation metrics.
3. Predicting the Diabetes progression in a patient based on Age, Gender, BMI, BP and six blood serum measurements on Scikit-Learn Diabetes dataset using Linear Regression.
4. Classifying hand-written digits on Scikit-Learn Digits dataset using Logistic Regression.
5. Classifying different species of Iris flowers on Scikit-Learn Iris dataset using KNN.
6. Classifying hand-written digits on Scikit-Learn Digits dataset using SVM.
7. Classifying hand-written digits on Scikit-Learn Digits dataset using MLP neural network.
8. Detecting spam emails / Sentiment analysis on Movie reviews using Naïve Bayes classification.
9. Unsupervised learning: K-means clustering on scikit learn Iris dataset.
10. Unsupervised learning: DBSCAN clustering on scikit learn Iris dataset.

Virtual Lab:

11. Perceptron and mlp(experiments 3 &4): https://cse22-iiith.vlabs.ac.in/List%20of%20experiments.html

Learning Resources:

1. https://www.numpy.org/
2. https://www.scipy.org/
3. https://matplotlib.org/
4. https://pandas.pydata.org/
5. https://scikit-learn.org/stable/

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Day-to-day laboratory class work which will be awarded based on the average of assessment for each experiment considering at the end of the course			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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DEPARTMENT OF INFORMATION TECHNOLOGY

SOFTWARE ENGINEERING LAB

SYLLABUS FOR B.E V- SEMESTER

L:T:P (Hrs./week):: 0:0:2	SEE Marks : 50	Course Code : **U24PC531IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course:	*At the end of the course student will be able to:*
1. Illustrate the concepts related to analysis, design, development and testing techniques related to Object Oriented Software development.	1. Develop system requirements specification. 2. Apply fundamental concepts of object-oriented techniques of systems analysis and design. 3. Use computer based tools to aid in software development 4. Generate and run test cases for various levels of testing by applying different testing methods.

List of Experiments:

Do the following 12 exercises for any one project given in the list of sample projects or any other projects:

1. Development of problem statement.
2. Requirements management, Preparation of Software Requirement Specification Document.
3. Configuration Management: Preparation of Software Configuration Management related document.
4. Perform the user's view analysis for the system: Use case diagram.
5. Model the structural view for the system: Class diagram
6. Model the behavioral view for the system: Sequence diagram, Collaboration diagram
7. Model the advanced behavioral view for the system : State-chart diagram, Activity diagram
8. Model the implementation view and deployment view for the system: Component diagram, Deployment diagram.
9. Software Development: Application and web modelling, content management.
10. Develop test cases for various white box testing techniques.
11. Perform unit testing, Functional Testing for a sample code of the suggested system using the testing tool.
12. Perform load Testing, bug tracking for a sample code of the suggested system using the testing tool.

Virtual Lab:

13. Estimation of Project Metrics: http://vlabs.iitkgp.ernet.in/se/2/exercise/

Sample Projects:

1. Passport automation System
2. Book Bank
3. Online Exam Registration
4. Stock Maintenance System
5. Online course reservation system
6. E-ticketing
7. Software Personnel Management System
8. Credit Card Processing
9. E-book management System.
10. Recruitment system

Content Beyond Syllabus:

1. Prepare time line chart/Gantt Chart/PERT Chart for selected software project.

Learning Resources:

1. Grady Booch, James Rumbaugh, Ivor Jacobson, The Unified Modeling Language-User Guide(Covering UML 2.0), Second Edition, Pearson Education, India,2007.
2. Ivor Jacobson, Grady Booch, James Rumbaugh, The Unified Software Development Process, Pearson Education, India, 2008.
3. Software Testing Techniques by Bories Beizer,Second Edition, Dream Tech Press
4. http://nptel.ac.in/courses/106105153/
5. http://vlabs.iitkgp.ac.in/se/

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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DEPARTMENT OF INFORMATION TECHNOLOGY

OPERATING SYSTEMS LAB

SYLLABUS FOR B.E. V SEMESTER

L:T:P(Hrs./week): 0:0:2	SEE Marks :50	Course Code: U24PC541IT
Credits : 1	CIE Marks :30	Duration of SEE : 3 Hours

Course Objective:	Course Outcomes:
The course will enable the students to:	**At the end of the course student will be able to:**
Learn the OS concepts by using or implementing operating system functionality in the areas of process management, file management, Inter-process communication & Synchronization.	1. Understand the OS functionality by executing shell commands. 2. Write programs to understand various CPU scheduling & Page replacement algorithms. 3. Write programs to demonstrate process creation, inter process communication mechanisms, multi-threaded programming. 4. Write programs for various classical problems to understand process synchronization. 5. Write programs to demonstrate usage of File System calls and disk scheduling algorithms.

1. Familiarity and usage of Linux user commands
   - File management (cp, cat, head, tail, stat, dir, mkdir, ls, mv, rm, rmdir, find, grep, diff, sort etc)
   - Process management (ps, top, kill, etc)
   - Protection (chmod, chown)
   - other (whereis, who, env, man)
2. Implement The following cases using Filesystem management calls
   - Implement cp, cat, stat command.
   - Implement ls command with or without search string.
   - Implement head / tail commands
3. Implement uniprocessor cpu scheduling algorithms FIFO, SJF, RR, Multi-level feedback Q and find out waiting time, turnaround time.

   Virtual Lab:
   https://ebootathon.com/labs/beta/csit/OS/exp2/references.html
4. Implement the following cases using Process Management System calls
   a) Find out total no of processes created when fork is used multiple times like below. Generalize it to n forks.
   b) Create a child process to execute command "ps -el" in child process and parent wait for the child to terminate.

c) Create five child processes in some random hierarchy and print pid, parent pid in all the processes. Make sure you wait for the child to terminate in all the cases.
d) Write a multithreaded program using POSIX threads – creation, termination, join etc.

5. Implement page replacement algorithms FIFO, OPT, LRU and find out number of page faults for the given reference string.
6. Implement the echo scenario between two processes using the following IPC mechanisms using system calls.
   a) Pipes
   b) Message passing with Message Queue
   c) Shared memory
7. Implement Producer Consumer Problem using following POSIX synchronization calls.
   a) Mutex
   b) Semaphore

   Virtual Labs: https://ebootathon.com/labs/beta/csit/OS/exp1/references.html
8. Implement Dining Philosopher Problem using following POSIX synchronization calls.
   a) Semaphore
   b) Monitor
9. Implement Reader/writer problem using following options with POSIX API.
   a) Reader preference
   b) Writer preference
10. Implement Disk scheduling algorithms FCFS, SCAN, C-SCAN and find out the total head movement required for the given case where Your program will service a disk with 5,000 cylinders numbered 0 to 4,999. The program will generate a random series of 1,000-cylinder requests and service them according to each of the algorithms listed above. The program will be passed the initial position of the disk head (as a parameter on the command line) and report the total amount of head movement required by each algorithm.
11. Install and setup Android Studio with specific Latest SDK in your system. Developing an Android app which displays "HelloWorld" message, testing and debugging
12. The simple calculator app that has two edit texts and four buttons. When you enter two numbers and a click button, the app performs the calculation for that button and displays the result.

Additional Experiment:

13. https://ebootathon.com/labs/beta/csit/OS/exp3/references.html (Banker's Algorithm)

Learning Resources:

1. W. Richard Stevens, Unix Network Programming, Prentice Hall/Pearson Education,2009.
2. https://www.kernel.org/doc/man-pages/
3. https://developer.android.com/studio/
4. http://profile.iiita.ac.in/bibhas.ghoshal/teaching_os_lab.html

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Day-to-day laboratory class work which will be awarded based on the average of assessment for each experiment considering at the end of the course			18
Duration of Internal Test: 2Hours			

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DEPARTMENT OF INFORMATION TECHNOLOGY

THEME BASED PROJECT

SYLLABUS FOR B.E. V SEMESTER

L:T:P(Hrs./week):0:0:2	SEE Marks :50	Course Code : **U24PW519IT**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course:	*At the end of the course student will be able to:*
1. Promote project-based learning by working on societal problems. 2. Encourage individual and teamwork, communication, life-long learning and follow professional ethics.	1. Review the existing literature/ models to identify the scope for extension. 2. Apply technical knowledge to develop novel solutions for real life problems. 3. Plan and execute projects by following effective software development life cycle. 4. Design and demonstrate the prototypes. 5. Practice professional ethics, teamwork and lifelong learning.

Continuous Internal Evaluation (CIE) – 30 marks : To be evaluated by the Internal Examiner

Assesment-1 : [15 Marks]

To be conducted on week-7: Review of problem Statement, Motivation, Introduction, Use cases and Techstack, Review of low level design details for all end-to end use cases.

Assesment-2: [15 Marks]

To be conducted on week-15: Review of final implementation / demonstration of all use cases, presentation and report.

Semester End Examination (SEE) – 50 marks: To be evaluated by the External Examiner

Evaluation is done based on the following deliverables:

PowerPoint Presentation	[10 Marks]
Demonstration of the application	[20 Marks]
Project report	[10 Marks]
Viva Voce	[10 Marks]

External Examiner should be appointed from other Institutes or from the industry.

Virtual Lab:

Basics of HTML: https://html-iitd.vlabs.ac.in/List%20of%20experiments.html

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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OPEN ELECTIVES - III		
Department	**Code**	**Title**
Civil	U24OE510CE	GEO Spatial Information Technology
ECE	U24OE510EC	Introduction to Biomedical Electronics (General Pool)
	U24OE530PH	Signal Engineering (General Pool)
	U25OE540EC	Introduction to Communication Systems (Communication Engineering - Stream)
EEE	U24OE510EE	Modelling and Simulation of Basic Photovoltaic Systems
Mechanical	U24OE510ME	Drives and Control Systems for Robotics (Stream: Robotics)
H&SS	U24OE510EH	Marketing Management for Engineers (Management Courses for Engineers-Stream)
	U24OE520EH	Financial Analytics (BFSI- Stream)
	U24OE530EH	Philosophy (Liberal Arts Courses-Stream)
	U24OE540EH	Basics of Entrepreneurship (General Pool)
Maths	U24OE510MA	Transform Techniques
	U24OE520MA	Applied Statistical Methods

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING

GEO SPATIAL INFORMATION TECHNOLOGY
(Open Elective-III)

SYLLABUS FOR B.E. V SEMESTER

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

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

	along with their applications in spatial analysis, infrastructure planning, and environmental monitoring.

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

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

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

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

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

Learning Resources:

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

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

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

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Introduction to Biomedical Electronics

(Open Elective - III)

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

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U24OE510EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO-PSO Mapping

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

UNIT-I:

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

UNIT - II:

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

UNIT - III:

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

UNIT - IV:

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

UNIT - V:

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

Learning Resources:

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

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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Signal Engineering

(Open Elective - III)

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

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

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

CO-PO/PSO Mapping

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

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

Opening of Railways: Duties of Commissioners, Sanction to Open Railway for

Public Carriage of Passengers, Requirements & Recommendations for Signaling and Interlocking Installations, Catechism for Signaling and Interlocking Installations, for 25KV AC, Spl layouts: Isolation, Ruling gradients, Slip, Catch sidings

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

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

UNIT – II: Railway Signaling (6 Hours)

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

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

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

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

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

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

Level Crossing Gates – Working, Circuit Progression, Safety features

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

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

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

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

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

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

7. Integrated Power Supply, CLS Panel, Lightning and Surge Protection.

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

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

Duration of Internal Tests: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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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: **U25OE540EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO-PSO Mapping

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

UNIT - I :

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

Lab activity: Gain, Bandwidth, Attenuation calculations using MATLAB

UNIT - II :

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

Receiver characteristics: Sensitivity, Selectivity, Fedility.

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

Lab activity: Image frequency and IFRR calculations using MATLAB

UNIT - III :

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

Lab activity: Estimation of optical losses using MATLAB

UNIT - IV :

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

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

UNIT - V :

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

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

Learning Resources:

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

7. https://nptel.ac.in/courses/117101051/12

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

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

Duration of Internal Tests: 90 Minutes

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

MODELLING AND SIMULATION OF BASIC PHOTOVOLTAIC SYSTEMS

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

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

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

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

Unit-1 Introduction to Photovoltaic Systems and PSpice

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

Unit-2 Spectral Response and Short-Circuit Current

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

Unit-3 Electrical Characteristics of the Solar Cell

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

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

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

Unit-5 Interfacing PV Modules to Loads and Battery Modelling

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

Learning Resources:

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

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

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

Duration of Internal Tests :90 Minutes

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF MECHANICAL ENGINEERING

DRIVES AND CONTROL SYSTEMS FOR ROBOTICS
(Stream: Robotics)
(Open Elective-III)
SYLLABUS FOR B.E. V-SEMESTER

Instruction : 3Hours	SEE Marks : 60	Course Code : U24OE510ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

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

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGNEERING (AUTONOMOUS), HYDERABAD
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Course Title: MARKETING MANAGEMENT FOR ENGINEERS

(Stream: Management Courses for Engineers)
Open Elective - V SEMESTER

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

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

Unit-1: Introduction

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

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

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

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

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

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

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

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

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
HYDERABAD
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

COURSE NAME- FINANCIAL ANALYTICS (BFSI)-OPEN ELCETIVE
SYLLABUS- COMMON TO ALL BRANCHES
V SEMESTER

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

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

Unit 1 (5 hours) Introduction to Financial Management
Introduction to Financial Management - Meaning - Financial Decisions- Interrelation between Financial decisions - Time Value of Money - Concept of Present Value and Future value - Effective Vs Nominal rates of interest. Risk Return Tradeoff- (Simple numerical problems on Risk)

Unit 2 (10 hours) Financial Statement Analysis-MS-Excel based
Financial Statement Analysis - Financial Statements- Components of financial statements- Profit and Loss - Balance Sheet - Cashflow Statement - building blocks of financial statements- Sensitivity of various components on the profitability - Inter and Intra Company comparision - Ratio Analysis, Common Size statements.(Including numericals on Inter and Intra company comparison)

Unit 3 (8 hours) Debt Securities-MS-Excel based
Debt Securities - Types of Bonds - Bond Indenture - Valuation of Bonds - Bonds with Annual and Semi Annual Interest payments - Current Yield - Yield to Maturity and Yield to Call - Bond Duration – importance and Computation - Bond Portfolio management

Unit 4 (5 hours) Capital Structure

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

Unit 5 (15 hours) Business Valuation

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

LEARNING RESOURCES:-

Textbooks

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

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

1	No. of Internal tests	:	2	Max. Marks	:	
2	No. of Assignments	:	3	Max. Marks	:	
3	No. of Quizzes	:	3	Max. Marks	:	

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGNEERING (AUTONOMOUS)
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

COURSE TITLE: - PHILOSOPHY

OPEN ELECTIVE- COMMON TO ALL BRANCHES
B.E-V SEMESTER

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

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

Unit 1: What Is Philosophy?
Definition and scope of philosophy
Branches of philosophy: metaphysics, epistemology, ethics, logic, aesthetics
Philosophical methods and the role of reasoning

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

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

Moral dilemmas and applied ethics

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

Unit 5: Social Philosophy
Social contract theory and
Civil disobedience

LEARNING RESOURCES:-

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

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

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

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

VASAVI COLLEGE OF ENGINEEING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

BASICS OF ENTREPRENEURSHIP

(Open Elective-III)

SYLLABUS FOR B.E V Semester

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

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

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

UNIT-I

Introduction to Entrepreneurship: Definition of Entrepreneurship, Entrepreneurship as a career choice, Benefits and Myths of Entrepreneurship.

Characteristics, Qualities and Skills of an Entrepreneur. Impact of entrepreneurship on the Economy and Society.

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

Learning Resources:

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

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

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

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

Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

Accredited by NAAC with A++ Grade

9-5-81, Ibrahimbagh, Hyderbad-500031

DEPARTMENT OF MATHEMATICS

TRANSFORM TECHNIQUES

(OPEN ELECTIVE)

For B.E., V - Semester – CBCS

(Common to CSE, AIML & IT Branches)

Instruction: 3 Hours per week	SEE Marks: 60	Subject Reference Code: U24OE510MA
Credits:3	CIE Marks: 40	Duration of SEE : 3 Hours

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

UNIT – I: (8 Hours)

LAPLACE TRANSFORMS

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

UNIT – II: (8 Hours)

INVERSE LAPLACE TRANSFORMS

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

UNIT – III: (8 Hours)

APPLICATIONS OF LAPLACE TRANSFORMS

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

UNIT – IV: (8 Hours)

Z-TRANSFORMS

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

UNIT – V: (8 Hours)

INVERSE Z-TRANSFORMS

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

Text Books:

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

Reference Books:

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

Online Resources:

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

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

1	No. of Internal Tests	:	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
4	Duration of Internal	:	90 Minutes			

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
Accredited by NAAC with A++ Grade
9-5-81, Ibrahimbagh, Hyderbad-500031
DEPARTMENT OF MATHEMATICS

APPLIED STATISTICAL METHODS

(OPEN ELECTIVE)
For B.E., V - Semester – CBCS
(Common to CSE, AIML & IT Branches)

Instruction: 3 Hours per week	Semester End Exam Marks: 60	Subject Reference Code: U25OE510MA
Credits:3	Sessional Marks: 40	Duration of Semester End Exam: 3 Hours

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

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

Correlation –Scatter diagrams-Spearman's Rank of Correlation-Curve fitting by the Method of Least Squares - Fitting of Straight line - Parabola - Exponential curves:

$y = a\,e^{bx}$ & $y = a\,b^{x}$— Regression - Lines of Regression - Multiple Regression - Curvilinear regression.

UNIT – II: (8 Hours)

TIME SERIES

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

UNIT – III: (8 Hours)

DESIGN OF EXPERIMENTS

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

UNIT – IV: (8 Hours)

QUEUEING THEORY

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

UNIT – V: (8 Hours)

STATISTICAL QUALITY CONTROL

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

ONLINE SOURCES:

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-24)
B.E. – INFORMATION TECHNOLOGY : SIXTH SEMESTER (2026 - 2027)

SEMESTER - VI									
S No.	**Course Code**	**Course Name**	**Scheme of Instruction**			**Scheme of Examination**			
			Hours per week			**Duration in Hrs**	**Maximum Marks**		**Credits**
			L	**T**	**P/D**		**SEE**	**CIE**	
THEORY									
1	U24PC610IT	Distributed Systems & Cloud Computing	3	1	-	3	60	40	4
2	U24PC620IT	**Deep Learning**	3	1	-	3	60	40	4
3	U24PC630IT	**Cybersecurity**	3	-	-	3	60	40	3
4	U24HS530EH	Design Thinking	1	-	-	2	40	30	1
5	U24OE6XXXX	Open Elective - IV	3	-	-	3	60	40	3
6	U24HS630EH	Skill Development Course – VII (Verbal Ability)	1	-	-	2	40	30	1
7	U24PE610IT	Skill Development Course – VIII (Technical Skills –IV)	1	-	-	2	40	30	1
PRACTICALS									
8	U24PC611IT	Distributed Systems & Cloud Computing Lab	-	-	2	3	50	30	1
9	U24PC621IT	**Deep Learning Lab**	-	-	2	3	50	30	1
10	U24PC631IT	**Cybersecurity Lab**	-	-	2	3	50	30	1
11	U24PW619IT	Theme Based Project	-	-	2	3	50	30	1
		Library / Sports / Mentor Interaction	-	-	-	-	-	-	-
• Student should acquire one NPTEL Certification Course equivalent to 2 credits (8 weeks) by the end of VI Semester.									-
Total			**16**	**1**	**8**	**-**	**580**	**380**	**21**
Grand Total			**17 + 8 = 25**			**-**	**960**		

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

DISTRIBUTED SYSTEMS AND CLOUD COMPUTING

SYLLABUS FOR B.E.- VI SEMESTER

L:T:P(Hrs./week):3:1:0	SEE Marks : 60	Course Code : **U24PC620IT**
Credits : 4	CIE Marks : 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course:	*On completion of the course, students will be able to:*
1. Examine state-of-the-art distributed systems. 2. Provide an overview of distributed resource management. 3. Provide the fundamentals and essentials of Cloud Computing. 4. Describe the importance of virtualization in Cloud Computing. 5. Explore some important cloud computing environments such as Google Apps, Microsoft Azure and Amazon Web Services.	1. Understand the principles of distributed system. 2. Illustrate the basic concepts of synchronization. and communication mechanisms used in distributed systems. 3. Compare the strengths and limitations of Cloud computing. 4. Analyse advantages and disadvantages of virtualization technology. 5. Identify the appropriate cloud services for a given application.

UNIT I

Characterization of Distributed Systems: Introduction, Examples of distributed systems, Resource sharing and the web, Challenges; Hardware concepts; Software Concepts

System Models: Introduction, Architectural models, Fundamental models.

Time and Global States: Introduction, Clocks events and process states, synchronizing physical clocks, Logical Clocks, Global states, Distributed debugging.

UNIT-II

Coordination and Agreement: Introduction, distributed mutual exclusion, Election, Multicast communication, Consensus and related problems.

Replication: Introduction, System model and group communication, Fault-tolerant services.

Distributed File Systems: Introduction; File service architecture; Case study: Sun Network File System;

UNIT-III

Introduction to Cloud Computing, Cloud Computing Architecture: Essential Characteristics, Service Models, Deployment Models, Pros and Cons of Cloud Computing. Scalable Computing over the Internet, Technologies for Network-based Systems, System Models for Distributed and Cloud Computing, Software Environments for Distributed Systems and Clouds.

UNIT-IV

Virtual Machines and Virtualization of Clusters and Data Centers: Implementation levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Virtualization of CPU Memory and I/O devises, Virtual Clusters and Resource Management, Virtualization for Data Center Automation

Case Studies: Xen Virtual machine monitors - Xen API. VMware - VMware products- VMware Features.

Containers: Container Architecture, Virtualization Vs. Containers, Overview of Dockers, Docker Components and Docker Commands.

UNIT-V

Cloud Platform Architecture over Virtualized Data Centers: Data Center Design and interconnection networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms: Google App Engine (GAE), Amazon Web Services (AWS), Microsoft Windows Azure. Inter-cloud Resource Management, Cloud Security and Trust Management

Learning Resources:

1. Colouris, Dollimore, Kindberg, " Distributed Systems concepts and Design" 5th Ed. Pearson Education, 2011
2. Kai Hwang, Geoffrey C Fox, Jack J. Dongarra, "Distributed and cloud Computing", Morgan Kaufmann
3. Andrew S. Tanenbaum, Van Steen, " Distributed Systems ", Pearson Education, 2010.
4. Rajkumar Buyya, James Broberg, Andrzej M Goscinski "Cloud Computing: Principles & Paradigms, Wiley Series on Parallel and Distributed computing, 2011
5. Singhal M, Shivratari N.G, "Advanced Concepts Introduction, Operating Systems" McGraw Hill, 2001
6. Pradeep K Sinha, " Distributed Opearating Systems: Concepts and Design", Pearson Education Asia India, 2007.
7. https://onlinecourses.nptel.ac.in/noc23_cs89/preview
8. https://onlinecourses.nptel.ac.in/noc23_cs72/preview

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

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	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 Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

DEEP LEARNING

SYLLABUS FOR B.E VI-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U24PC620IT**
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	*At the end of the course student will be able to:*
1. Introduce the fundamental concepts to Neural networks and deep learning. 2. Introduce Keras, Tensorflow and Pytorch libraries. 3. Explore the applications of CNN and RNN.	1. **Understand** foundational neural network models and implement DL programs using Keras, TensorFlow, and PyTorch. 2. **Apply** regularization and optimization techniques to improve deep learning model performance. 3. **Implement** CNN architectures for solving image classification problems using transfer learning. 4. **Design** RNN and LSTM models for sequence modelling and time series data. 5. **Analyze** transformer-based models and apply compression and distillation techniques for efficient deployment.

UNIT-I:

Introduction to Neural networks and Deep Learning: Perceptron, Sigmoid Neurons, Gradient descent, Multilayer Neural Network, Backpropagation, Convergence, Deep learning, Representation learning.

DL programming: Keras Sequential and Functional API, TensorFlow Data Pipeline (tf.data), PyTorch Tensors and Autograd, Model Training Loop, Loss Functions and Optimizers, Saving and Loading Models, GPU Acceleration.

UNIT-II:

Regularization and Optimization techniques: L1 and L2 regularization, Early stopping, Dataset augmentation, Parameter sharing, Bagging and Ensemble, Dropout and Adversarial training.

Challenges in optimization, Basic algorithms: SGD, Momentum, Nesterov Momentum; Parameter initialization strategies, Adaptative learning algorithms: RMSProp, Adam.

UNIT-III:

Convolutional Neural networks (or CNN): Convolution operation, Motivation, Pooling, Convolution and pooling as an infinitely strong prior, Convolution variants, AlexNet, GoogleNet and ResNet models, Applications, Transfer learning for Image classification.

UNIT-IV:

Recurrent neural networks (or RNN): Intro, unfolding graph, Basic architecture, Backpropagation through time (BPTT), Long term dependencies, Vanishing and exploding gradients, Optimization for Long-term dependency challenge, LSTM, GRU.

UNIT-V:

Encoder-decoder seq-seq architecture, Transformer Architecture: Attention mechanism, Self-attention, Cross-Attention, Positional encoding.
Model Compression Techniques: Pruning, Quantization, Low-rank factorization. Knowledge Distillation: Teacher-student paradigm.
Applications - Neural machine translation.

Learning Resources:

1. Deep learning, MIT Press by Ian Goodfellow and Yoshua Bengio and Aaron Courville.
2. https://www.cse.iitm.ac.in/~miteshk/CS7015.html
3. https://www.deeplearningbook.org/
4. https://keras.io/
5. https://www.tensorflow.org/
6. https://pytorch.org/

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

1	No. of Internal Tests:	02	Max.Marks for each Internal Tests:	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 Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

CYBERSECURITY

SYLLABUS FOR B.E VII-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U23PC730IT**
Credits : 3	CIE Marks : 40	Duration of SEE: 3 Hrs

Course Objectives	**Course Outcomes**
The Objectives of the course:	**At the end of the course student will be able to:**
1. Introduce the basics of Cyber Security cyber crime. 2. Explore essential techniques in protecting Information Systems,	1. Understand the concept of Cyber security and issues and challenges associated with it. 2. Interpret various cybercrimes, their nature, legal remedies and how to report the crimes through available platforms and procedures. 3. Gain knowledge about exploitations used by the attackers 4. understand the basic security aspects related to Computer and Mobiles. They will be able to use basic tools and technologies to protect their devices. 5. Demonstrate the use of standards and cyber laws to enhance information security in the development process and infrastructure protection

Unit-I Introduction to Cyber security: Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.

Unit- II Cybercrime and Cyber law: Classification of cybercrimes, Common cybercrimes- cyber crime targeting computers and mobiles, financial frauds,

social engineering attacks, malware and ransomware attacks, zero day and zero click attacks.
Reporting of cybercrimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber crime and offences, Organizations dealing with Cyber crime and Cyber security in India, Case studies.

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

Evading detection and Elevating Privileges – Obfuscation, VM Obfuscation, Persistent software techniques, Rootkits, Spyware, Attacks against privileged user accounts and escalation of privileges, token kidnapping, VM detection. Stealing information and exploitation – Form grabbing, Man-in-themiddle attacks, DLL injections, Browser Helper objects.

Unit-IV Digital Devices Security , Tools and Technologies for Cyber Security: Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.

Unit-V Cyber Laws and Forensics: Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, National Cyber Security Policy 2013. Introduction to Cyber Forensics, Need of Cyber Forensics, Cyber Evidence, Documentation and Management of Crime Sense, Image Capturing and its importance, Partial Volume Image, Web Attack Investigations, Denial of Service Investigations, Internet Crime Investigations, Internet Forensics, Steps for Investigating Internet Crime, Email Crime Investigations**.**

Learning Resources:

1. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011).
2. James Graham, Richard Howard, Ryan Olson, "Cyber Security Essentials", CRC Press, 2016.
3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)

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

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

3 No. of Quizzes: 03 Max. Marks for each Quiz Test: 05
Duration of Internal Test: **90 Minutes**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

COURSE NAME-DESIGN THINKING

SYLLABUS FOR B.E. 3/4 – V & VI SEMESTERs

L:T:P (Hrs./week):: 1:0:0	SEE: 40	Course code: **U24HS530EH**
Credits: 1	CIE: 30	Duration of SEE: 2 Hours
COURSE OBJECTIVES **The course will enable the learners to:** 1. Understand the stages of design thinking and the role of empathy in design. 2. Learn techniques to brainstorm and frame problem statements effectively. 3. Develop prototyping and feedback techniques for iterative improvements. 4. Apply design thinking to solve community challenges and real-world problems.		**COURSE OUTCOMES** **At the end of the course the learners will be able to:** 1. Students will articulate the stages of design thinking and create empathy maps for user-centered solutions. 2. Students will use ideation tools and define clear, actionable problem statements. 3. Students will create low-fidelity prototypes and refine solutions based on feedback. 4. Students will demonstrate design thinking by creating innovative prototypes for specific challenges.

OVERVIEW:

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

UNIT 1: Introduction to Design Thinking

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

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

Learning Outcomes:

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

UNIT 2: Ideation and Problem Definition

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

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

Learning Outcomes:

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

UNIT 3: Prototyping and Feedback

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

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

Learning Outcomes:

- Design simple prototypes that communicate core ideas
- Collect meaningful feedback through observation and interaction

- Refine prototypes through successive iterations for better user fit

UNIT 4: Real-World Applications

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

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

Learning Outcomes:

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

Suggeted Books

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

LEARNING RESOURCES

learn.talentsprint.com

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

1	No. of Internal tests	:	1	Max. Marks	:	20
2	No. of assignments	:	1	Max. Marks	:	5
3	No. of Quizzes	:	1	Max. Marks	:	5

Duration of Internal Tests : 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

COURSE NAME-SKILL DEVELOPMENT COURSE - VII (VERBAL ABILITY)
SYLLABUS - COMMON TO ALL BRANCHES
VI SEMESTER

Instruction: 2 Hours	SEE: 40	Course code: U24HS630EH
Credits: 1	CIE: 30	Duration of SEE: 2 Hours

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

Unit 1: Vocabulary- Reading for Content and Context

Overview:

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

vocabulary based questions and also use vocabulary as a tool to solve problems.

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

Unit 2: Fill in the Blanks- Applying Content and Context

Overview:

This course is designed for students to identify the clue/ theme words in sentences, then understand the context in which the words are used and finally apply concepts like collocation, antonyms, and synonyms to solve questions.

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

Unit 3: Jumbles

Overview:

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

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

Unit 4: Critical Reading Skills

Overview:

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

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

Unit 5: Spotting the Errors

Overview:

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

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

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

Learning Resources:

learn.talentsprint.com

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

1	No. of Internal tests	:	2	Max. Marks	:	20
2	No. of assignments	:	2	Max. Marks	:	5
3	No. of Quizzes	:	2	Max. Marks	:	5

Duration of Internal Tests : 90 Minutes

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING(Autonomous)
IBRAHIMBAGH, HYDERBAD-500031
DEPARTMENT OF INFORMATION TECHNOLOGY

DISTRIBUTED SYSTEMS & CLOUD COMPUTING LAB

SYLLABUS FOR B.E.- VI SEMESTER

L:T:P (Hrs./week): 0:0:2	SEE Marks : 50	Course Code : **U24PC621IT**
Credits : 1	CIE Marks : 30	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course:	**On completion of the course, students will be able to:**
1. Demonstrate client server application in distributed environment. 2. Illustrate cluster environment and execute distributed application. 3. Provide hands on experience to create virtual machines and hosting of a website in public cloud environments.	1. Design and develop distributed client server applications using socket programming concepts. 2. Design and develop distributed applications using MPI cluster. 3. Create and manage virtual machines using Type 1 and Type II virtualizations 4. Write a distributed application using Map Reduce. 5. Deploy a website in the cloud environment.

1. Write a program for command line based client server Java application using TCP protocol.
2. Write a program for command line based client server Java application using UDP protocol.
3. Write a program for Message Passing Interface (MPI) Cluster for matrix multiplication of order 5000 x 5000.
4. Implementation of Type II virtualization using Oracle Virtual Box and installing Linux OS.
5. Write a Map Reduce application and execute it on Hadoop environment.
6. Using Microsoft Azure Cloud environment create a virtual machine and host a simple website.
7. Using Amazon Web Services (AWS) Academy Sandbox environment:
   i) Create an Amazon Elastic Compute Cloud (Amazon EC2) instance and host a website.

ii) Create an Amazon Simple Storage Service (Amazon S3) bucket to host a static webpage.

8. Create Docker on a EC2 instance and write a simple hello world application.
9. Creating and managing a relational database using Amazon AWS RDS Service.
10. Deploy a Scalable website using Kubernetes.

Additional Experiments:

1. Write a program for implementation of Network Time Protocol (NTP) client server for clock synchronization.
2. Create a virtual machine using open stack.

Learning Resources:

1. AMAZON WEB SERVICES: The Complete Guide From Beginners For Amazon Web Services, Richard Derry, Amazon
2. Learning AWS, by Aurobindo Sarkar, Amit Shah, 2015, Packt Publishing Digital Services LLC, 2019
3. Colouris, Dollimore, Kindberg, " Distributed Systems concepts and Design" 5th Ed. Pearson Education, 2011
4. Rajkumar Buyya, James Broberg, Andrzej M Goscinski "Cloud Computing: Principles & Paradigms, Wiley Series on Parallel and Distributed computing, 2011
5. Herbert Schildt, "Java : the complete reference" McGraw-Hill Education, 2019
6. azure.microsoft.com

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2 Hours			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF INFORMATION TECHNOLOGY

DEEP LEARNING LAB

SYLLABUS FOR B.E VI- SEMESTER

L:T:P (Hrs./week):: 0:0:2	SEE Marks : 50	Course Code : **U24PC621IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course:	*At the end of the course student will be able to:*
1. Introduce Tensorflow, Keras and Pytorch to implement DL models. 2. Explore different CNN architectures for Image Analysis. 3. Discuss different types of RNNs for text and speech processing applications. 4. Introduce GANS and Transformers with suitable applications.	1. Implement single layer Perceptron, multi payer perceptron and test the efficiency of multilayer neural network with different activation functions. 2. Identify appropriate regularization and optimization techniques and use to improve the performance of a fully connected neural network model. 3. Apply CNN models for transfer learning for computer vision problems. 4. Implement RNNs for text and speech processing. 5. Use transformers for language translation.

1. Introduction to Keras, TensorFlow and PyTorch.
2. Implementation of the perceptron algorithm for two-dimensional data.
3. Implement multilayer neural networks for classification and regression with different activation functions, regularization techniques and optimization techniques on MNIST data.

4. Build CNN Models for image classification on CIFAR10 and Fashion-MNIST datasets.
5. Segmentation and object detection using the latest Deep Convolution models (FCN/UNet/DeepLab).
6. Transfer learning for any image classification.
7. Classification of person names with their identity using character level RNN.
8. Language translation with seq-to-seq encoder-decoder based RNN.
9. Language translation with seq-to-seq attention based RNN.
10. Language translation with Transformer or pretrained models from Hugging Face.

Learning Resources:

1. https://pytorch.org/
2. https://www.tensorflow.org/
3. Chollet, Francois. Deep learning with Python. Simon and Schuster, 2021.
4. Ketkar, Nikhil, and Eder Santana. Deep learning with Python. Vol. 1. Berkeley, CA: Apress, 2017.
5. https://d2l.ai/

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2Hours			

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF INFORMATION TECHNOLOGY

CYBERSECURITY LAB

SYLLABUS FOR B.E VI- SEMESTER

L:T:P (Hrs./week):: 0:0:2	SEE Marks : 50	Course Code : **U24PC631IT**
Credits : 1	CIE Marks: 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES**
The Objectives of the course:	*At the end of the course student will be able to:*
1. To provide hands-on experience with industry-standard cybersecurity tools for identifying, exploiting, and mitigating vulnerabilities across diverse platforms. 2. To develop a "Defense-in-Depth" mindset by simulating real-world attack vectors, including social engineering, network exploits, and AI-specific threats. 3. To train students in the systematic process of log analysis, digital forensics, and ethical reporting to ensure organizational resilience.	1. **Implement** cryptographic primitives and detect social engineering attacks using modern identity management and phishing simulation tools. 2. **Execute** network traffic analysis and memory exploits to identify infrastructure vulnerabilities and apply system-level hardening. 3. **Audit** web applications and digital payment interfaces for OWASP vulnerabilities to secure transactional code and APIs. 4. **Test** and mitigate adversarial attacks and prompt injections to secure machine learning models and generative AI systems. 5. **Conduct** digital forensic investigations and log analysis to reconstruct attack timelines and manage incident response procedures.

UNIT	EXP. NO.	LAB TITLE	TOOLS & RESOURCES
I	1	**Cryptographic Primitives & Digital Signatures** Implement and break simple encryption; generate hashes to verify file integrity; create and verify a digital signature.	**Tools:** OpenSSL, Python (hashlib, cryptography libraries). **Resource:** OpenSSL Documentation.
I	2	**Simulating & Detecting Social Engineering** Create a controlled phishing campaign (email/SMS) to understand credential harvesting and analyze headers to detect spoofs.	**Tools:** Gophish (Open-Source Phishing Framework), Evilginx2. **Resource:** Social Engineering Framework.
II	3	**Network Traffic Analysis & MITM** Capture and analyze network packets to intercept unencrypted	**Tools:** Wireshark, Ettercap/Bettercap. **Resource:** Wireshark University.

		passwords and observe the difference between HTTP and HTTPS traffic.	
II	4	**Exploiting & Fixing Buffer Overflows** Write a vulnerable C program, perform a stack-based buffer overflow to gain shell access, and then re-compile with protections (ASLR/DEP).	**Tools:** GDB (GNU Debugger), GCC, Kali Linux. **Resource:** Exploit-DB.
III	5	**The OWASP Top 10 Hands-on** Perform SQL Injection to bypass login and Cross-Site Scripting (XSS) to steal session cookies in a controlled environment.	**Tools:** Burp Suite (Community Ed.), OWASP Juice Shop (Vulnerable App). **Resource:** PortSwigger Academy.
III	6	**API & Payment Security Analysis** Intercept API calls from a mobile-view web app to test for IDOR (Insecure Direct Object Reference) and parameter tampering in a mock checkout.	**Tools:** Postman, OWASP ZAP (Zed Attack Proxy). **Resource:** OWASP API Security Top 10.
IV	7	**LLM Jailbreaking & Prompt Injection** Attempt to bypass system instructions of a local LLM to extract sensitive data or force prohibited outputs.	**Tools:** Local LLM (Ollama/Llama3), Gandalf (by Lakera). **Resource:** Learn Prompting - Injection.
IV	8	**Adversarial Image Attacks** Apply "noise" to an image that is invisible to humans but causes an AI Image Classifier to misidentify the object.	**Tools:** Python, Adversarial Robustness Toolbox (ART), TensorFlow/PyTorch. **Resource:** IBM ART Github.
V	9	**Log Analysis & Incident Response** Analyze web server and	**Tools:** Splunk (Free Edition) or ELK Stack (Elasticsearch, Logstash,

		firewall logs to identify the timeline of a brute-force attack and automate a blocking response.	Kibana). **Resource:** NIST Incident Handling Guide.
V	10	**Digital Forensics & Evidence Recovery** Recover "permanently deleted" files from a USB drive image and analyze browser history artifacts to reconstruct a user's activity.	**Tools:** Autopsy (Digital Forensics Suite), FTK Imager. **Resource:** SANS Forensics Blog.

Implementation Notes for Faculty:

1. **Virtualization:** It is highly recommended to have students run these labs inside a **Kali Linux** virtual machine (VirtualBox or VMware) to avoid messing with the host system's security settings.
2. **Environment:** For Unit III, you don't need to build a website; just host the **OWASP Juice Shop** (a broken web app) locally via Docker.
3. **Ethics:** Every lab should begin with a 5-minute briefing on the **Ethical Use** of these tools, emphasizing that they are only to be used on authorized targets.

No. of Internal Tests:	02	Max. Marks for Internal Test:	12
Marks for assessment of each experiment			18
Duration of Internal Test: 2Hours			

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

THEME BASED PROJECT

SYLLABUS FOR B.E. VI SEMESTER

L:T:P(Hrs./week):0:0:2	SEE Marks :50	Course Code : **U24PW619IT**
Credits : 1	CIE Marks : 30	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	COURSE OUTCOMES
The Objectives of the course:	*At the end of the course student will be able to:*
3. Promote project-based learning by working on societal problems. 4. Encourage individual and teamwork, communication, life-long learning and follow professional ethics.	6. Review the existing literature/ models to identify the scope for extension. 7. Apply technical knowledge to develop novel solutions for real life problems. 8. Plan and execute projects by following effective software development life cycle. 9. Design and demonstrate the prototypes. 10. Practice professional ethics, teamwork and lifelong learning.

Continuous Internal Evaluation (CIE) – 30 marks : To be evaluated by the Internal Examiner

Assesment-1 : [15 Marks]

To be conducted on week-7: Review of problem Statement, Motivation, Introduction, Use cases and Techstack, Review of low level design details for all end-to end use cases.

Assesment-2: [15 Marks]

To be conducted on week-15: Review of final implementation / demonstration of all use cases, presentation and report.

Semester End Examination (SEE) – 50 marks: To be evaluated by the External Examiner

Evaluation is done based on the following deliverables:

PowerPoint Presentation [10 Marks]

Demonstration of the application	[20 Marks]
Project report	[10 Marks]
Viva Voce	[10 Marks]

External Examiner should be appointed from other Institutes or from the industry.

Virtual Lab:

Basics of HTML: https://html-iitd.vlabs.ac.in/List%20of%20experiments.html

With effect from Academic Year 2026-27 (R24)

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

IBRAHIMBAGH, HYDERABAD – 500 031

OPEN ELECTIVES - IV		
Department	**Code**	**Title**
Civil	U24OE610CE	Project Management
ECE	U24OE610EC	Internet of Things and Applications (General Pool)
	U24OE630PH	Automatic Train Protection System – Kavach (General Pool)
	U25OE640EC	Introduction to Wireless Communication Technologies (Communication Engineering-Stream)
EEE	U24OE610EE	Introduction to Batteries and Battery management System
Mechanical	U24OE610ME	Autonomous Mobile Robots (Stream: Robotics)
	U24OE620ME	Additive Manufacturing and its Applications (General Pool)
H&SS	U24OE610EH	Strategic Management for Engineers (Management Courses for Engineers – Stream)
	U24OE620EH	Business Intelligence (BFSI – Stream)
	U24OE630EH	Psychology (Liberal Arts Courses-Stream)
	U24OE630EH	Advanced course in Entrepreneurship (General Pool)
Physics	U24OE610PH	Introduction to Nanotechnology
Maths	U240E610MA	Applied Algebra for Computing

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF CIVIL ENGINEERING
PROJECT MANAGEMENT (OPEN ELECTIVE-IV)

SYLLABUSFORB.E.VI-SEMESTER

L:T:P(Hrs/Week):3:0:0	SEE Marks:60	CourseCode:U24OE610CE
Credits: 3	CIEMarks:40	DurationofSEE:3Hours

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

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

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

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

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

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

Learning Resources:

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

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

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

Duration of Internal Tests : 90 Minutes

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

Internet of Things and Applications
(Open Elective - IV)

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

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U24OE610EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**

1. To enable students to understand the fundamentals and architecture of the Internet of Things (IoT) and explore its role in enhancing quality of life through interconnected devices and systems. 2. To familiarize learners with various IoT communication protocols such as MQTT, AMQP, CoAP, and mDNS, and equip them with the knowledge to address real-world design constraints, including technical limitations and power management. 3. To introduce students to IoT hardware platforms, focusing on the selection and integration of microcontrollers and Raspberry Pi for prototyping and building practical IoT applications using Python. 4. To provide an in-depth understanding of IoT data representation, visualization, and device-level interactions, along with remote control capabilities and power conditioning techniques using energy harvesting methods. 5. To expose students to real-world case studies and application domains of IoT such as Smart Cities, Connected Vehicles, Smart Agriculture, Healthcare, and Activity Monitoring, fostering innovation in interdisciplinary domains.	On completion of the course, students will be able to 1. Understand the Architectural Overview of IoT 2. Enumerate the need and the challenges in Real World Design Constraints 3. Compare various IoT Protocols. 4. Build basic IoT applications using Raspberry Pi. 5. Understand IoT usage in various applications.

CO-PO Mapping

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

UNIT - I : OVERVIEW

Introduction to IoT – Improving Quality of life.

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

UNIT - II : Real-World Design Constraints

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

UNIT - III : IOT PROTOCOLS

Introduction to MQTT, Quality of services in MQTT,standards and security in MQTT. Introduction and implementation of AMQP, Implementation of CoAP and MDNS.

UNIT - IV : Device for IoT

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

UNIT - V : IoT case studies

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

Learning Resources:

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from Academic Year 2026-27 (R24)

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

IBRAHIMBAGH, HYDERABAD – 500 031

Automatic Train Protection System - Kavach

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

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

COURSE OBJECTIVES	COURSE OUTCOMES
1. To provide comprehensive knowledge of automatic train protection systems with emphasis on the Kavach architecture and working. 2. To develop understanding of onboard and wayside subsystems, communication protocols, and signaling interfaces in Kavach. 3. To familiarize students with design aspects including station layouts, survey, estimation, and implementation strategies for Kavach deployment. 4. To impart knowledge on operational concepts such as braking curves, speed profiles, movement authority, and communication mechanisms. 5. To enable students to simulate, test, and validate Kavach system configurations ensuring safety, reliability, and compliance.	On completion of the course, students will be able to 6. Explain the concepts of train protection systems and the working principles of the Kavach system. 7. Analyze the components and subsystems of Kavach including onboard and wayside equipment. 8. Apply design principles to develop layout plans and implementation strategies for Kavach deployment. 9. Evaluate operational parameters such as speed profiles, braking curves, and communication protocols in Kavach. 10. Demonstrate the ability to simulate, test, and validate Kavach configurations using testbench environments.

CO-PO/PSO Mapping

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

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

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

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

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

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

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

UNIT – II: (6 Hours)

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

UNIT – III: Design –Kavach: (8 Hours)

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

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

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

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

Stationary Kavach: Interlocking Interface, RFID Tags, Station Master Operation

Console Indication Panel (SM_OCIP), GPS/GSM Antennas, Pre-commissioning Checklist, Testing

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

Practicals at IRISET Laboratory (12 Hours)

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from Academic Year 2026-27 (R24)

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

Introduction to Wireless Communication Technologies
(Communication Engineering Stream: Open Elective - IV)

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

L:T:P (Hrs./week) :3:0:0	SEE Marks : 60	Course Code: **U25OE640EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO-PSO Mapping

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

UNIT - I:

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

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

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

UNIT - II:

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

UNIT - III:
Mobile Radio Propagation - Small Scale Fading and Multipath: Small Scale Multipath Propagation, Small – Scale Multipath Measurements, Parameters of Mobile Multipath Channels, Types of Small-Scale Fading, Rayleigh and Ricean Distributions.
Lab Activity: Small scale fading parameter calculations using MATLAB

UNIT -IV:
Multiple Access Techniques for Wireless Communications: Introduction, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), Space Division Multiple Access (SDMA).
Lab Activity: Demonstrating multiple access techniques using MATLAB.

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

Learning Resources:

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

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

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

Duration of Internal Tests: 90 Minutes

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Introduction to Batteries and Battery management System

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

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

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

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

UNIT -I: Introduction to Battery Management System:

Cells & Batteries, Nominal 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 estimateSOC, Model-based state estimation, Battery Health Estimation, Lithium-ion aging: Negative electrode, Lithium-ion aging: Positive electrode, Cell Balancing, Causes of imbalance, Circuits for balancing.

UNIT –IV: Modelling and Simulation:

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

UNIT -V: Design of battery BMS:

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

Learning Resources:

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

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

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

Duration of Internal Test: 90 minutes

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEEING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF MECHANICAL ENGINEERING

AUTONOMOUS MOBILE ROBOTS
(Stream: Robotics) (Open Elective-IV)
SYLLABUS FOR B.E VI Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : U24OE610ME
Credits: 03	CIE Marks:40	Duration of SEE : 03 Hours

COURSE OBJECTIVES The objectives of the course is to	**COURSE OUTCOMES** On completion of the course, students will be able to
• Provide students with fundamental understanding of mobile robots and their operation in real-world environments. • Introduce concepts of robot motion, navigation, and interaction with surroundings. • Develop analytical understanding of robot positioning, movement, and path planning. • Familiarize students with basic autonomous decision-making in robotic systems.	• Understand different types of mobile robots and analyze their motion mechanisms. (CO1) • Apply kinematic relationships to determine position and velocity of mobile robots. (CO2) • Estimate robot position using basic localization techniques. (CO3) • Analyze path planning methods for navigating structured environments. (CO4) • Understand fundamental navigation and obstacle avoidance strategies in autonomous robots. (CO5)

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

UNIT-I
Introduction to Mobile Robots:
Definition and classification of mobile robots. Comparison between fixed and mobile robots. Applications of mobile robots in industry and service sectors. Types of

locomotion: wheeled, tracked, and legged robots. Degrees of freedom and mobility. Basic concepts of robot motion and constraints.

UNIT-II

Kinematics of Mobile Robots:

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

UNIT-III

Localization of Mobile Robots:

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

UNIT-IV

Path Planning Techniques:

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

UNIT-V

Navigation and Obstacle Avoidance:

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

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEEING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF MECHANICAL ENGINEERING

ADDITIVE MANUFACTURING AND ITS APPLICATIONS
(General Pool)
(Open Elective-IV)
SYLLABUS FOR B.E VI Semester

L:T: P (Hrs./week):3: 0 : 0	SEE Marks:60	Course Code : U24OE620ME
Credits: 03	CIE Marks:40	Duration of SEE : 3 Hours

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

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

UNIT-I

Introduction, Prototyping fundamentals, Historical development, Advantages of AMT, Commonly used terms, **Fundamental Automated Processes,** process chain, 3D modeling, Data Conversion, and transmission, Checking and preparing, Building, Post processing, RP data formats, **Newly Proposed formats,** Classification of AMT process.

UNIT-II

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

UNIT-III
Solid based systems: Laminated object manufacturing (LOM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.
Fused Deposition Modeling (FDM): Models and specifications, Process, Working principle, Applications, Advantages and disadvantages, Case studies.

UNIT-IV
Powder Based Systems: Selective laser sintering (SLS): Models and specifications, process, materials**,** working principle, applications, advantages and disadvantages, case studies.
Three dimensional printing (3DP): Models and specification, process, working principle, applications, advantages and disadvantages, case studies.

UNIT-V
Applications of AM systems: Applications in Design**,** aerospace industry, automotive industry, jewellery industry, coin industry, GIS Application, arts and architecture.
RP medical and bio engineering Application: planning and simulation of complex surgery, customized implant and prosthesis, design and production of medical devices, forensic science and anthropology, visualization of bio-molecules.

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

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

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

Duration of Internal Test: 90 Minutes

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGNEERING (AUTONOMOUS), HYDERABAD
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

COURSE NAME: STRATEGIC MANAGEMENT FOR ENGINEERS
OPEN ELECTIVE SYLLABUS – COMMON TO ALL BRANCHES
VI - SEMESTER

Instruction: 3 Hrs/week	SEE: 60	Course code: U25OE610EH
Credits: 3	CIE: 40	Duration of SEE: 3 Hours

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

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

Unit-II: Environmental Appraisal

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

Unit-III : Strategy Formulation

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

Unit-IV: Alternative Strategies

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

Unit-V: Strategy Implementation and Control

Forms of Organizational Structures –Evaluation of Organization Structures - Leadership Styles - Corporate Governance - Mechanism for Evaluation - Key Performance Indicators -Difference between Operational and Strategic Controls

Learning resources:Prescribed Text Books

Strategic Management – Text and Cases, VSP Rao, 2nd Edition, Excel Publishers

Business Policy and Strategic Management – Text and Cases, P Subba Rao, Himalaya Publishers.

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

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

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

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)HYDERABAD
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

COURSE NAME : LOGISTICS AND SUPPLY CHAIN MANAGEMENT
OPEN ELECTIVE SYLLABUS – COMMON TO ALL BRANCHES
VI SEMESTER

Instruction: 3 Hours/Week	SEE: 60	Course code: U24OE611EH
Credits: 3	CIE: 40	Duration of SEE: 3 hrs.

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

Unit-I: Introduction to Supply Chain Management
Supply chain – objectives – importance – decision phases – process view – competitive and supply chain strategies – achieving strategic fit – supply chain drivers – obstacles – framework – facilities – inventory – transportation – information – sourcing – pricing.

Unit-II: Inventory and Logistics Management Planning Demand and Supply
Demand forecasting –Planning and Managing Inventories- Safety inventory and its appropriate level – impact of supply uncertainty, aggregation and replenishment

policies. Lab (Excel) : Demand Forecasting: Use historical data with functions like FORECAST.LINEAR to predict future needs, preventing stock outs or overstocking, filters to see current stock levels and trigger reorders ABC Analysis: Classify items by value (A, B, C) and demand volatility (X, Y, Z) to optimize safety stock. Trigger Alerts for ABC using Conditional IF.

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

Unit-IV: Supply Chain & Global Logistics (Transportation)
Meaning and Significance of International Transportation- Role of transportation in the integrated logistics process, Basic principles of international transportation, Parties involved in international transportation, Significance of Transportation, Modes of International Transportation – Air, Sea and Road - Criteria for Selection of different modes of transportation.

Unit-V: IT and AI in Supply Chain Management Supply Chain IT framework
Automation- Predictive Analytics in Supply Chain- AI applications in demand forecasting, inventory management, and logistics. Real-time data analytics and decision making in supply chains, Exploring AI's role in enhancing supply chain agility and resilience- Successful AI implementations in SCM (e.g., Amazon, Walmart).
Case study may be given for Unit 2

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

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

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

With effect from Academic Year 2026-27 (R24)

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

Duration of Internal Tests : 90 Minutes

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD-31
Department of Humanities & Social Sciences
BUSINESS INTELLIGENCE
(Stream:BFSI)
(Open Elective-IV)
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: **U24OE620EH**
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

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

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

Unit-I: Introduction to Business Intelligence (BI)
Definition, History and Evolution, Styles of Business Intelligence, Benefits of Business Intelligence, Real-time Business Intelligence, Business Intelligence Value chain, Architecture of Business Intelligence.

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

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

Unit -III: Business Performance Measurement (BPM)
Definition, BPM v/s BI, Summary of BPM Process, Performance measurement, BPM methodologies, BPM architecture and applications, Performance dash boards.

Unit-IV: Business Analytics and Data Visualization
Business Analytics-Definitions, Tools and techniques of BA, Advanced business analytics Business Analytics and Web usage, Benefits and success factors of Business Analytics.

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

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

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

Suggested Readings:

1. Business Intelligence-A Managerial Approach, Turban, Sharada, Delen, King- Pearson -Second Edition-2014.
2. Decision Supportand Business Intelligence Systems-Turban, Aaronson, Liang, Sharada- Pearson, and latest Edition.
3. Successful Business Intelligence, CindiHowson,McGrawHillEducation-IndianEdition.
4. BusinessIntelligence-AhandsonapproachbyN.Rajeshwari,1stEdition,PHI

5. Ramesh Sharda, TurbanE, Business Intelligence and analytics,10th Edition, Pearson Books
6. Bernard Marr,"Datastrategy"KoganPagepublishing
7. AnoopV KKumar, "Business Intelligence demystified " 1st edition 2022, BPB publications

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

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

Duration of Internal Tests : 90 Minutes

With effect from Academic Year 2026-27 (R24)

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD-31

Department of Humanities & Social Sciences

PSYCHOLOGY

(Liberal Arts Course – Stream) (Open Elective-IV)

SYLLABUS FOR B.E.VI-SEMESTER

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

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

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

Course Description:

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

Unit 1: Foundations of Psychology

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

Unit 2: Cognitive Psychology

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

Unit 3: Positive Psychology

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

Unit 4: Health Psychology

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

Unit 5: Social Psychology

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

Textbook

Galloti: Cognitive Psychology

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

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

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

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

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

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

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, HYDERABAD-31
DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

ADVANCED COURSE IN ENTREPRENEURSHIP
(General Pool) (Open Elective-IV)
SYLLABUS FOR B.E.VI-SEMESTER

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

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

CO-PO Mapping

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

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

UNIT-II: Business Planning
Product Management: Need for a product management with examples. Making a sales plan. Entrepreneur interview, Hiring sales team, Making a people plan for

the venture. Introduction and understanding financial planning and forecasting template. Discussing financial planning and revisiting business model. Creating a procurement plan. Negotiation.

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

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

UNIT-IV: Branding and Channel Strategy, Leveraging Technologies

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

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

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

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
Accredited by NAAC with A++ Grade
9-5-81, Ibrahimbagh, Hyderbad-500031
DEPARTMENT OF MATHEMATICS

APPLIED ALGEBRA FOR COMPUTING

(OPEN ELECTIVE)
For B.E., VI- Sem.,
(Common to CSE, AIML & IT Branches)

Instruction : 3 Hours per week	Sem. End Exam Marks : 60	Subject Reference Code: **U250E610MA**
Credits : 3	Sessional Marks : 40	Duration of Semester End Exam : 3 Hrs

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

UNIT – I: (8 Hours)

GROUPS

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

UNIT – II: (8 Hours)

SUBGROUPS & CYCLIC GROUPS

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

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

UNIT – III: (8 Hours)

COSETS & LAGRANGE'S THEOREM

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

UNIT – IV: (8 Hours)

HOMOMORPHISM & ISOMORPHISM OF GROUPS

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

UNIT – V: (8 Hours)

RINGS

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

Text Books:

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

Reference Books:

1. A First Course in Abstract Algebra, John B. Fraleigh, Pearson Education Limited.

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

Online Resources :

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

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

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