VASAVI COLLEGE OF ENGINEERING
(AUTONOMOUS)
Ibrahimbagh, Hyderabad-31
Approved by A.I.C.T.E., New Delhi and
Affiliated to Osmania University, Hyderabad-07

**Sponsored
by
VASAVI ACADEMY OF EDUCATION
Hyderabad**

**SCHEME OF INSTRUCTION AND SYLLABI UNDER CBCS FOR
M.Tech. (CSE) I and II Semesters
(For the batch admitted in 2020-21)
(R-20)**

**DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
Phones: +91-40-23146020, 23146021
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VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-20)
M.TECH. – CSE : FIRST SEMESTER (2020-2021)

Course Code	Name of the Course	Scheme of Instruction Hours per Week L	T	P/D	Duration in Hrs	Scheme of Examination Maximum Marks SEE	CIE	Credits
M.TECH (CSE) I Semester							
THEORY							
PI 20HS110EH	Skill Development Course-I: Communication Skills in English	1	-	-	2	40	30	1
PI 20PE110CS	Skill Development Course-I: Technical Skills	2	-	-	3	60	40	2
PI 20PC110CS	Mathematical Foundations of Computer Science	3	-	-	3	60	40	3
PI 20PC120CS	Advanced Data Structures	3	-	-	3	60	40	3
PI 20PC130CS	Advanced Data Bases	3	-	-	3	60	40	3
PI 20PE1XXCS	Professional Elective - I	3	-	-	3	60	40	3
PI 20PE1XXCS	Professional Elective - II	3	-	-	3	60	40	3
PI 20AC110EH	Audit course-I: English for Research Paper Writing	2	-	-	3	60	40	0
PRACTICALS							
PI 20PC121CS	Advanced Data Structures Lab	-	-	3	-	-	50	1.5
PI 20PE1X1CS	Advanced Data Bases Lab	-	-	3	-	-	50	1.5
PI 20PC118CS	Seminar	-	-	2	-	-	50	1
TOTAL		20	-	8	-	460	460	22
GRAND TOTAL		28			920			
Student should acquire one online course certification equivalent to two credits during I Sem to III Sem							
1 Hour allocated for Sports							

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

Department of Humanities and Social Sciences

SKILL DEVELOPMENT COURSE-I: COMMUNICATION SKILLS IN ENGLISH

SYLLABUS FOR M.TECH. (CSE) – I SEMESTER

L:T:P (Hrs./week) : 1:0:0	SEE Marks : 40	Course Code: **PI20HS110EH**
Credits : 1	CIE Marks : 30	Duration of SEE : 2 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
This course will enable the students to: 1. involve in the content for all the above mentioned four skills in teaching English and to get students proficient in both receptive and productive skills	On completion of the course the students will be able to: 1. Make effective presentations 2. Successfully attempt versant, AMCAT and secure better placements 3. Perform better in Interviews

UNIT – I : Remedial English: Delightful Descriptions
Describing Past, Present and Future Events.

UNIT - II: Developing Conversational Skills
Exchange of pleasantries, Exchange facts and opinions, Using relevant vocabulary.

UNIT - III: Contextual Conversations:
Ask for Information, Give Information, Convey bad news, show appreciation

UNIT - IV: Business English: Professional Communication:
Concise Cogent Communication, Active Listening, Interact, Interpret and Respond.
Expositions and Discussions: Organization, Key Points, Differing Opinions, Logical conclusions. **Effective Writing Skills:** Structure, Rough Draft, Improvisations and Final Draft for Emails, paragraphs and Essays.
High Impact Presentations: Structure, Content, Review, Delivery

UNIT - V: Industry Orientation and Interview Preparation

Interview Preparation– Fundamental Principles of Interviewing, Resume Preparation, Types of Interviews, General Preparations for an Interview. Corporate Survival skills: Personal accountability, Goal Setting, Business Etiquette, Team Work

Learning Resources:

1. Business Communication, by Hory Shankar Mukerjee, Oxford/2013
2. Managing Soft Skills for Personality Development by B.N.Gosh, Tata McGraw- Hill/ 2012
3. Personality Development & Soft Skills by Barun K Mitra, Oxford/2011
4. Murphy, Herta A., Hildebrandt, Herbert W., & Thomas, Jane P., (2008) "Effective Business Communication", Seventh Edition, Tata McGraw Hill, New
   Delhi
5. Locker, Kitty O., Kaczmarek, Stephen Kyo, (2007), "Business Communication – Building Critical Skills", Tata McGraw Hill, New Delhi
6. Lesikar, Raymond V., &Flatley, Marie E., (2005)"Basic Business Communication – Skills for Empowering the Internet Generation", Tenth Edition, Tata McGraw Hill, New Delhi
7. Raman M., & Singh, P., (2006) "Business Communication", Oxford University Press, New Delhi.

Journals / Magazines:

1. Journal of Business Communication, Sage publications
2. Management Education, Mumbai

Websites:

www.mindtools.com
www.bcr.com

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

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

Duration of Internal Tests   :   90 Minutes

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

Department of Computer Science & Engineering

MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

SYLLABUS FOR M.TECH. (CSE) – I SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks Marks:60	Course Code:**PI20PC110CS**
Credits: 3	CIE Marks : 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
	At the end of the course, students will be able to
1. Understand the mathematical fundamentals that is prerequisites for a variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, software Engineering, computer architecture, Operating Systems, distributed systems, Bioinformatics, Machine Learning. 2. Develop the understanding of the mathematical and logical basis to many modern techniques in information technology like machine learning, programming language design, and concurrency. 3. Study various sampling and regression analysis.	1. Understand the basic notions of discrete and continuous probability. 2. Solve simple real world problems of discrete and continuous distributions 3. Understand the methods of statistical inference, and the role that sampling distributions play in those methods. 4. Perform correct and meaningful statistical analyses of simple to moderate complexity.

UNIT – I
Random Variables: Discrete and Continuous Random Variable, Probability Mass, Density and Cumulative Distribution Function, Expected Value, Variance, Moments, Moment Generating Function, Joint Probability Density Function, Marginal, Conditional Probability Distribution, Conditional Expectation and Independent Random Variables.

UNIT – II
Applications of Univariate and Multivariate Random Variables: Central Limit Theorem, Special Discrete Distributions – Binomial and

Poisson, Continuous Distributions – Uniform, Gamma, Normal Distributions (univariate and bivariate random variables), Markov Chains.

UNIT – III
Sampling Distributions: Random samples, Sampling Distributions of Estimators, Method of Moments and Maximum likelihood function.

UNIT – IV
Statistical Inference: Parameters and Statistics, Tests of Hypothesis and Tests of Significance, Critical Region and Level of Significance, Inferences concerning a mean - inferences concerning variances

UNIT – V
Regression Analysis: Curvilinear Regression, Multiple Regression, Correlation, Multiple linear Regression (Matrix Notation)

Learning Resources:

1. Miller & Freund's, Probability and Statistics For Engineers, by Richard A. Johnson, Eight Edition, PHI.
2. T. Veerarajan, Probability, Statistics and Random Processes, Second Edition, Tata McGraw-Hill.
3. John Vince, Foundation Mathematics for computer Science, Springer
4. K. Trivedi. Probability and Statistics with Reliability, Queuing, and Computer Science Applications, Wiley.
5. M. Mitzenmacher and E. Upfal.Probability and Computing: Randomized Algorithms and Probabilistic Analysis.
6. Alan Tucker, Applied Combinatorics, Wiley

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

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

Duration of Internal Tests   :   1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING (Autonomous)
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Department of Computer Science & Engineering

ADVANCED DATA STRUCTURES

SYLLABUS FOR M.TECH. (CSE) – I SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks Marks:60	Course Code:**PI20PC120CS**
Credits: 3	CIE Marks : 40	Duration of SEE: 3 Hours

Course Objectives	**Course Outcomes**
	At the end of the course, Students will be able to
1. Use ADT/libraries to design algorithms for a specific problem. 2. Understand the necessary mathematical abstraction to solve problems. 3. Understand advanced paradigms and data structure to solve algorithmic problems. 4. Analyze the algorithm efficiency and proofs of correctness.	1. Design symbol table using hashing techniques. 2. Explain and design the operation on skip list 3. Develop and analyze algorithms for red-black trees, B-trees and Splay trees. 4. Develop algorithms for text processing applications. 5. Identify suitable data structures and develop algorithms for computational geometry problems.

UNIT-I
Dictionaries: Definition, Dictionary Abstract Data Type, Implementation of Dictionaries.
Hashing: Review of Hashing, Hash Function, Collision Resolution Techniques in Hashing, Separate Chaining, Open Addressing, Linear Probing, Quadratic Probing, Double Hashing, Rehashing, Extendible Hashing.

UNIT-I I
Skip Lists: Need for Randomizing Data Structures and Algorithms, Search and Update Operations on Skip Lists, Probabilistic Analysis of Skip Lists, Deterministic Skip Lists

UNIT-III
Trees: Binary Search Trees, AVL Trees, Red Black Trees, 2-3 Trees, B-Trees, Splay Trees

UNIT-IV
Text Processing: Sting Operations, Brute-Force Pattern Matching, The Boyer-Moore Algorithm, The Knuth-Morris-Pratt Algorithm, Standard Tries, Compressed Tries, Suffix Tries, The Huffman Coding Algorithm, The Longest Common Subsequence Problem (LCS), Applying Dynamic Programming to the LCS Problem.

UNIT-V
Computational Geometry: One Dimensional Range Searching, Two Dimensional Range Searching, Constructing a Priority Search Tree, Searching a Priority Search Tree, Priority Range Trees, Quadtrees, k-D Trees.

Learning Resources:

1. M T Goodrich, Roberto Tamassia, Algorithm Design, John Wiley, 2002.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.
3. Thomas H. Cormen, Leiserson .C.E, Rivest.R.L , Stein.C, Introduction to Algorithm ,2nd edition(2001), MIT press, USA.
4. Horowitz E. Sahani S, Fundamentals of computer Algorithms", Galgotia publications.
5. Aho, Hopcroft, Ulman, The Design and Analysis of Computer algorithms, Pearson Education, (2000).
6. Steven S.Skiena ,The algorithm design manual, Springer (1997).
7. Hari Mohan Pandy, " Design analysis and Algorithms", University Science Press,(2009).
8. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/index.htm.
9. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms
10. http://nptel.ac.in/courses/106101060/
11. https://www.khanacademy.org/computing/computer-science/algorithms

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

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

Duration of Internal Tests   :   1 Hour 30 Minutes

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Department of Computer Science & Engineering

ADVANCED DATABASES
SYLLABUS FOR M.TECH. (CSE) – I SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks Marks:60	Course Code:**PI20PC130CS**
Credits: 3	CIE Marks : 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	At *the end of the course, students will be* able to
1. Apply knowledge of advanced database management techniques to provide solution for a database intensive problem.	1. Create and query tables in object relational and object oriented databases 2. Create, query and process data in xml files 3. Describe query processing mechanisms and query optimization 4. Explain inter query, intra query parallelism and distributed database processing techniques 5. Apply performance tuning methods and describe data representation in spatial, geographical and temporal databases

UNIT-I :
Object Based Databases: Overview, Complex Data Types, Structured Types and Inheritance in SQL, Table Inheritance, Array and Multiset Types in SQL, Object-Identity and Reference Types in SQL, Implementing O-R features, Persistent Programming Languages, Object-Relational Mapping, Object-Oriented versus Object-Relational.

UNIT-II :
XML: Motivation, Structure of XML data, XML Document Schema, Querying and Transformation, Application program Interfaces to XML , Storage of XML Data, XML applications.

UNIT-III :
Query Processing: Overview, Measures of Query Cost, Selection Operation, Sorting, Join Operation, Other Operations, Evaluation of Expressions.
Query Optimization: Overview, Transformation of Relational Expressions, Estimating Statistics of Expression Results, Choice of Evaluation Plans, Materialized Views.

UNIT-IV :
Parallel Databases: Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Query Optimization, Design of Parallel Systems.
Distributed Databases : Homogeneous and Heterogeneous Databases, Distributed Data Storage, Distributed Transactions, Commit Protocols, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing, Heterogeneous Distributed Databases, Cloud-Based Databases, Directory Systems.

UNIT-V :
Advanced Application Development: Performance Tuning, Performance Benchmarks, Other Issues in Application Development, Standardization.
Spatial and Temporal Data and Mobility: Motivation, Time in Databases, Spatial and Geographic Data, Multimedia Databases, Mobility and Personal Databases.

Learning Resources:
1. Abraham Silberschatz, Henry F Korth, Sudharshan S, Database System Concepts, 6th Edition(2011), McGraw-Hill International Edition.
1. Ramez Elmasri, Durvasul VLN Somyazulu, Shamkant B Navathe, Shyam K Gupta, Fundamentals of Database Systems, 4th Edition(2006), Pearson Education.
2. Date CJ, Kannan A, Swamynathan S, An Introduction to Database System, 8th Edition(2006) Pearson Education.
3. Raghu Ramakrishna, and Johannes Gehrke, Database Management Systems, 3rd Edition(2003), McGraw Hill.
4. http://nptel.ac.in/courses/106106093/

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

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

Duration of Internal Tests   :   1 Hour 30 Minutes

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

Department of Computer Science & Engineering

ARTIFICIAL INTELLIGENCE (PROFESSIONAL ELECTIVE-I)

SYLLABUS FOR M.TECH. (CSE) – I SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks Marks:60	Course Code: **PI20PE110CS**
Credits: 3	CIE Marks : 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	At the end of the course, Students will be able to
1. Understand issues and techniques involved in the creation of intelligent systems 2. Create logical agents to do inference using predicate logic, fuzz logic or probability theory.	1. Choose appropriate state space searching techniques to maximize the performance 2. Understand first-order propositional and predicate logic to represent knowledge 3. Solve problems involving uncertain information using probabilistic techniques. Apply planning algorithms to find optimal solutions 4. Apply techniques like decision tree , neural network and rule learning to a given AI application for learning 5. Understand the steps involved in Natural language processing. Apply fuzzy logic in designing AI systems

UNIT-I
Introduction: Definition, history and applications of AI.
Search in State Spaces: Agents that plan, Uninformed search, Algorithm A*, Heuristic Functions and Search Efficiency, Alternative Search Formulations and Applications, Adversarial Search.

UNIT – II
Knowledge Representation and Reasoning: The Propositional Calculus, Resolution in Propositional Calculus, The Predicate Calculus, Resolution in Predicate Calculus, Rule-Based Expert Systems, Representing Common Sense Knowledge.

UNIT-III
Reasoning with Uncertain Information: Review of probability theory, Probabilistic Inference, Bayes Networks.
Planning Methods Based on Logic: The Situation Calculus, Planning.

UNIT-IV
Learning from Observations: Learning decision-trees using Information theory, Learning General Logical Descriptions.
Neural Networks: Perceptron, Multilayer feed-forward neural network. Rule Learning.

UNIT-V
Natural Language Processing: Communication among agents
Fuzzy Logic Systems: Crisp Sets, Fuzzy Sets, Some fuzzy terminology, Fuzzy Logic Control, Sugeno Style of Fuzzy inference processing, Fuzzy hedges, α-Cut Threshold, Neuro Fuzzy systems.

Learning Resources:
1. Nils J. Nilsson, Artificial Intelligence: A New Synthesis, (1998),Elsevier
2. Stuart Russell, Peter Norvig, Artificial Intelligence – A Modern Approach, Third Edition (2015), Pearson
3. Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, Third Edition(2009), Tata McGraw Hill
4. George F Luger , Artificial Intelligence, Structures and strategies for Complex Problem Solving, Sixth Edition,(2009), Pearson
5. http://www.nptel.ac.in/courses/106105077
6. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-spring-2005
7. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-034-artificial-intelligence-fall-2010/lecture-videos

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

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

Duration of Internal Tests   :   1 Hour 30 Minutes

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

Department of Computer Science & Engineering

ADVANCED OPERATING SYSTEMS (PROFESSIONAL ELECTIVE-II)

SYLLABUS FOR M.TECH. (CSE) – I SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks Marks:60	Course Code: **PI20PE124CS**
Credits: 3	CIE Marks : 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	**COURSE OUTCOMES**
	At the end of the course, Students will be able to
1. Describe different components of distributed operating system and design suitable algorithms for the better functionality of distributed operating system.	1. Explain architectures and issues in distributed operating systems 2. Illustrate different distributed mutual exclusion algorithms and distributed deadlock algorithms 3. Design distributed scheduling algorithm and describe distributed shared memory 4. Explain failure recovery, fault tolerance and apply various cryptographic algorithms for the protection of given data 5. Differentiate architectures of multiprocessor system and concurrency control algorithms

UNIT-I
Architectures of Distributed Systems: System Architecture Types, Distributed OS, Issues in Distributed Operating Systems.
Theoretical Foundations: Inherent Limitations of a Distributed System, Lamport's Logical clocks, Vector Clocks, Global State, Termination Detection.

UNIT-II
Distributed Mutual Exclusion: The classification of Mutual Exclusion Algorithms, Preliminaries, Non-Token-Based Algorithms, Lamport's Algorithm, The Ricart-Agrawala Algorithm, Token-Based Algorithms Suzuki-kasami's Broadcast Algorithm, Singhal's Heuristic Algorithm.

Distributed Deadlock Detection: Resource Vs Communication Deadlocks, A graph– theoretic Model, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Control Organizations for Distributed Deadlock Detection, Centralized Deadlock-Detection Algorithms, The completely Centralized Algorithm, The Ho-Ramamoorthy Algorithms. Distributed Deadlock Detection Algorithms-A Path-Pushing, Edge-Chasing, Hierarchical Deadlock Detection Algorithms, The Menasce-Muntz and Ho-Ramamoorthy Algorithm.
Agreement protocols: The System Model, The Byzantine Agreement Problem, The Consensus Problem.

UNIT-III
Distributed File Systems: Mechanisms for Building Distributed File Systems, Design Issues.
Case Studies: Sun NFS, Sprite File System, Apollo DOMAIN, Coda File systems.
Distributed Shared Memory: Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues.
Case Studies: IVY, Mirage, Clouds
Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributing Algorithm, Stability, Load Distributing Algorithms, Performance Comparison.

UNIT-IV
Failure Recovery: Backward and Forward Error Recovery in Concurrent Systems, Consistent Set of Checkpoints, Synchronous And Asynchronous check Pointing and Recovery.
Fault Tolerance: Commit Protocols, Non-blocking Commit Protocols, Voting Protocols.
Resource Protection and Security: The Access Matrix Model
Data Security:Cryptography: Private Key and Public Key Cryptography
Case Study: The Kerberos System.

UNIT-V
Multiprocessor System Architectures: Motivation, Basic Multiprocessor System Architectures, Interconnection Networks for Multiprocessor Systems, Caching, Hypercube Architectures.
Multiprocessor Operating Systems: Threads, Process Synchronization, Processor Scheduling, Memory management: The Mach Operating System.

Database Operating Systems: Concurrence Control Model, Problem of Concurrency Control, Distributed Database Systems, Concurrency Control Algorithms.

Learning Resources:

1. Mukesh Singhal,Niranjan G. Shivaratri, "Advanced concepts in Operating systems", Tata McGraw Hill Edition (2001),Tata McGraw Hill Education, New Delhi.
2. Pradeep K, Sinha,   Distributed Operating Systems Concepts and Design, First Edition(2002),   Prentice-Hall of India, Delhi.
3. Andrew S.Tanenbaum, Distributed Operating Systems, ,First Edition(2011), Pearson Education India,   New Delhi.
4. http://nptel.ac.in/courses/106106107/1
5. https://www.youtube.com/watch?v=2L7jnaXuOc8
6. https://people.eecs.berkeley.edu/~kubitron/cs194-24/index_lectures.html

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

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

Duration of Internal Tests   :   1 Hour 30 Minutes

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

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

English for Research Paper Writing (Audit Course – I)
SYLLABUS FOR M.TECH. (CSE) – I SEMESTER

L:T:P (Hrs./week) : 2:0:0	SEE Marks : 60	Course Code:**PI20AC110EH**
Credits : -	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
This will enable the students should be able to: 1. Understand, how to improve your writing skills and level of readability 2. Learn about what to write in each section 3. Understand the skills needed when writing a Title 4. Ensure the good quality of paper at very first-time submission	On completion of the course, students will be able to 1. write research papers 2. write citations as per the MLA style sheet and APA format 3. write concisely and clearly following the rules of simple grammar, diction and coherence.

UNIT-1
Planning and Preparation, Word Order, Breaking up long sentences. Structuring Paragraphs and Sentences, Being concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT-2
Clarifying Who Did What, Highlighting your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT-3
Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.

UNIT-4
Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, useful phrases,

how to ensure paper is as good as it could possibly be the first-time submission.

UNIT-5

Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions.

Learning resources:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on Google Books)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge University Press
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM Highman's book.
4. Adrian Wallwork, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011

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

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

Duration of Internal Tests   :   90 Minutes

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Department of Computer Science & Engineering

ADVANCED DATA STRUCTURES LAB

SYLLABUS FOR M.TECH. (CSE) – I SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks Marks:0	Course Code: **PI20PC111CS**
Credits:1.5	CIE Marks : 50	Duration of SEE: -----

Course Objectives	**Course Outcomes**
	At the end of the course, Students will be able to
1. Identify and apply various algorithm design strategies to solve engineering problems with efficient time and space utilization	1. Implement and use basic data structures like stack, queue, linked list to solve problems 2. Implement hashing techniques 3. Develop algorithm to do operations on special trees 4. Develop string pattern matching algorithms. 5. Implement range searching algorithms

List of Experiments:

1. Stack, queues and Linked list
2. Linear open addressing collision resolution Techniques
3. Chaining collision resolution Techniques
4. Double hashing
5. Skip list
6. Binary Search Tree (BST)
7. AVL Tree
8. B-trees
9. Brute-Force pattern matching algorithm
10. Boyer–Moore Pattern Matching Algorithm.
11. KMP Pattern Matching Algorithm with failure function.
12. Huffman Coding algorithm
13. One dimensional range searching algorithm
14. Two dimensional range searching algorithm
15. Priority search tree

Learning Resources:

1. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, 2nd Edition, Pearson, 2004.
2. Thomas H. Cormen, Leiserson .C.E, Rivest.R.L , Stein.C, Introduction to Algorithm ,2nd edition(2001), MIT press, USA.
3. M.T.Goodrich, R.Tomassia, Algorithm design – Foundations, Analysis, and Internet Algorithms, John Wiley, (2002).
4. Horowitz E. Sahani S, Fundamentals of computer Algorithms", Galgotia publications.
5. Aho, Hopcroft, Ulman, The Design and Analysis of Computer algorithms, Pearson Education, (2000).
6. Steven S.Skiena ,The algorithm design manual, Springer (1997).
7. Hari Mohan Pandy, " Design analysis and Algorithms", University Science Press,(2009).
8. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/index.htm.
9. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms
10. http://nptel.ac.in/courses/106101060/
11. https://www.khanacademy.org/computing/computer-science/algorithms

No. of Internal Tests:	01	Max. Marks for Internal Test:	20
Marks for assessment of each experiment			30
Duration of Internal Test: 2 Hours			

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

Department of Computer Science & Engineering

ADVANCED DATABASES LAB

SYLLABUS FOR M.TECH. (CSE) – I SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks Marks:0	Course Code: **PI20PC131CS**
Credits: 1.5	CIE Marks : 50	Duration of SEE: ---

Course Objectives	Course Outcomes
	At the end of the course, Students will be able to
1. Apply database management techniques to provide solution for a data intensive problem	1. Create and query the tables in object relational and object oriented databases 2. Create, query and process data in xml files 3. Implement sort and join operations on tables 4. Access remote data in distributed database system 5. Apply tuning methods to optimize the performance of a database

List of Experiments:

1. Creating tables and Inserting values for Retail Banking Database
2. Grouping Data, Sub Queries
3. Joins, Set operations
4. Aggregation operations.
5. Creating indexes on a table
6. Views, Clusters
7. Sequences, Object Types
8. Object views, Nested tables
9. Variable Arrays, Referencing Objects
10. Creating XML File for university database
11. Implementing External Sort-Merge algorithm
12. Implementing Nested-loop join algorithm
13. Implementing Block Nested-loop join algorithm
14. Accessing remote data

Learning Resources:

1. Ivan Bayross, SQL, PL/SQL, The Programming Language of Oracle, 4th Edition, PBP Publications.

2. AbrSilberschatz, Henry F Korth, Sudharshan S, Database System Concepts, 6th Edition(2011), McGraw-Hill International Edition.

3. http://nptel.ac.in/courses/106106093/

No. of Internal Tests:	01	Max. Marks for Internal Test:	20
Marks for assessment of each experiment			30
Duration of Internal Test: 2 Hours			

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

Department of Computer Science & Engineering

SEMINAR-I

SYLLABUS FOR M.TECH. (CSE) – I SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks Marks:-	Course Code:**PI20PC118CS**
Credits:1	CIE Marks : 50	Duration of SEE: -

Course Objectives	**Course Outcomes**
	At the end of the course, Students will be able to
1. Acquire knowledge on latest technologies and on-going research areas in Computer Science and Engineering.	1. Improve presentation and communication skills 2. Acquire knowledge about recent advancements in industry and new research trends 3. Collect information through literature survey, analyze and present them 4. Acquire knowledge about new hardware and software needs of market 5. Acquire technical document writing skills

Oral presentation is an important aspect of engineering education. The objective of the seminar is to prepare the student for systematic independent study of state of the art topics in broad area of his/her specialization.

Seminar topics can be chosen by the students with the advice from the faculty members.

Students are to be exposed to following aspects of seminar presentation:
       Literature survey
       Organization of material
       Preparation of OHP slides / PC presentation
       Technical writing.

Each student is required to:

1. Submit one page of synopsis of the seminar talk two days before for display on notice board.
2. Give 20 minutes presentation through OHP, PC and slide project followed by 10 minutes discussion.
3. Submit a report on the seminar topic with a list of references and slides used within a week.

Seminars are to scheduled from the 3rd week to the last week of the semester and any change in schedule should be discouraged.

The sessional marks will be awarded to the students by at least 2 faculty members on the basis of an oral and a written presentation as well as their involvement in the discussion. Average of two presentations is considered for award of sessional marks for each student.

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-20)
M.TECH. – CSE : SECOND SEMESTER (2020- 2021)

Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			Credits
		Hours per Week			Duration in Hrs	Maximum Marks		
		L	T	P/D		SEE	CIE	
THEORY								
PI 20HS210EH	Skill Development Course-II: Soft Skills	1	-	-	2	40	30	1
PI 20PE210CS	Skill Development Course-II: Technical Skills	2	-	-	3	60	40	2
PI 20PC210CS	Advanced Algorithms	3	-	-	3	60	40	3
PI 20PC220CS	Distributed Computing	3	-	-	3	60	40	3
PI 20PC230CS	Data Mining	3	-	-	3	60	40	3
PI 20PC240ME	Research Methodology and IPR	2	-	-	3	60	40	2
PI 20PE2XXCS	Professional Elective -III	3	-	-	3	60	40	3
PI 20PE2XXCS	Professional Elective - IV	3	-	-	3	60	40	3
PI20AC210EH	Audit course-II: Pedagogy Studies	2	-	-	3	60	40	0
PRACTICALS								
PI 20PC211CS	Advanced Algorithms Lab	-	-	3	-	-	50	1.5
PI20PC221CS	Distributed Computing Lab	-	-	3	-	-	50	1.5
PI20PW219CS	Mini Project	-	-	2	-	-	50	1
TOTAL		22	-	8	-	520	500	24
GRAND TOTAL		30				1020		
M.TECH (CSE) II Semester								

Student should acquire one online course certification equivalent to two credits during I Sem to III Sem

1 Hour allocated for Sports

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

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

Course Name : Skill Development Course-II: Soft Skills

SYLLABUS FOR M.TECH - SECOND SEMESTER

L : T : P (Hrs/Week) : 2	SEE Marks : 60	Course Code: **U20HS210EH**
Credits: 2	CIE Marks : 40	Duration of SEE : Hours : 120 Minutes

COURSE OBJECTIVES	COURSE OUTCOMES
This is a foundation course and aims at enhancing employability skills in students.	At the end of the course students will be able to:
1. Students will be introduced to higher order thinking skills and problem solving on the following areas - Arithmetic ability, Numerical ability and General reasoning.	1. Solve questions on the above mentioned areas using short cuts and smart methods.
2.Students will be trained to work systematically with speed and accuracy while problem solving.	2. Understand the fundamentals concept of Aptitude skills. 3. Perform calculations with speed and accuracy.

UNIT 1 QUANTITATIVE APTITUDE - NUMERICAL ABILITY
COURSE CONTENTS:

UNIT – I

Introduction to Aptitude Exams and test Areas, Numeric Puzzles and games, Speed Maths.

Unit – II

Ratio, Proportion, Variations and its applications in Time & Work, Time Speed & Distance and other general applications.

Unit – III

Linear Permutations, Permutations of things including identical items, Circular arrangements, Combinations and Probability

Unit – IV

Percentages and its applications and Introduction to various Question Types in Data Interpretation

Unit –V

Syllogisms, Cubes, Venn Diagrams and Set Theory, Clocks and calendars, Number series

Learning Resources:

1.scoremore.talentsprint.com
The break-up of CIE: Internal Tests   + Assignments + Quizzes

1	No. of Internal Tests	:	2	Max. Marks for each Internal Test	:	30
2	No. of Assignments	:	2	Max. Marks for each Assignment	:	2.5
3	No. of Quizzes	:	2	Max. Marks for each Quiz Test	:	2.5

Duration of Internal Tests   :   1 Hour 30 Minutes

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

Department of Computer Science & Engineering

ADVANCED ALGORITHMS

SYLLABUS FOR M.TECH. (CSE) – II SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks Marks:60	Course Code: **PI20PC210CS**
Credits: 3	CIE Marks : 40	Duration of SEE: 3 hours

Course Objectives	**Course Outcomes**
	At the end of the course, Students will be able to
1. introduce students to the advanced methods of designing and analyzing algorithms. 2. choose appropriate algorithms and use it for a specific problem. 3. understand different classes of problems concerning their computation difficulties.	1. Analyze the complexity/performance of sorting and graph algorithms 2. Apply greedy paradigm to solve problem on non linear data structure 3. Design and analyze network flow and matrix computation algorithms. 4. Design and analyze algorithms using dynamic programming approach and number theoretic algorithm to solve shortest path problem 5. Differentiate between NP-complete and NP-hard problems

UNIT-I
Sorting: Review of various sorting algorithms, topological sorting
Graph: BFS, DFS, shortest path in edge-weighted case (Dijkasra's), computation of strongly connected components, emphasis on correctness proof of the algorithm and time/space analysis, example of amortized analysis.

UNIT-II
Introduction to greedy paradigm, algorithm to compute a maximum weight maximal independent set. Application of Minimum Spanning Tree.
Graph Matching: Algorithm to compute maximum matching. Characterization of maximum matching by augmenting paths, Edmond's Blossom algorithm to compute augmenting path.

UNIT-III

Flow-Networks: Maxflow-mincut theorem, Ford-Fulkerson Method to compute maximum flow, Edmond-Karp maximum-flow algorithm.

Matrix Computations: Strassen's algorithm and introduction to divide and conquer paradigm, inverse of a triangular matrix, relation between the time complexities of basic matrix operations, LUP-decomposition.

UNIT-IV

Dynamic programming: Introduction to dynamic programming paradigm, examples of dynamic programming.

Modulo Representation of integers/polynomials: Chinese Remainder Theorem, Conversion between base-representation and modulo-representation. Extension to polynomials, Interpolation problem.

Fourier Transforms: Discrete Fourier Transform (DFT),Fast Fourier Transform (FFT) algorithm, Schonhage-Strassen Integer Multiplication algorithm.

UNIT- V

Linear Programming: Geometry of the feasibility region and Simplex algorithm.

NP-completeness: Proof of NP-hardness and NP-completeness. Approximation algorithms, Randomized Algorithms, Interior Point Method, Advanced Number Theoretic Algorithm

Learning Resources:

1. Thomas H. CORMEN, LEISERSON .C.E, RIVEST.R.L, STEIN.C, "Introduction to Algorithm,2nd edition(2001), MIT press, USA.
2. Aho, Hopcroft, Ulman, The Design and Analysis of Computer algorithms,(2000) Pearson Education
3. "Algorithm Design" by Kleinberg and Tardos.
4. M.T.Goodrich, R.Tomassia, Algorithm design – Foundations, Analysis, and Internet Algorithms, John Wiley, (2002).
5. Horowitz E. Sahani S, Fundamentals of computer Algorithms, Galgotia publications.
6. Steven S.Skiena ,The algorithm design manual, Springer (1997).
7. Hari Mohan Pandy, Design analysis and Algorithms, University Science Press, (2009).
8. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/index.htm.
9. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms
10. http://nptel.ac.in/courses/106101060/
11. https://www.khanacademy.org/computing/computer-science/algorithms

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

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

Duration of Internal Tests   :   1 Hour 30 Minutes

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

Department of Computer Science & Engineering

DISTRIBUTED COMPUTING

SYLLABUS FOR M.TECH. (CSE) – II SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks Marks:60	Course Code: **PI20PC220CS**
Credits: 3	CIE Marks : 40	Duration of SEE: 3 Hours

Course Objectives	Course Outcomes
	At the end of the course, Students will be able to
1. describe the design issues of distributed systems and demonstrate component technologies	1. Explain the goals and design issues of distributed systems 2. Demonstrate remote procedural call and describe message and stream oriented communication 3. Describe design issues of server and naming entities in a distributed system 4. Distinguish between CORBA, EJB and GLOBE 5. Describe quality of service parameters in distributed multimedia systems

UNIT-I
Introduction: Definition of Distributed Systems, Goals: Makin Resources Accessible, Distribution Transparency, Openness, Scalability, Types of Distributed Systems: Distributed Computing Systems, Distributed Information Systems, Distributed Pervasive Systems, Architectural Styles, System Architectures: Centralized Architectures, Distributed Architectures, Hybrid Architectures, Architectures Versus Middleware: Interceptors, General Approaches to Adaptive Software.

UNIT-II
Communication: Layered Protocols, Types of Communication, Remote Procedure Call: Basic RPC Operation, Parameter Passing, Asynchronous RPC, Message-Oriented Communication: Message-Oriented Transient Communication, Message-Oriented Persistent Communication, Stream Oriented Communication: Support for Continuous Media, Streams and Quality of Service, Stream Synchronization.

UNIT-III
Processes, Threads: Introduction to Threads, Threads in Distributed Systems, Clients: Networked User Interfaces, Client-Side Software for Distribution Transparency, Servers: General Design Issues, Server Clusters, Managing Server Clusters.
Naming: Names, Identifiers and Addresses, Flat Naming: Simple Solutions, Home-Based Approaches, Distributed Hash Tables, Hierarchical Approaches, Structured Naming: Name Spaces, Name Resolution, The Implementation of a Name Space, Example: DNS, Attribute-Based Naming: Directory Services, Hierarchical Implementations: LDAP, Decentralized Implementations.

UNIT-IV
Distributed Object Based Systems: Architecture: Distributed Objects, Example: Enterprise Java Beans (EJB), Example: Globe Distributed Shared Objects, Processes: Object Servers, Example: Ice Runtime System, Communication: Binding a Client to an Object, Static versus Dynamic Remote Method Invocations, Parameter Passing, Example: Java RMI, Object-Based Messaging, Naming: CORBA Object References, Globe Object References, Synchronization, Caching and Replication: Entry Consistency, Replicated Invocations, Fault Tolerance: Example: Fault-Tolerant CORBA, Java, Security: Example: Globe, Security for Remote Objects.

UNIT-V
Distributed Multimedia Systems: Introduction, Characteristics of Multimedia Data, Quality of Service Management: Quality of Service Negotiation, Admission Control, Resource Management: Resource Scheduling, Stream Adaptation.

Learning Resources:
1. Andrew S. Tanenbaum and Maarten Van Steen, Distributed Systems: Principles and Paradigms, PHI, 2nd Edition, (2011).
2. Colouris G. Dollimore Jean, Kindberg Tim, "Distributed Systems Concepts and Design", 4th Edition, ,(2012),Pearson Education.
3. Arun Kulkarni, Nupur Prasad Giri, Nikhilesh Joshi, Bhushan Jadhav, "Parallel and Distributed Systems", Weily Paperback – 2016
4. http://courses.cs.washington.edu/courses/cse552/07sp/
5. http://nptel.ac.in/courses/106106107/
6. https://henryr.github.io/distributed-systems-readings/

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

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

Duration of Internal Tests   :   1 Hour 30 Minutes

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

Department of Computer Science & Engineering

DATA MINING

SYLLABUS FOR M.TECH. (CSE) – II SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks Marks:60	Course Code: **PI20PC230CS**
Credits: 3	CIE Marks : 40	Duration of SEE: 3 hours

Course Objectives	Course Outcomes
	At the end of the course, Students will be able to
1. Analyze various data mining tasks to find relevant patterns from large databases	1. Explain the steps in KDD , Identify various pre-processing techniques and Compute similarity among objects and differentiate relational & multidimensional data models
	2. Build a classification model to classify unknown data objects based on different classification techniques
	3. Illustrate the use of advanced classification models for prediction
	4. Find associations and correlations among items by mining frequent patterns from transactional databases
	5. Evaluate clusters formed based on various clustering techniques

UNIT-I
Introduction: Challenges, The Origins of Data Mining, Data Mining Tasks
Data: Types of Data, Data Quality, Data Preprocessing, Measures of Similarity and Dissimilarity, OLAP and Multidimensional Data Analysis.

UNIT-II
Classification: Preliminaries, General Approach to Solving a Classification Problem, Decision Tree Induction, Model Overfitting, Evaluating the Performance of a Classifier, Methods for Comparing Classifiers, Rule-Based Classifier.

UNIT-III
Classification: Nearest-Neighbor classifiers, Bayesian Classifiers, Artificial Neural Networks (ANN), Support Vector Machine (SVM), Ensemble Methods, Class Imbalance Problem, Multiclass Problem.

UNIT-IV
Association Analysis: Problem Definition, Frequent Itemset Generation, Rule Generation, Compact Representation of Frequent Itemsets, Alternative Methods for Generating Frequent Itemsets, FP-Growth Algorithm, Evaluation of Association Patterns, Effect of Skewed Support Distribution, Handling Categorical Attributes, Handling Continuous Attributes, Handling a Concept Hierarchy.

UNIT-V
Cluster Analysis: Overview, K-means, Agglomerative Hierarchical Clustering, DBSCAN, Cluster Evaluation, Clusters and Clustering Algorithms.

Learning Resources:
1. Pang-Ning Tan, Vipin Kumar,Michael Steinbach, "Introduction to Data Mining", (2017),Pearson Education
2. Jiawei Han & Micheline Kamber and Jain Pei ,Data Mining Concepts and Techniques , Third Edition(2011), India.
3. Margaret H Dunham, Data Mining Introductory and advanced topics , Pearson education
4. Arun K Pujari ,Data Mining Techniques, (2017) ,University Press
5. Sam Anahory , Dennis Murray ,Data Warehousing in the Real World, Pearson Education
6. Paulraj Ponnaiah, Data Warehousing Fundamentals, Wiley Student ed.
7. http://web.stanford.edu/class/cs345a/

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

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

Duration of Internal Tests   :   1 Hour 30 Minutes

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

Department Of Mechanical Engineering

Research Methodology and IPR

SYLLABUS FOR M.TECH. (CSE) – II SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks Marks:60	Course Code: **PI20PC240CS**
Credits: 2	CIE Marks : 40	Duration of SEE: 3 hours

Course Objectives	Course Outcomes
	At the end of the course, Students will be able to
1. To impart knowledge on Research problem definition and IPR	1. Understand research problem formulation.
	2. Analyze research related information and follow research ethics
	3. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
	4. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
	5. Understand that IPR protection provides an incentive to inventors for further researchwork and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.

UNIT - I
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of

investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations

UNIT - II
Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developinga Research Proposal, Format of research proposal, a presentation and assessment by a review committee

UNIT - III
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT - IV
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT - V
New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

Learning References:

1. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students'"
2. Wayne Goddard and Stuart Melville, "Research Methodology: An Introduction"
3. Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"
4. Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd,2007.
5. Mayall, "Industrial Design", McGraw Hill, 1992.

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 Computer Science & Engineering

OBJECT ORIENTED SOFTWARE ENGINEERING (PROFESSIONAL ELECTIVE-III)

SYLLABUS FOR M.TECH. (CSE) – II SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks Marks:60	Course Code: **PI20PC235CS**
Credits: 3	CIE Marks : 40	Duration of SEE: 3 hours

Course Objectives	Course Outcomes
	At the end of the course, Students will be able to
1. construct an efficient information system using Object Oriented programming concepts	1. Define the software systems ,discuss different problems in software system development and solve these problems using object oriented concepts
	2. Differentiate different fact finding techniques to capture the requirements and apply different methods for requirement analysis
	3. Analyze the different object oriented programming concepts and apply them in software system development
	4. Apply different design patterns in software system development to solve real world problems
	5. Explain different methods for database design and different reusable components for software system development

UNIT-I
Information System: Problems in Information System development, Project Life Cycles, Managing Information Systems Development, User Involvement and Methodological approaches, Basic Concepts and Origins of Object Orientation Modeling concepts.

UNIT-II

Requirement Capture: User requirements, Requirements capture and Modeling, Requirement Analysis, Use Case Realization, The Class Diagram, Assembling the Analysis Class Diagram Refining the Requirement Models, Component – based Development, Software Development patterns,
Object Interaction, Object Interaction and Collaboration, Interaction Sequence Diagram, Collaboration Diagram, Model Consistency

UNIT-III

Specifying Operations, The Role of Operation Specification, Contracts, Describing Operation Logic, Object Constraint Language, Creating an operation specification, Specifying Control, States and Events, Basic Notations, Further Notations, Preparing a state chart, Consistency Checking, Quality Guidelines, Design, Moving into Design , Logical and Physical design, System Design and Detail Design, Qualities and Objectives of Analysis and design, Measurable Objectives in Design, planning for Design , System Design, The Major elements of system design, Software Architecture , Concurrency, Processor Allocation, Data Management Issues, Development Standards, Design for Implementation

UNIT-IV

Object Design, Class Specification, Interfaces, Criteria for Good Design, Designing Associations, Integrity Constraints, Designing Operations, Normalization, Design patterns, Software Development Patterns, Documenting Patterns- Pattern Temples, How to use design patterns, Human Computer Interaction, The User Interface, Approaches to User Interface Design , Standards and Legal Requirements , Designing Boundary Classes, The Architecture if presentation layer, Prototyping User Interface, User Interface Design Patterns, Modeling the Interface using State charts

Testing concepts: Fault and Erroneous states and failures, Test Cases.
Testing activities: Component Inspection, Usability Testing, Unit Testing, Integration Testing, system testing, Regression Testing, Model Based Testing.

UNIT-V

Data Management Design, Persistence, File Systems, Data Base Management Systems, Design RDBMS , Design ODMS, Distributed Data Bases, Designing Data Management Classes, Software Implementation, Component diagram and Deployment Diagram, Data Conversion, User Documentation and Training, Implementation Strategies, Review and Maintenance, Reusable Components, Planning a strategy for reuse, Commercial available Component ware, Managing Object Oriented Projects, Resource Allocation and Planning, Managing Iterations, Dynamic System Development Methods, Extreme Programming, Software Metrics, Process Patterns, Legacy Systems, System Development Methodologies, Method and Methodology, Participative Design

Approaches, Issues in Choosing a Methodology, Hard versus Soft Methodologies.

Learning Resources:
1. Simon Benett, Steve Mc Robb & ray Farmer, Object Oriented System Analysis and Design using UML,2nd Edition (2002), McGraw Hill
2. Bernd Bruegge and Allen H. Dutoit, Object-Oriented Software Engineering: Using UML Patterns and Java, 2nd Edition(2006), Pearson Education Asia
3. Grady Booch, James Rumbaugh, Ivor Jacobson, The Unified Modeling Language-User Guide, 4th Edition(1999) ,Addison Wesley
4. Ivor Jacobson, Grady Booch, James Rumbaugh, The Unified Software Development Process, 4th Edition(1999), Addison Wesley, 1999
5. http://philip.greenspun.com/teaching/teaching-software-engineering

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

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

Duration of Internal Tests   :   1 Hour 30 Minutes

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

Department of Computer Science & Engineering

INFORMATION SECURITY (PROFESSIONAL ELECTIVE-IV)

SYLLABUS FOR M.TECH. (CSE) – II SEMESTER

L:T:P (Hrs./week):3:0:0	SEE Marks Marks:60	Course Code: **PI20PE244CS**
Credits: 3	CIE Marks : 40	Duration of SEE: 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
	At the end of the course, Students will be able to
1. apply different algorithms to achieve security services	1. Understand various components of Information Security and Explain different security attacks And threats
	2. Differentiate secrete Key cryptography and public key cryptography and state DES, AES and RSA algorithms for information security
	3. Differentiate methods for message integrity and authentication and analyze strategies to protect information assets from common attacks
	4. Explain PKI Interface and differentiate methods for smart card security
	5. Implement Information security and web security protocols

UNIT-I
Introduction: History, critical characteristics of information, NSTISSC security model, Components of an information system, Securing the components, balancing security and access, The SDLC, The security SDLC Need for Security: Business needs, Threats, Attacks-secure software development

UNIT-II
Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques
Secret Key Cryptography: DES, Triple DES, AES, Key distribution, Attacks
Public Key Cryptography: RSA, ECC, Key Exchange (Diffie-Hellman), Java Cryptography Extensions, Attacks.

UNIT-III
Integrity, Authentication and Non-Repudiation: Hash Function (MD5, SHA5), Message Authentication Code (MAC), Digital Signature (RSA, DSA Signatures), Biometric Authentication, Kerberos.
Planning for Security: Security policy, Standards and practices, Security blue print, Security education, Continuity strategies.

UNIT-IV
PKI Interface: Digital Certificates, Certifying Authorities, POP Key Interface, System Security using Firewalls and VPN's, Intrusion Detection and Prevention Systems.
Smart Cards: Application Security using Smart Cards, Zero Knowledge Protocols and their use in Smart Cards, Attacks on Smart Cards

UNIT-V
Applications: Web Security Protocols (SSL), IPSec, Electronic Payments, E-cash, Secure Electronic Transaction (SET), Micro Payments.
Implementing Information Security: information security project management, technical topics of implementation , Non- technical aspects of implementation, Security certification and accreditation

Learning Resources:
1. William Stallings,"Cryptography and Network Security ", 5th Edition. pearson. 2011
2. Michael E Whitman and Herbert J Mattord, Principles of Information Security, (2011),Cengage Learning.
3. Michael E. Whitman and Hebert J Mattord, "Principles of Information Security", 4th edition Ed. Cengage Learning 2011
4. Behrouz A Forouzan, "Cryptography and Network Security", TMH, 2009
5. Joseph Migga Kizza," A guide to Computer network security", Springer, 2010
6. Dario cataiano," Contemporary Cryptalogy", Springer, 2010
7. http://nptel.ac.in/courses/106106129/

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

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

Duration of Internal Tests   :   1 Hour 30 Minutes

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

Department of Computer Science & Engineering

IMAGE PROCESSING (PROFESSIONAL ELECTIVE-IV)

SYLLABUS FOR M.TECH. (CSE) – II SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks Marks:60	Course Code: **PI20PE245CS**
Credits: 3	CIE Marks : 40	Duration of SEE : 3 Hours

Course objective	Course outcomes
	At the end of the course, students will be able to
1. Understand the different operations required in the image processing for better representation and recognition of objects in an image.	1. Distinguish sampling and quantization processes in obtaining digital images from continuously sensed data and describe the steps in image processing. 2. Apply Fourier transformation and other transformation techniques to enhance digital image. 3. Apply different techniques in spatial domain and frequency domain to enhance and segment digital images. 4. Describe different methods to encode raw image data into standard compressed image format. 5. Demonstrate most commonly applied image restoration and color models and their use in basic image processing.

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

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

UNIT-III
Intensity Transformations and Spatial Filtering: Histogram Processing, Fundamentals of Spatial Filtering, Smoothing and Sharpening Spatial Filters. Image Segmentation: Point, Line and Edge Detection, Thresholding, Region-Based Segmentation.

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

UNIT-V
Image Restoration: Noise Models, Inverse filtering, Least squares Filtering.
Color Image Processing : Color fundamentals, color models, Pseudo color Image Processing, Basics of full color image processing.

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

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

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

Duration of Internal Tests   : 1 Hour 30 Minutes

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

Department of Humanities and Social Sciences

PEDAGOGY STUDIES (Audit Course – II)

SYLLABUS FOR M.TECH. (CSE) – II SEMESTER

L:T:P(Hrs./week): 2:0:0	SEE Marks : 60	Course Code: **PI20AC210EH**
Credits : -	CIE Marks : 40	Duration of SEE : 3 Hours

COURSE OBJECTIVES	COURSE OUTCOMES
This course will enable the students to: 1. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers. 2. Identify critical evidence gaps to guide the development.	On completion of the course, students will be able to 1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries? 2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners? 3. How can teacher education (curriculum and practicum) and the school

Units Content
1. Teaching and Learning
    - Theories of learning
    - Theories of Teaching

    Pedagogic approaches and strategies
    - Curriculum and Syllabus design
    - Assessment and Evaluation
    - Teacher attitudes and believes
    - Best pedagogical practices.
2. Research Methods
    - Overview of Methods
    - Researching
    - Research Designs
    - Reporting Research

Learning Resources:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2):245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report London: DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3): 272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

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 Computer Science & Engineering

ADVANCED ALGORITHMS LAB

SYLLABUS FOR M.TECH. (CSE) – II SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks : -	Course Code:**PI20PC211CS**
Credits: 1.5	CIE Marks : 50	Duration of SEE: -

Course Objectives	Course Outcomes
	At the end of the course, Students will be able to
1. Identify and apply various algorithm design strategies to solve engineering problems with efficient time and space utilization	1. Implement Sorting Algorithms 2. Apply divide-and-conquer, greedy design strategy, and dynamic programming approaches to solve problems 3. Implement network flow algorithms 4. Develop Fourier transform algorithm. 5. Implement encryption algorithms

List of Experiments:

1. Quick , Merge sort and topological Sort Algorithms.
2. Graph Traversal-DFS , BFS algorithms.
3. Single Source Shortest Path algorithms- Dijkstra's and Bellman-Ford.
4. Minimum Cost Spanning tree Algorithms- Prim's and Kruskal's.
5. Edmond's Blossom algorithm
6. Network Flow- Ford-Fulkerson Algorithm.
7. LUP Decomposition Algorithm
8. All-Pairs shortest paths Algorithm.
9. Matrix Chain Multiplication Algorithm.
10. Optimal Binary Search Tree (OBST) Algorithm.
11. Longest Common Subsequence (LCS) algorithm.
12. Discrete Fourier Transform algorithm

13. Fast Fourier Transform algorithm
14. Encryption algorithms-RSA and DES
15. Randomized Quick sort algorithm

Learning Resources:
1. Thomas H. Cormen, Leiserson .C.E, Rivest.R.L , Stein.C, Introduction to Algorithm ,2nd edition(2001), MIT press, USA.
2. M.T.Goodrich, R.Tomassia, Algorithm design – Foundations, Analysis, and Internet Algorithms, John Wiley, (2002).
3. Horowitz E. Sahani S, Fundamentals of computer Algorithms", Galgotia publications.
4. Aho, Hopcroft, Ulman, The Design and Analysis of Computer algorithms, Pearson Education, (2000).
5. Steven S.Skiena ,The algorithm design manual, Springer (1997).
6. Hari Mohan Pandy, " Design analysis and Algorithms", University Science Press,(2009).
7. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-046j-design-and-analysis-of-algorithms-spring-2015/index.htm.
8. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms
9. http://nptel.ac.in/courses/106101060/
10. https://www.khanacademy.org/computing/computer-science/algorithms

No. of Internal Tests:	01	Max. Marks for Internal Test:	20
Marks for assessment of each experiment			30
Duration of Internal Test: 2 Hours			

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

Department of Computer Science & Engineering

DISTRIBUTED COMPUTING LAB

SYLLABUS FOR M.TECH. (CSE) – II SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks: 0	Course Code:**PI20PC221CS**
Credits: 1.5	CIE Marks: 50	Duration of SEE: -

Course Objectives	Course Outcomes
	At the end of the course, Students will be able to
1. Implement distributed applications	1. Develop, test and debug RPC and RMI based client-server programs in Linux 2. Create client and server using socket programming 3. Develop an application using EJB and Web services 4. Implement programs using message passing interface 5. Develop an application on Hadoop framework

List of Experiments :

1. Design a distributed application which consists of a state-full server using socket primitives
2. Design a distributed application which consists of a stateless server using socket primitives
3. Design a distributed application which consists of a server and client using Threads
4. Design a distributed application using Remote Procedural Call (RPC) for remote computation
5. Design a distributed application using Remote Method Invocation (RMI) for remote computation in which client submits two strings to the server and server returns the concatenation of the given strings
6. Design a distributed application using RMI in which client submits a string to the server and server returns the reverse of it

7. Design a distributed application using Stateless Session Bean in Enterprise Java Bean (EJB)
8. Design a distributed application using State-full Session Bean in EJB
9. Implement Message Passing Interface (MPI) program using Point-to-Point Communication Library Calls
10. Design a distributed application using MPI for remote computation
11. Design a Web service using Simple Object Access Protocol (SOAP)
12. Installation and configuration of Hadoop
13. Implement a distributed application on Hadoop framework to count word frequency with Map Reduce
14. Implement a distributed application on Hadoop framework to process a log file of a system

Note: The students have to submit a report at the end of the semester.

Learning Resources:
1. W. Richard Stevens ,Unix Network Programming, Volume 1: The Sockets Networking API, PHI, (2013).
2. Nirva Morisseau-Leroy, Martin K. Solomon, Julie Basu, Oracle8i Java Component Programming With EJB, CORBA AND JSP, Tata McGraw Hill, (2000).
3. Arun Kulkarni, Nupur Prasad Giri, Nikhilesh Joshi, Bhushan Jadhav, Parallel and Distributed Systems, Weily Paperback – 2016.
4. http://www.hpjava.org/mpiJava.html
5. http://hadoop.apache.org/
6. http://courses.cs.washington.edu/courses/cse552/07sp/
7. https://henryr.github.io/distributed-systems-readings/

No. of Internal Tests:	01	Max. Marks for Internal Test:	20
Marks for assessment of each experiment			30
Duration of Internal Test: 2 Hours			

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

Department of Computer Science & Engineering

MINI PROJECT

SYLLABUS FOR M.TECH. (CSE) – II SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks: --	CourseCode:**PI2019PC219CS**
Credits: 1	CIE Marks: 50	Duration of SEE: --

Course objectives	**Course outcomes**
	At the end of the course students will be able to
1. Develop an application in the relevant area of Computer Science 2. Learn contemporary technologies	1. Understand the literature survey and identify the problem 2. Design a model to address the proposed problem 3. Develop and test the solution 4. Demonstrate the work done in the project through presentation and documentation 5. Adapt to contemporary technologies

The students are required to carry out mini projects in any areas such as Advanced operating systems, Advanced Databases, Artificial Intelligence, Advanced algorithms, Data Mining, Distributed Computing Object Oriented software Engineering

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

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)

SCHEME OF INSTRUCTION AND EXAMINATION (R-20)
M.TECH. – CSE : THIRD SEMESTER(2021 - 2022)

M.TECH (CSE) III Semester								
Course Code	Name of the Course	Scheme of Instruction			Scheme of Examination			Credits
		Hours per Week			Duration in Hrs	Maximum Marks		
		L	T	P		SEE	CIE	
THEORY								
PI20PE3XXCS	Professional Elective – VI	3	-	-	3	60	40	3
PI20OE3XXCS	Open Elective	3	-	-	3	60	40	3
PRACTICALS								
PI20PW319CS	Dissertation - Phase-I / Internship	-	-	8	-	-	100	4
	TOTAL	6	-	8	-	120	180	10
	GRAND TOTAL	14				300		

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

Department of Computer Science & Engineering

CLOUD COMPUTING (PROFESSIONAL ELECTIVE-V)

SYLLABUS FOR M.TECH. (CSE) – III SEMESTER

L:T:P (Hrs./week): 3:0:0	SEE Marks:60	Course Code: **PI20PE 354CS**
Credits: 3	CIE Marks : 40	Duration of SEE: 3 Hours

	Course Outcomes
Course Objectives	*At the end of the course, Students will be able to*
1. evaluate the deployment and service models, understand the security issues and apply the concepts in practice to design a cloud solution.	1. Relate the evolution of hardware & software which substantiated the need and rise for cloud computing and its service offerings 2. Apply deployment approaches and prototype a cloud computing system 3. Analyze the need for virtualization in a cloud environment and apply it across compute and storage levels 4. Analyze the security issues across SPI infrastructure and evaluate the role of IAM and Privacy in cloud 5. Explain the standards in cloud computing & showcase the cloud service providers strategy in providing cloud computing

UNIT-I
The Evolution of Cloud Computing: Hardware Evolution, Internet Software Evolution, Establishing a common Protocol for the Internet, Evolution of Ipv6, Cloud Formation-From One Computer to a Grid of Many, Server Virtualization, Parallel Processing, Vector Processing, Symmetric Multiprocessing Systems, Massively Parallel Processing Systems.
Web Services and the Cloud: Communication-as-a Service (CaaS), Infrastructure-as-a-Service (IaaS), Monitoring-as-a-Service (MaaS), Platform-as-a-Service (PaaS), Software-as-a-Service(SaaS).

UNIT-II
Cloud Deployment Models: Public, Private, Hybrid Community.
Building Cloud Networks: The Evolution from the MSP Model to Cloud, Computing and Software- as-a-Service, The Cloud Data Centre, Collaboration, Service-Oriented Architectures as a Step Towards Cloud Computing, Basic Approach to a Data Centre-Based SOA The Role of Open Source Software in Data Centers, Where Open Source Software is Used.

UNIT-III
Virtualization: Introduction, types and technologies, accomplishing virtualization, Levels of virtualization, importance of virtualization in Cloud computing. Virtualization at the infrastructure level, CPU Virtualization, Virtualization in a Multicore processor, Hypervisor and its types, Storage Virtualization
Case studies: Xen Virtual machine monitor – Xen API, VMware – VMware products
Federation in the Cloud, Presence in the Cloud, Privacy and Its Relation to Cloud-Based Information System.

UNIT-IV
Security Issues in Cloud Computing: Infrastructure Security, Data Security and Storage, Identity and Access Management, Trust Boundaries and IAM, IAM Challenges, Relevant IAM Standards and Protocols for Cloud Services, IAM Practices in the Cloud, Cloud Authorization Management
Privacy Issues : Privacy Issues, Data Life Cycle, Key Privacy Concerns in the Cloud, Protecting Privacy, Changes to Privacy Risk Management and Compliance in Relation to Cloud Computing, Legal and Regulatory Implications

UNIT-V
Audit and Compliance
Internal Policy Compliance, Governance, Risk, and Compliance (GRC)
Common Standards in Cloud Computing: The Open Cloud Consortium, The Distributed Management Task Force, Standards for Application Developers, Standards for Messaging, Internet Messaging Access Protocol (IMAP), Standard for Security
Case study of CSP's: AWS, Google Cloud, Microsoft Azure, Salesforce

Learning Resources:
1. John W. Rittinghouse, James F. Ransome, Cloud Computing: Implementation, Management and Security, CRC Press Special Indian edition, 2009, CRC Press, New Delhi.

2. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra,Distributed and Cloud Computing From Parallel Processing to the Internet of Things, 2012, Morgan Kaufmann, Elsevier

3. Tim Mather, Subra Kumaraswamy, Shahed Latif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, 1st Edition, 2009, O'Reilly.

4. Ivanka Menken, Cloud computing Specialist Certification Kit virtualization, 2nd Edition, 2010, Emereo Pty Limited, New Delhi.

5. William Von Hagen, Professional Xen Virtualization, Wrox, 2008,Wiley Publications, New Delhi.

6. David Marshall, Wade A. Reynolds, Dave McCrory Advanced Server Virtualization: VMware and Microsoft Platforms in the virtual Data Center, Auerbach Publications, 2006, New Delhi.

7. https://aws.amazon.com/ec2/

8. https://cloud.google.com/appengine

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

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

Duration of Internal Tests   :   1 Hour 30 Minutes

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS)
SCHEME OF INSTRUCTION AND EXAMINATION (R-20)
M.TECH. – CSE : FOURTH SEMESTER(2021 - 2022)

	M.TECH (CSE) IV Semester							
		Scheme of Instruction			Scheme of Examination			
Course Code	Name of the Course	Hours per Week			Duration in Hrs	Maximum Marks		Credits
		L	T	P		SEE	CIE	
PRACTICALS								
PI20PW419CS	Dissertation – Phase II / Internship	-	-	20	-	Viva – voce (Grade)		10
	TOTAL	-	-	20				10
	GRAND TOTAL	20						

List of Professional Electives - Stream wise					
	AI and Data Engineering		Systems & Networks		Applications
	Course Code	Title	Course Code	Title	Course Code	Title
PE-I	PI20PE110CS	Artificial Intelligence	PI20PE114CS	Information Storage Management	PI20PE115CS	Mobile Computing
PE-II	PI20PE120CS	Parallel Algorithms	PI20PE124CS	Advanced Operating Systems	PI20PE125CS	Software Quality & Testing
PE-III	PI20PE230CS	Natural Language Processing	PI20PE234CS	Parallel Computer Architecture	PI20PE235CS	Object Oriented Software Engineering
PE-IV	PI20PE240CS	Machine Learning	PI20PE244CS	Information Security	PI20PE245CS	Image Processing
PE-V	PI20PE110CS	Information Retrieval systems	PI20PE354CS	Cloud Computing	PI20PE115CS	Mutlimedia Technologies

Semester	Actual credits
I Semester	22
II Semester	24
III Semester	10
IV Semester	10
Online NPTEL certification course 8 weeks / 12 weeks	02
Total credits	**68**

S.No.	Course Code	Course Title
Audit courses and Open Electives		
Audit Course – I		
1	PI20AC110EH	English for Research Paper Writing
2	PI20AC120XX	Value Education
3	PI20AC130XX	Stress Management by Yoga
4	PI20AC140XX	Sanskrit for Technical Knowledge
Audit Course –II		
1	PI20AC210EH	Pedagogy Studies
2	PI20AC220XX	Personality Development through Life Enlightenment Skills.
3	PI20AC230XX	Constitution of India
4	PI20AC240XX	Disaster Management
Open Electives		
1	PI20OE310XX	Business Analytics
2	PI20OE320XX	Industrial Safety
3	PI20OE330XX	Operations Research
4	PI20OE340XX	Cost Management of Engineering Projects
5	PI20OE350XX	Composite Materials
6	PI20OE360XX	Waste to Energy