VASAVI COLLEGE OF ENGINEERING
(AUTONOMOUS)

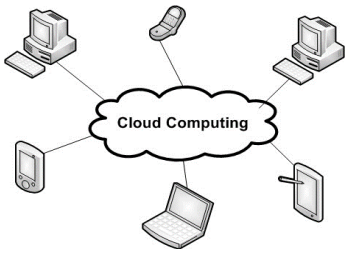
IBRAHIMBAGH, HYDERABAD-500 031

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 2024-2025
(For the batch admitted in 2022-23)
(R-22)



DEPARTMENT OF INFORMATION TECHNOLOGY
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VASAVI COLLEGE OF ENGINEERING
(AUTONOMOUS)
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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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DEPARTMENT OF INFORMATION TECHNOLOGY

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-22)

B.E. – INFORMATION TECHNOLOGY : FIFTH SEMESTER (2024 - 2025)

B.E (IT) V-SEMESTER								
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**	
U22PC510IT	Computer Networks	3	1	-	3	60	40	4
U22PC520IT	Artificial Intelligence and Machine Learning	3	-	-	3	60	40	3
U22PC530IT	Microprocessors & Interfacing	3	-	-	3	60	40	3
U22PC540IT	Operating Systems	3	-	-	3	60	40	3
U22OE5XXXX	Open Elective - III	3	-	-	3	60	40	3
U22HS510EH	Skill Development Course – V : Communication Skills in English – II)	1	-	-	2	40	30	1
U22PE510IT	Skill Development Course – VI : Technical Skills – III	1	-	-	2	40	30	1
PRACTICALS								
U22PC511IT	Computer Networks Lab	-	-	2	3	50	30	1
U22PC521IT	Artificial Intelligence and Machine Learning Lab	-	-	2	3	50	30	1
U22PC531IT	Microprocessors & Interfacing Lab	-	-	2	3	50	30	1
U22PC541IT	Operating Systems Lab	-	-	2	3	50	30	1
Co-Curricular Activities-III (Paper Presentations)		-	-	-	**-**	**-**	**-**	**-**
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**	**1**	**8**	**-**	**580**	**380**	**22**
Grand Total		**26**			**-**	**960**		

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER NETWORKS

Syllabus for B.E V-SEMESTER

L:T:P(Hrs./week): 3:1:0	SEE Marks :60	Course Code:**U22PC510IT**
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. 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. Analyse different routing protocols and algorithms to enable end-to-end connectivity. 4. Analyse 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:
Introduction: Data communication, network applications, Data flow, network types, topologies, Protocols and standards, OSI and TCP/IP Protocol Suite.
Physical Layer: Introduction to Data and Signals, Transmission impairments, Transmission media (wired and wireless), Switching.

UNIT II:
Data Link Layer: Design issues, framing, error detection and correction, parity, LRC, CRC, hamming code, elementary data link protocols- Stop-and-wait, sliding window protocols.
Medium Access sublayer: ALOHA, CSMA/CD, LAN Standards: IEEE 802.3, IEEE 802.11.

UNIT III:

Network Layer: Network layer design issues, routing algorithms- Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, IPV4, IPV6, Internet, Internet Control protocols - ARP, RARP, ICMP, DHCP.

UNIT IV:
Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Congestion control algorithms, Quality of Service.

UNIT V:
Application Layer: Domain Name System (DNS), EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP.

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. Data and Computer Communication, 8th Edition, William Stallings, Pearson Prentice Hall India
4. James F. Kurose, Keith W. Ross, "Computer Networking, A Top-Down Approach Featuring the Internet", Sixth Edition, Pearson Education, 2012.
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

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)
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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: **U22PC520IT**
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, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

MICROPROCESSORS AND INTERFACING

SYLLABUS FOR V-SEMESTER

L: T:P (Hrs./week): 3:0:0	SEE Marks :60	Course Code: **U22PC530IT**
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:*
understand the architectural features of 8085 and 8086 microprocessors and use them in assembly language programming and interfacing with different peripherals.	1. Understand the architectural features of 8085 processor and write assembly language programs. 2. Apply architectural features of 8086 processor for developing assembly languages programs. 3. Analyze programmable parallel peripheral interface (8255) and programmable keyboard and display controller (8279) architectures and design interfacing circuits for interfacing memory and I/O. 4. Design interfacing circuits using programmable interrupt controller (8259) and programmable interval timer (8253). 5. Develop interfacing circuits with USART (8251) and DMA controller (8257).

UNIT – I:

General definitions of microprocessors and microcontrollers, micro processor architecture and its operations, 8085 microprocessor Architecture and signal descriptions, 8085 instructions and addressing modes , Instruction cycle, machine cycle, T-states, counters and time delays, stacks and subroutines, assembly language programming examples

UNIT – II:

8086/8088 Architectures, pin diagrams and timing diagrams: Register Organization, Architecture, signal descriptions, physical memory organization, General bus operation, I/O Addressing capability, Minimum and Maximum mode of 8086 System and Timings.

8086/8088 Instruction set and assembler directives: Instruction formats, Addressing modes of 8086, Instruction set of 8086/8088, Assembler directives and operators, Assembly language programming with 8086/8088

Special architectural features and related programming: Stack, Stack Structure of 8086/8088, Interrupts and ISRs, Interrupt cycle, Maskable and Non maskable Interrupts, procedures and macros, Coprocessor.

UNIT – III:

Basic peripherals and their interfacing with 8086/8088: Semiconductor memory Interfacing, Dynamic RAM interfacing, Interfacing I/O ports, PIO 8255, modes of operation of 8255, Interfacing ADC, DAC, Stepper Motor, The Keyboard/ Display controller 8279, programming examples.

UNIT – IV:

Programmable Peripheral devices and their Interfacing with 8086: 8259A programmable interrupt controller, 8253 programmable interval timer, DOS and BIOS function calls.

UNIT – V:

Programmable communication Interface 8251 USART, DMA Controller 8257. DMA Transfers and operations, Introduction to advanced processors.

Learning Resources:

1. Ramesh S. Gaonkar, Microprocessor Architecture, Programming and Applications with the 8085, 5/E, Prentice Hall, 2002.
2. A.K.Ray and K.M.Bhurchandi, Advanced Microprocessors and peripherals 2nd edition Tata McGrawHill, 2006.
3. Douglas V. Hall, Microprocessors and Interfacing: Programming and Hardware, Tata McGraw- Hill Publishing Company Limited, 2006.
4. Barry B.Brey,The Intel Microprocessors 8086, 8088, 80188, 80186, 80286, 80386, 80486, and Pentium Processors, Pearson Education, 8th Edition, 2009.
5. I. Liu, G. A. Gibson, Microcomputer Systems: The 8086/8088 Family, 2nd Ed., Prentice Hall, 1986.
6. N. Sentil Kumar, M. Saravanan, S. Jeevananthan, S.K. Shah, Microprocessors and Interfacing, Oxford University Press, 2012.
7. https://nptel.ac.in/courses/108105102/53

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:**U22PC540IT**
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 : **U22HS510EH**
Credits : 1	CIE Marks: 30	Duration of SEE : 2 Hrs

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

Unit 1: Delightful Discussions

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

Unit 2: Powerful Presentations

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

Unit 3: Fact, Observation and Inference

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

Unit 4: Effective Technical Writing

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

Learning Resources:

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

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

1	No. of Internal tests	:	2	Max. Marks	:	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: **U22PE510IT**
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, Exponential time 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.

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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:**U22PC511IT**
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. Discuss the client/server application development using socket API. 2. Demonstrate various tools for network monitoring.	1. Demonstrate the usage of socket APIs 2. Develop Client Server applications using TCP and UDP 3. Develop Client Server applications using RPC. 4. Analyze the network performance using iPerf, tc, wireshark.

1. Understanding and using of commands like ifconfig, DNS, netstat, ping, arp, telnet, ftp, finger, traceroute, whois etc.
2. Usage of elementary socket system calls[socket(),bind(),listen(), accept(),connect(),send(), recv(), sendto(), recvfrom()].
3. Implementation of Connection oriented iterative service (TCP).
4. Implementation of Connection oriented concurrent service (TCP).
5. Implementation of Connectionless Iterative service (UDP).
6. Implementation of Connectionless concurrent service (UDP).
7. Implementation of Time service and Date service using RPC.
8. Implementation of Ping service.
9. Implement CRC, bit stuffing, byte stuffing.
10. Measure TCP throughput between two hosts in a network using **iPerf**.
11. Use the **tc** Linux utility to control bandwidth, delay, loss, Observe impact on measured throughput. Experiment with multiple applications running concurrently to generate congestion
12. Use **Wireshark** to capture packets when browsing the Internet. Examine the structure of packets: the various layers, protocols, headers, payload.

Virtual Lab:

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

Note: Implement programs in C programming using LINUX platform.

Content Beyond Syllabus:

1. Implementation of HTTP.
2. Implementation of Concurrent chat server(current Logged in users)

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://nptel.ac.in/courses/106105183/25
4. http://www.nptelvideos.in/2012/11/computer-networks.html
5. 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 : **U22PC521IT**
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

MICROPROCESSORS AND INTERFACING LAB

SYLLABUS FOR B.E. V SEMESTER

L:T:P(Hrs./week): 0:0:2	SEE Marks :50	Course Code: **U22PC531IT**
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. Write assembly language programs using 8085 and 8086 microprocessors and develop Interfacing circuits	1. Write basic assembly language programs for 8085 processor. 2. Write basic assembly language programs for 8086 processor. 3. Develop interfacing circuits for different microprocessors.

1. Assembly Language programming with 8085, 8086 .
2. Interfacing and programming of 8255.
3. Interfacing and programming of 8253/8254.
4. Interfacing and programming of 8279.
5. A/D and D/A converter interface.
6. Stepper motor interface.
7. Display interface

Virtual Lab:

8. 8085 simulator JUBIN: https://github.com/SiddhantSilwal/8085-simulator-installer-for-debian

Note: Adequate number of programs covering all the instructions of 8085 & 8086 instruction set. Experiments should be done on the 8085, 8086 microprocessor trainer kits and Assembler

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			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031
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: **U22PC541IT**
Credits : 1	CIE Marks :30	Duration of SEE : 3 Hours

Course Objective:	**Course Outcomes:**
The Objectives of the course:	*At the end of the course student will be able to:*
1. Explain the usage of system calls. 2. Discuss the concepts of inter process communication and process synchronization.	2. Write programs to implement system call APIs. 3. Implement programs for Inter-Process Communication 4. Implement programs for process synchronization. 5. Write programs to implement threads.

1. Familiarity and usage of system calls of Linux on
    a) File management (open,close, read, write, open dir, readdir, stat etc)
    b) Process management (fork, exec ,getpid, wait exit etc)
2. Implement a program to get and set the environment variables using system calls.
3. Implementation of Echo server using pipes.
4. Implementation of Echo server using shared memory.
5. Implementation of Echo server using messages.
6. Implementation of Producer Consumer Problem using semaphores.
7. Implementation of Producer Consumer Problem using message passing.
8. Implementation of Reader-writer problem using semaphores.
9. Implementation of Dining philosophers' problem using semaphores.
10. Creating threads and manipulating under Linux platform.
11. Install and setup Android Studio with specific Latest SDK in your system.
12. Developing an Android app which displays "HelloWorld" message,

testing and debugging

13. 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.

Virtual Lab

14. Producer Consumer bounded buffer problem, Bankers Algorithm : http://ebootathon.com/labs/beta/csit/OS/exp1/

Learning Resources:

1. W. Richard Stevens, Unix Network Programming, Prentice Hall/Pearson Education,2009.
2. https://developer.android.com/studio/
3. 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			

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
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OPEN ELECTIVES - III		
Department	**Code**	**Title**
Civil	U22OE510CE	Spatial Information Technology
ECE	U22OE510EC	Introduction to Biomedical Electronics
	U22OE530PH	Signal Engineering
EEE	U22OE510EE	Modelling and Simulation of Basic Photovoltaic Systems
Mechanical	U22OE510ME	Drives and Control Systems for Robotics (Stream: Robotics)
	U22OE520ME	Introduction to Robotics
English	U22OE530EH	Design Thinking
	U22OE540EH	Basics of Entrepreneurship
Physics	U24OE510PH	Fundamentals of Thin Film Technology and Applications
	U24OE520PH	Fundamentals of Vacuum Technology and Applications

With effect from Academic Year 2024-25 (R22)

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

SPATIAL INFORMATION TECHNOLOGY

(Open Elective-III)

SYLLABUS FOR B.E. V SEMESTER

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

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

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

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

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

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

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

Learning Resources:

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

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

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

Duration of Internal Tests : 90 Minutes

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

Introduction to Biomedical Electronics

(Open Elective - III)

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

L:T:P (Hrs./week) : 3:0:0	SEE Marks : 60	Course Code: **U22OE510EC**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO-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

UNIT - I :

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

UNIT - II :

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

UNIT - III :

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

UNIT - IV :

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

UNIT - V :

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

Learning Resources:

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

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

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

Duration of Internal Tests: 90 Minutes

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

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

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

CO-PO/PSO Mapping

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

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

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

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

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

UNIT – II: Railway Signaling (6 Hours)

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

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

Signaling Interlocking Plan: Essentials of Interlocking, Train Detection,

Point Switching, Signal, Block Control, Aspect Control Chart.

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

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

Practicals at IRISET Laboratory (12 Hours)

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

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

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

Duration of Internal Tests: 90 Minutes

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

Modelling and Simulation of Photovoltaic Systems

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

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code: **U22OE510EE**
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

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

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

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

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

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

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

Unit-5 Interfacing PV Modules to Loads and Battery Modelling

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

Learning Resources:

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

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

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

Duration of Internal Tests :90 Minutes

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

Essentials of Operating Systems
(GENERAL TRACK : OPEN ELECTIVE-III)
(Common for CIVIL, ECE, EEE & MECH)
SYLLABUS OF B.E V- SEMESTER

L:T:P(Hrs./week): 3:0:0	SEE Marks :60	Course Code : **U22OE510IT**
Credits :3	CIE Marks: 40	Duration of SEE :3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
Learn the principles of modern operating systems i.e various functionalities provided by an operating system such as process management, memory management, Storage and I/O management.	1. Analyze the importance and its key principles by differentiating and categorizing the functionalities of an operatingsystem 2. Examine mechanisms involved in memory management to handle processes and threads. 3. Evaluate and solve deadlocks by assessing various handling strategies related to each of the conditions for deadlock. 4. Interpret the mechanisms adopted for storage organization and access. 5. Interpret the mechanisms adopted for I/O organization and access.

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.

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 Management:

File System-Basic Concepts, File System Structure, File System Mounting, Directory Structure, Allocation Methods, Free Space Management.

UNIT-V: I/O Management:

I/O Management: Disk Structure, RAID Structure, Disk Scheduling, Protection: Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix.

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. https://nptel.ac.in/courses/106108101/
8. 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	:	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)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF INFORMATION TECHNOLOGY

Introduction to Artificial Intelligence

(AI&ML TRACK : OPEN ELECTIVE-III)
(Common for CIVIL, ECE, EEE & MECH)
SYLLABUS OF B.E V- SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code: **U22OE520IT**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hrs

COURSE OBJECTIVES	**COURSE OUTCOMES** *On completion of the course, students will be able to*
The objective of this course is to provide the necessary fundamentals, approaches in Artificial intelligence for problem solving for a goal-based single or multi agents with or without constraints and formalise soft computing techniques for better optimization for intelligent systems.	1. Investigate applications of AI techniques in intelligent agents. 2. Apply various search algorithms for demonstrating agents, searching and inferencing 3. Analyse searching beyond classical search and adversarial Techniques. 4. Identify problem types which might have constraints and evolutionary computation. 5. Define the fuzzy systems, ethics and risks of AI.

UNIT-I:
Introduction to AI: What is AI, Foundations of AI, History of AI, State of the Art, Applications of AI.
Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.
UNIT-II:
Solving Problems by Search: Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies: Breadth first search, Depth-first search, Depth limited search, Iterative deepening depth first search
Informed (Heuristic) Search Strategies: Greedy best first search, A* Search, Optimality of A*, Heuristic Functions.
UNIT-III:
Beyond Classical Search: Local search and optimization problems, Local search in continuous spaces, Searching with non-deterministic actions and partial observations.

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

UNIT-IV:

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

Introduction to Evolutionary Computation: Representation – The Chromosome, Initial Population, Fitness Function, Selection, Reproduction Operators, Stopping Conditions, Evolutionary Computation versus Classical Optimization.

UNIT-V:

FUZZY Systems, Logic and Reasoning: Fuzzy Sets- Formal Definitions, Membership Functions, Fuzzy Operators, Fuzzy Set Characteristics, Fuzziness and Probability, Fuzzy Inferencing.

Philosophical foundations: Weak AI, Strong AI, Ethics of AI and Risks of AI.

Learning Resources:

1. Artificial Intelligence A Modern Approach Third Edition – Russell & Norvig
2. Computational Intelligence: An Introduction, 2nd Edition - Andries P. Engelbrecht
3. https://online.stanford.edu/courses/cs221-artificial-intelligence-principles-and-techniques
4. https://nptel.ac.in/courses/106105077
5. https://ocw.mit.edu/courses/6-034-artificial-intelligence-spring-2005/

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 Test: **90 Minutes**

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 : U22OE510ME
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

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

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

INTRODUCTION TO ROBOTICS

(General Pool)

(Open Elective-III)

SYLLABUS FOR B.E. V-SEMESTER

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

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

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

UNIT-I

ROBOT BASICS

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

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

Robot wrist mechanism, Precision and accuracy of robot.

UNIT-II

ROBOT ELEMENTS

End effectors-Classification, Robot drive system types: Electrical, pneumatic and hydraulic. Robot joints and links-Types, Motion interpolation, Robot trajectories2D and 3D Transformation- Scaling, Rotation and Translation, Homogeneous transformation

UNIT-III

ROBOT KINEMATICS AND CONTROL

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

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

UNIT-IV

ROBOT SENSORS

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

Introduction to Machine Vision and Artificial Intelligence.

UNIT-V

ROBOT APPLICATIONS

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

Applications of Micro and Nanorobots, Future Applications of robots.

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

COURSE NAME-DESIGN THINKING

(Open Elective) SYLLABUS FOR B.E. 3/4 – V SEMESTER

Instruction: 3 Hours	SEE: 60	Course code: U22OE530EH
Credits: 3	CIE: 40	Duration of SEE: 3 Hours

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

examples where these have been applied to create a design that represents customer needs and product specifications.	

Unit 1: Design Thinking Skills
Understand the critical design thinking skills needed to either improve an existing product or design a new product.
1.1 The Need for Design Thinking
1.2 What makes design thinking unique?
1.3 Design thinking checklist

Unit 2: Identifying Customer Needs
Learn to identify customer needs and draft customer needs statements as your first step towards user innovations.
2.1 Think Users' First
2.2 Users' inherent needs
2.3 Empathy and Design Thinking
2.4 Asking the Right Questions
2.5 Persona Empathy map

Unit 3: Product Specifications
Learn how to translate user needs into product specifications quantitatively, and how establishing product metrics can help define those specifications
3.1 Creating a Design Brief Template
3.2 Stakeholder map template
3.3 Customer journey template
3.4 Context map template
3.5 Opportunity map template

Unit 4: Applied Creativity
Learn to apply creativity, brainstorming, and concept generation process in designing needs solutions.
4.1 The need to ideate
4.2 The Rules of ideation
4.3 Participating in an ideation session
4.4 Building a Creative Culture
4.5 Divergent—5 common ideation techniques

Unit 5: Product Development Processes and Prototyping
Learn to select and implement a product development process that's aligned to your project needs. Explore prototyping methods, strategies, and real-life examples where

these have been applied to create a design that represents customer needs and product specifications.
5.1 The need for a prototype
5.2 The Need to Test and how to conduct a structured test
5.3 How to conduct the observers' debrief

METHODOLOGY

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

ASSESSMENTS

- Online assignments
- Individual and Group

Suggested Books

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

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

1	No. of Internal tests	:	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

VASAVI COLLEGE OF ENGINEEING (Autonomous)
IBRAHIMBAGH, HYDERABAD – 500 031
Department of H & SS

Basics of Entrepreneurship
(Open Elective-III) SYLLABUS FOR B.E V Semester

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

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

UNIT-I

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

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

Marketing &Business Regulations:Positioning, Positioning Strategies, Building Digital Presence and Leveraging

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

Learning Resources:

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

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

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

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
DEPARTMENT OF PHYSICS
Open elective Course
FUNDAMENTALS OF THIN FILM TECHNOLOGY AND APPLICATIONS (FTFT)
B.E. V-Semester

L : T : P	Credits	CIE Marks	SEE Marks	SEE Duration	Course Code
02: 0: 0	03	40	60	3 hours	U24OE510PH

CO-PO Mapping

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

Course Objectives	Course Outcomes	BTL
Students are able to	***The students acquire the ability to***	
1. Learn the fundamental atomistic mechanisms.	1. State fundamental definitions of thin film technology.	1
2. Narrate thin film deposition techniques.	2. Describe thin film deposition techniques.	2
3. Acquire knowledge on thin film devices.	3. Illustrate thin film devices and their use.	3
4. Appreciate applications of thin films	4. Use thin films coatings in industrial applications	

UNIT-I: THIN FILM GROWTH

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

UNIT-II: DEPOSITION TECHNIQUES

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

UNIT-III: THIN FILM MATERIAL CHARACTERIZATION TECHNIQUES

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

UNIT-IV: PROPERTIES OF THIN FILMS

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

UNIT-V: THIN FILM DEVICES AND APPLICATIONS

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

Learning resources:

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

Ibrahimbagh, Hyderabad-500 031, Telangana State

DEPARTMENT OF PHYSICS

Open elective Course

FUNDAMENTALS OF VACUUM TECHNOLOGY AND APPLICATIONS (FVT)

B.E. V-Semester

L : T : P	Credits	CIE		SEE		Course Code
		Marks	Exam Duration	Marks	Exam Duration	
03 :0 :0	03	40	90 min	60	3hours	**U24OE520PH**

CO-PO Mapping

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

Course objectives	***Course outcomes***
Students will be able to learn	***At the end of the course students will be***
1. Learn basics definitions of vacuum technology. 2. Acquire principles of vacuum pump parameters. 3. Gain insight of vacuum production methods 4. Learn measurement of vacuum 5. Known various applications of vacuum.	1. Define various vacuum ranges and terms related to vacuum technology. 2. List out vacuum pump parameters. 3. Narrate working of various types of vacuum pumps. 4. Explain working of different vacuum measuring devices. 5. List applications of vacuum in various fields.

UNIT-I: FUNDAMENTALS OF VACUUM

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

UNIT-II: VACUUM TERMINOLOGY

Methods of production of vacuum, vacuum pump function basics, throughput, pumping speed, conductance, evacuation rate, fore vacuum and high-vacuum pumping, Pump Choice, valve less, valved pumping

system, Positive Displacement Vacuum Pumps, Momentum Transfer Vacuum Pumps, Entrapment Pumps, traps and baffles. Function of the oil in oil-sealed vacuum pumps. Effects of condensable vapours on mechanical pump performance, Water vapour tolerance of a pump, Back-streaming

UNIT-III: VACUUM PUMPS

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

UNIT-IV: VACUUM MEASUREMENT

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

UNIT-V: VACUUM APPLICATIONS

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

SUGGESTED BOOKS:

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-22)

B.E. – INFORMATION TECHNOLOGY : SIXTH SEMESTER (2024 - 2025)

B.E (IT) VI-SEMESTER								
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**	
U22PC610IT	Software Engineering	3	-	-	3	60	40	3
U22PC620IT	Embedded Systems and IoT	3	-	-	3	60	40	3
U22PC630IT	Neural Networks and Deep Learning	3	-	-	3	60	40	3
U22OE6XXXX	Open Elective - IV	3	-	-	3	60	40	3
U22HS040EH	Economics and Finance for Engineers	2	-	-	3	60	40	2
U22BS610MA	Skill Development – VII (Verbal Aptitude)	1	-	-	2	40	30	1
U22PE610IT	Skill Development – VIII (Technical Skills – IV)	1	-	-	2	40	30	1
PRACTICALS								
U22PC611IT	Software Engineering Lab	-	-	2	3	50	30	1
U22PC621IT	Embedded Systems and IoT Lab	-	-	2	3	50	30	1
U22PC631IT	Neural Networks and Deep Learning Lab	-	-	2	3	50	30	1
U22PW619IT	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.								2
	Total	**16**	**-**	**8**	-	**580**	**380**	**22**
	Grand Total	**24**			**-**	**960**		

With effect from Academic Year 2024-25 (R22)

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

SOFTWARE ENGINEERING

SYLLABUS FOR B.E VI-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U22PC610IT**
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:*
To introduce various SDLC models and stages in Software design and development lifecycle.	1. Select the most suitable software process model out of several, for the development of a given software project. 2. Develop software requirements specification through a productive working relationship with various stakeholders of the project. 3. Apply Architecture, Component and User Interface design principles for a given problem. 4. Analyze various Systems design like Twitter, Instagram. 5. Compare different ways and techniques of ensuring software quality and apply various test processes and techniques on conventional applications understanding the software quality Assurance concepts.

UNIT I Introduction to Software Engineering: Definition of Software Engineering, application areas of software engineering, Process Framework, Process Patterns, Process Assessment, Personal and Team Process Models, Process Technology, Product and Process. Process Models: Prescriptive Models, Waterfall Model, Incremental Process Models, Evolutionary Process Models, Specialized Process Models, and the Unified Process. An Agile view of Process: What is Agility? What is an Agile Process, and Agile Process Models.

UNIT II Understanding requirements: Requirement Analysis, Data Modeling Concepts, Scenario-Based Modeling, FlowOriented Modeling, Class-Oriented Modeling, Creating a Behavioral Model. 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:

System Design: Process requirements and Estimation**,** PEDALS framework, Basic and advanced strategies, articulating data model. Examples: Twitter, Instagram and Tinyurl- a system design perspective.

UNIT-V:

Software Testing Strategies: A Strategic Approach to Software Testing, Strategic Issues, Validation Testing, System Testing, Black-box and White-box testing, Basis path testing, and Control Structure testing and the Art of Debugging.
Software Quality Assurance (SQA):Elements of SQA, Software Configuration Management, CMMI, ISO 9000 Quality Standards. Product Metrics: A Framework for Product Metrics, Risk Management: Software Risks, Reactive Vs Proactive Risk Strategies, RMMM Plan.

Learning Resources:

1. Roger S.Pressman, Software Engineering: A Practitioners Approach, Seventh Edition, McGraHill, 2009.
2. The System Design Interview, by Lewis C. Lin and Shivam P. Patel. ISBN-13 : 979-8735625452
3. Pankaj Jalote "An Integrated Approach to Software Engineering, Third Edition, Narosa Publishing house, 2008.
4. Salman Abdul Moiz, Software Engineering,AICTE, February2024.
5. James F.Peters, WitoldPedrycz, Software Engineering-An engineering Approach, John Wiley Inc., 2000.
6. Ali Behforoz and Frederic J.Hadson, Software Engineering Fundamentals, Oxford University Press, 1997.
7. https://nptel.ac.in/downloads/106105087/
8. https://onlinecourses.nptel.ac.in/noc22_cs39/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**

DEPARTMENT OF INFORMATION TECHNOLOGY

EMBEDDED SYSTEMS and IOT

SYLLABUS FOR B.E VI- SEMESTER

L:T:P (Hrs./week):: 3:0:0	SEE Marks : 60	Course Code : **U22PC620IT**
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. Explore theoretic aspects of the design and development of an embedded system 2. Familiarize in programming and interfacing concepts related to 8051 and advanced processors. 3. Develop IoT infrastructure for different applications and understand the concepts of Real time systems	1. Apply the architectural features of 8051 microcontroller in writing assembly language and Embedded C programs and explain various concepts related to Real Time systems. 2. Design interfacing circuits for various peripherals with 8051 and understand the architecture features of ARM and write simple programs using it. 3. Understand the architectural of IoT. 4. Develop IoT based real time applications. 5. Understand architectural features of SOC's and Develop Embedded system applications with SOC's.

UNIT – I:

Introduction, Complex Systems and Microprocessor, Embedded System Design Process

Introduction to Real Time systems, Timing constraints, Real Time Task Scheduling, Classification of Real Time scheduling: clock driven, simple priority based, Features of Real time operating system, Case study: VxWorks.

8051 Architecture, signal functions, Instruction set, assembly language programming, Input/output Ports and Circuits, I/O port programming, External Memory interfacing, Counter and Timers: modes of operation, timer programming, Serial communication programming, Interrupts and interrupt programming.

UNIT – II:

Interfacing with 8051, keyboards, LEDs, LCDs, ADC, DAC, stepper motor.

ARM architecture - ARM organization and implementation - The ARM instruction set - The thumb instruction set - Basic ARM Assembly language program - ARM CPU cores.

UNIT – III:
Introduction to Internet of Things- Definition & Characteristics of IoT, Sensors and Actuators, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, Wireless sensor Networks and its technologies, IoT Levels & Deployment Templates, Domain specific IoT's

UNIT – IV:
IoT Design Methodology, Case study on IoT system, Basic building blocks of an IoT device, Bus protocols I2C, CAN, SPI, Raspberry Pi board, Linux on Raspberry Pi, Raspberry Pi Interfaces, Programming Raspberry Pi with Python, IoT Physical Devices and Endpoints Arduino UNO, Introduction to M2M, Differences between IoT and M2M, IoT platforms

UNIT – V:
IoT System On Chip, Embedded platforms for IoT**:** Zynq SOC Architecture, RF SOC architecture, Xilinx Vivado Design Flow, PYNQ open source platform for IoT embedded systems

Learning Resources:

1. Wayne Wolf, "Computers and Components", Elsevier.
2. KennethJ.Ayala, "The8051 Microcontroller", Third Edition, Thomson.
3. Muhammad Ali Mazidi, Janice Gillespie Mazidi, Rolin D. Mc Kinlay, The 8051 Microcontroller and Embedded Systems using Assembly and C, Second Edition, Pearson.
4. David E. Simon, "An Embedded Software Primer", Pearson Education
5. Raj Kamal, "Embedded Systems", Tata McGraw Hill.
6. FrankVahid, TonyGivargis, John Wiley, "Embedded System Design", Wiley Student Edition.
7. W.A. Smith, "ARM Microcontroller Interfacing: Hardware and Software, Eketor, 2010.
8. NPTEL Online Course on Microprocessors and Microcontrollers, Santanu Chattopadhyay.
9. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on Approach", Universities Press.
10. Sirinivas K.G,Siddesh G.M , "Internet of Things" ,2017 Cengage Learning India Pvt Ltd.
11. Rajib Mall, "Real-Time Systems: Theory and Practice," Pearson, 2008.
12. Jane W. Liu, "Real-Time Systems" Pearson Education, 2001.
13. Krishna and Shin, "Real-TIme Systems," Tata McGraw Hill. 1999.
14. http://www.pynq.io/
15. https://www.xilinx.com/products/silicon-devices/soc/zynq-7000.html
16. http://www.ioe.nchu.edu.tw/Pic/CourseItem/4468_20_Zynq_Architecture.pdf

17. https://www.rfwireless-world.com/ApplicationNotes/IoT-System-On-Chip.html
18. https://www.aldec.com/en/company/blog/185--enabling-tysom-zynq-based-embedded-development-board-for-aws-iot-greengrass

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

NEURAL NETWORKS AND DEEP LEARNING

SYLLABUS FOR B.E VI-SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : 60	Course Code : **U22PC630IT**
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 activation functions and apply in multi-layer neural network models. 2. Apply appropriate regularization and optimization techniques for DL model training. 3. Implement and validate CNN models for classification problems in image. 4. Identify appropriate RNN architecture for sequence data analysis. 5. Develop DL models using Keras, Tensorflow and Pytorch libraries.

UNIT-I:

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

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, NesterovMomentum; 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 models, Applications.

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, Encoder-decoder seq-seq architecture, Applications.

UNIT-V:

DL programming: Intro to Keras API, Intro to TensorFlow, Google Net convolution algorithm, Transfer learning for Image classification.
Intro to PyTorch, Neural machine translation algorithm.

Learning Resources:

1. Deep learning, MIT Press by Ian Goodfellow and YoshuaBengio 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**

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
IBRAHIMBAGH, HYDERABAD – 500 031
DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

ECONOMICS AND FINANCE FOR ENGINEERS

SYLLABUS FOR B.E VI-SEMESTER

L:T:P (Hrs./week):: 2:0:0	SEE Marks: 60	Course Code: **U22HS040EH**
Credits: 2	CIE Marks:40	Duration of SEE: 3 Hrs

COURSE OBJECTIVES	**Course Outcomes**
The course will enable the learners to: Understand the concepts and tools of economics, cost and finance that will equip them for decision making.	At the end of the course the learner will be able to : 1. Gain a conceptual understanding of economics as a discipline. 2. Construct a cost sheet and classify costs and make use of break-even analysis in decision making. 3. Evaluate the accounting cycle and explain its importance in recording business transactions 4. Analyze the financial position of business a firm through calculation and interpretation of ratios. 5. Compare and evaluate Long term investment decisions in business

Unit I: Concepts in Economics
Definition of Managerial Economics- Scope of Managerial Economics -Relevance of Economics for Engineers- Law of Demand- assumptions and exceptions - Price elasticity of demand (Application-oriented approach)

Unit II: **Cost Analysis and Profit Planning**
Concept of Cost - Classification of Costs (Fixed Vs Variable, Implicit Vs Explicit, Incremental Vs Marginal)–Preparation of Cost Sheet (Simple Problems)– Breakeven Analysis (Application-oriented approach)

Unit III: **Conceptual Understanding of Accounting**
Accounting Cycle-Journal-Subsidiary Books- Ledger-Trial Balance-Final Accounts (Trading, Profit and Loss Account, Balance Sheet (Theory Only)
Preparation of Trading and Profit and Loss Account and Balance Sheet (Problems without adjustments)

UNIT IV: **Financial Statement Analysis**

Ratio Analysis-uses and limitations- Liquidity, Solvency, Activity & Profitability Ratios (simple problems)

Unit V: **Long Term Investment decisions:**
Capital Budgeting –Traditional and DCF Techniques (simple problems)

Learning Resources for students:

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

Reference books:

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

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 VII – VERBAL ABILITY

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

L:T:P (Hrs./week):: 1:0:0	SEE Marks: 40	Course Code: **U22HS630EH**
Credits: 1	CIE Marks:30	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. Introduce students to higher order thinking and problem solving via vocabulary and its various components 2. Train students to understand context & theme and use it to complete sentences. 3. Train students to identify the structure of sentences & paragraphs 4. Train students to analyze text, e.g., simple outlining and note taking, summarize, draw conclusions, and apply information to personal experiences 5. Train students to improve the quality of sentences by fixing errors	1. Use vocabulary as a tool to solve questions in verbal ability 2. Identify meanings of words using theme and context 3. Solve questions based on jumbles- sentences and paragraphs 4. Develop skills to critically analyze texts and then the ability to identify its theme 5. Improve the quality of their writing by being aware of the common errors

Unit 1: Vocabulary- Reading for Content and Context

Overview:

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

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

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

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

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

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

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

Unit 5: Spotting the Errors
Overview:
In this unit students will focus on identifying errors in sentences, rectifying them and improving the quality of sentences. Building on these skills will also have an impact on the written and spoken skills of

students since they will be aware of the common and often made errors and therefore be able to avoid them while using language.

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

METHODOLOGY

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

ASSESSMENTS

- Online assignments
- Individual and Group

Learning Resources:

learn.talentsprint.com

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

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

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

SOFTWARE ENGINEERING LAB

SYLLABUS FOR B.E VI- SEMESTER

L:T:P (Hrs./week):: 0:0:2	SEE Marks : 50	Course Code : **U22PC611IT**
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:*
Demonstrate the concepts related to analysis, design, testing and Management techniques related to Object Oriented Software development.	1. Understand fundamental concepts and object-oriented techniques of systems analysis and design. 2. Collect and document system requirements. 3. Generate and run test cases for various levels of testing by applying different testing methods. 4. Use project management tools 5. Use of computer based tools to aid in system analysis and design.

1. System Definition
    a) Requirements Management
    b) Data Modeling
2. Design Modeling
    a) Use case Diagram
    b) Class Diagram
    c) Sequence Diagram
    d) Collaboration Diagram
    e) State Chart Diagram
    f) Activity Diagram
    g) Component Diagram
    h) Deployment Diagram
3. Software Development
    a) Application & Web modeling
    b) Configuration Management
    c) Unit Testing
4. Content Management
5. System Testing
    a) Functional Testing
    b) Reliability Testing
    c) Performance Testing
    d) Defect & Change Tracking

6. Change Management
    a) Configuration Management
    b) Requirement Management
    c) System Documentation
7. Project Management

Virtual Lab:

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

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. Http://nptel.iitg.ernet.in/Comp_Sci_Engg/IIT%20Madras/Object%20Oriented%20System%20Design.htm 4. http://nptel.ac.in/courses/106105153/

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

EMBEDDED SYSTEMS AND IOT LAB

SYLLABUS FOR B.E VI- SEMESTER

L:T:P (Hrs./week):: 0:0:2	SEE Marks : 50	Course Code : **U22PC621IT**
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. Learn Programming and interfacing different peripherals with ARM and 8051 microcontrollers and study VxWorks RTO's 2. Design and develop real time embedded system/IOT applications	1. Write Assembly and embedded C language programs for interfacing various peripherals with ARM/8051 microcontroller. 2. Write programs for interfacing various sensors and actuators with Raspberry Pi/Arduino. 3. Develop IoT applications with Wireless technologies like Bluetooth / Zigbee /LoRa. 4. Design and implement embedded system applications with SOC's. 5. Design real time applications using the Real Time Operating Systems concepts.

1. 8051/ARM programming and Interfacing (Using Keil simulator):
    1. Keil introduction and basic programs
    2. 8051 I/O port programming, Serial Communication programming, Timer programming, Interrupt programming
    3. Interfacing different peripherals to 8051 / ARM
2. Internet of Things:
    1. Interfacing different sensors and actuators with Raspberry Pi board/Arduino UNO
    2. Program to operate LED's using push buttons.
    3. Programs demonstrating communication protocol Bluetooth
    4. Programs demonstrating communication protocol Zigbee/LoRa
    5. programs for Publishing data on to cloud and read data from the cloud using MQTT protocol
    6. Data logs using UHF/WiFi
3. Programs with VxWorks RTO's
    1. multi-Tasking
    2. Semaphores

3. Message Queues

4. Experiments with SOC's and EDA (Electronic Design Automation) tool:
    1. Designing, Multiplexer, Counters, finite state machines
    2. Programs demonstrating image processing /speech processing /machine learning

Virtual Lab:

5. To simulate interfacing of basic output components (RGB Led, 7 segments and LCD 16*2) with Arduino: https://iotvirtuallab.github.io/vlab/Experiments/to_simulate_interfacing_of_basic_output_components/index.html

Additional Experiments:

Projects on IoT/SOC's

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 2024-25 (R22)

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF INFORMATION TECHNOLOGY

NEURAL NETWORKS AND DEEP LEARNING LAB

SYLLABUS FOR B.E VI- SEMESTER

L:T:P (Hrs./week):: 0:0:2	SEE Marks : 50	Course Code : **U22PC631IT**
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 technique and use to improve the performance of a fully connected neural network model. 3. Apply CNN models, GANs and transfer learning for computer vision problems. 4. Implement RNNs for text and speech processing. 5. Use transformers for language translation.

1. Introduction to Kerans and 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 R-CNN with Pen-Fudan dataset for Pedestrians.
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 attention based RNN.

9. Speech recognition with commonVoice dataset for English.
10. Classifying videos using CNNs.
11. GAN: Generating images using DCGAN.
12. Transformers for language translation.

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			

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 : **U22PW619IT**
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 : **[5 Marks]**
To be conducted on week-2 : Review of problem Statement, Motivation, Introduction, Use cases and Techstack.

Assesment-2: [10 Marks]
To be conducted on week-7: Review of low level design details for all end-to-end use cases.

Assesment-3: [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)
ACCREDITED BY NAAC WITH 'A++' GRADE
IBRAHIMBAGH, HYDERABAD – 500 031

OPEN ELECTIVES - IV		
Department	**Code**	**Title**
Civil	U22OE610CE	Project Management
ECE	U22OE630PH	Automatic Train Protection System – Kavach
EEE	U22OE610EE	Introduction to Batteries and Battery management System
Mechanical	U22OE610ME	Industry 4.O (Stream : Robotics)
	U22OE620ME	Additive Manufacturing and its Applications (General Pool)
English	U22OE630EH	Advanced Course in Entrepreneurship
Physics	U24OE610PH	Introduction to Nanotechnology

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: U22OE610CE
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 the 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: Tender form, Tender Documents, Tender Notice, Work Order

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

Learning Resources:

1. Srinath L.S., PERT and CPM: Principles and Application, East-West Press, 2001.
2. Peret, F, Construction Project Management an Integrated approach, Taylor and Francis, Taylor and Francis Group, London & New York, 2009
3. Punmia B.C., and Khandelwal, PERT and CPM, Laxmi Publications, 2016.
4. Gahloj. P.S. and Dhiv. B.M., Construction Planning and Management, Wiley Eastern Ltd., 2018.
5. Kumar NeerajJha., Construction Project Management: Theory and Practice, Pearson Education, India, 2015.
6. Seetharaman S., Construction Engineering and Management, Umesh Publications, 2012.

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

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

Duration of Internal Tests : 90 Minutes

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:**U22OE630PH**
Credits : 3	CIE Marks : 40	Duration of SEE : 3 Hours

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

CO-PO/PSO Mapping

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

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

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

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

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

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

UNIT – II: (6 Hours)

Concepts : Location Referencing - Train position, Modes of Onboard

subsystem, Train Characteristics, Mode Transitions, Braking Curves, Speed Profiles, Speed Limits, Speed Monitoring, Target Speed, Target Distance, Movement Authority, Communication Protocols, Key Management System (KMS), Messages & Language

UNIT – III: Design –Kavach: (8 Hours)

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

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

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

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

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

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

Practicals at IRISET Laboratory (12 Hours)

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

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

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

Duration of Internal Tests: 90 Minutes

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

Introduction to Batteries and Battery management System

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

L: T: P (Hrs/Week):3:0:0	SEE Marks: 60	Course Code:**U22OE610EE**
Credits:3	CIE Marks: 40	Duration of SEE: 3Hours

COURSE OBJECTIVES 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

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

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

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

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

UNIT -V: Design of battery BMS:
Design principles of battery BMS, Effect of distance, load, and force on battery life and BMS, energy balancing with multi-battery system.

Learning Resources:

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

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

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

Duration of Internal Test: 90 minutes

VASAVI COLLEGE OF ENGINEEING (Autonomous)

IBRAHIMBAGH, HYDERABAD – 500 031

DEPARTMENT OF MECHANICAL ENGINEERING

INDUSTRY 4.O

(Stream: Robotics)

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

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

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

UNIT – I

Introduction to Industry 4.0

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

Basic principles and technologies of a Smart Factory

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

UNIT – II

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

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

Cyber-Physical Systems and new Business Models

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

UNIT – III

Digital Twins in Production

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

Assistance systems for production

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

UNIT –IV

Human-Robot Collaboration

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

Safety and Security in networked Production Environments

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

UNIT – V

Cloud Manufacturing and the connected factory

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

The smart workpiece

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

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

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 : U22OE620ME
Credits: 3	CIE Marks:40	Duration of SEE : 3 Hours

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

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

Unit-I

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

Unit-II

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

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

UNIT III

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

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

Unit-IV

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

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

UNIT-V

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

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

Learning Resources:

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

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

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

Duration of Internal Test: 90 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
IBRAHIMBAGH, YDERABAD-31
Department of H&SS

ADVANCED COURSE IN ENTREPRENEURSHIP (OE-IV)
SYLLABUS FOR B.E.VI-SEMESTER

L:T:P(Hrs/week):3:0:0	SEE Marks:60	Course Code: U22OE630EH
Credits :03	CIE Marks:40	Duration of SEE: 03Hours

Course objectives The objectives of this course are to	**Course Outcomes** On completion of the course the student will be able to
1. Acquire additional knowledge and skills for developing early customer traction into a repeatable business. 2. Learn the tools and methods for achieving sustainable growth, such as refining the product or service and business models, building brand strategy, making a sales and financial plan etc.	1. Develop an A-team 2. Refine business models and expand customer segments, brand strategy and create digital presence, channel strategy for customer outreach 3. Develop strategies to grow revenues and markets, understand Advance Concepts of business finance, do Financial Planning, find Funding for growth 4. Leverage technologies and platforms for growth stage companies 5. Develop key metrics to track progress, understand basics of registering a company.

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

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

Unit III: Customer Life cycle and Building the A-team
Customer life cycle; identifying secondary revenue streams; Funding Landscape: Funding options for an entrepreneur; Investor hunt: Creating funding plan and

designing the pitch deck; Attracting right talent – I: Intro to building the A-team; Examples; Setting the team for success.

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

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

Learning Resources:

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

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

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

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

Ibrahimbagh, Hyderabad-500 031, Telangana State

DEPARTMENT OF PHYSICS

Open elective Course

INTRODUCTION TO NANOTECHNOLOGY

B.E. VI-Semester

L:T:P	Credits	CIE		SEE		Course Code
		Marks	Exam Duration	Marks	Exam Duration	
03:0:0	03	40	90 min	60	3hours	U24OE610PH

CO-PO Mapping

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

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

UNIT-I: INTRODUCTION TO NANOSCIENCE

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

UNIT-II: PROPERTIES OF NANO MATERIALS

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

UNIT-III: NANOMATERIALS PREPARATION TECHNIQUES

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

UNIT-IV: NANO MATERIAL CHARACTERIZATION TECHNIQUES

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

UNIT-V: CARBON NANO MATERIALS AND APPLICATIONS

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

Learning Resources:

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