SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

M.Tech

(Information Technology)

CURRICULUM and SYLLABI

[For students admitted in 2021-2022]

M.E / M.Tech Regulation 2019

Approved by BOS and Academic Council meetings

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for ME I Semester under Regulations 2019
Information Technology
Branch: M.Tech. Information Technology

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	P19MIT101	Mathematics for Data Analytics	3	1	0	4	60
2	P19MIT102	Big Data Technologies	3	0	0	3	45
3	P19MIT103	Advanced Data Structures and Algorithms	3	0	0	3	45
4	P19GE101	Research Methodology and IPR	2	0	0	2	30
5	P19MIT516	**Elective** - Agile Software Development	3	0	0	3	45
6	P19GE701	**Audit Course** – English for Research Paper Writing	2	0	0	0	30
		Practical					
7	P19MIT104	Big Data and Analytics Laboratory	0	0	4	2	60
8	P19MIT105	Data Structures Laboratory	0	0	4	2	60
					Total Credits	19	

Approved by

Chairperson, Information Technology BoS   **Member Secretary, Academic Council**   **Chairperson, Academic Council & Principal**
       Dr.J.Akilandeswari   **Dr.R.Shivakumar**   **Dr.S.R.R.Senthil Kumar**

Copy to:-
       HOD/IT, First Semester M.Tech IT Students and Staff, COE

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	P19MIT201	High Performance Computing	3	0	0	3	45
2	P19MIT202	Cyber Security	3	0	0	3	45
3	P19MIT501	**Elective -** Internet of Things	3	0	0	3	45
4	P19MIT510	**Elective -** Cloud Computing	3	0	0	3	45
5	P19MIT517	**Elective -** Human Computer Interaction	3	0	0	3	45
6	P19GE702	**Audit Course** – Stress Management by Yoga	2	0	0	0	30
		Practical					
7	P19MIT203	Internet of Things Laboratory	0	0	4	2	60
8	P19MIT204	High Performance Computing Laboratory	0	0	4	2	60
					Total Credits	**19**	

Approved by

Chairperson, Information Technology BoS   **Member Secretary, Academic Council**   **Chairperson, Academic Council & Principal**
    Dr.J.Akilandeswari   **Dr.R.Shivakumar**   **Dr.S.R.R.Senthil Kumar**
Copy to:-
    HOD/IT, Second Semester M.Tech IT Students and Staff, COE

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	P19MIT519	**Professional Elective-** Multimedia communication	3	0	0	3	45
2	P19ISE601	**Open Elective–** Transport Safety	3	0	0	3	45
Practical							
3	P19MIT301	Project Phase - I	0	0	16	8	240
					Total Credits	14	

Approved by

Chairperson, Information Technology BoS   **Member Secretary, Academic Council**   **Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari   **Dr.R.Shivakumar**   **Dr.S.R.R.Senthil Kumar**

Copy to:-
        HOD/IT, Third Semester M.Tech IT Students and Staff, COE

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Practical							
1	P19MIT401	Project Phase – II	0	0	28	14	420
					Total Credits	**14**	

Approved by

Chairperson, Information Technology BoS   **Member Secretary, Academic Council**   **Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari   **Dr.R.Shivakumar**   **Dr.S.R.R.Senthil Kumar**

Copy to:-
     HOD/IT, Fourth Semester M.Tech IT Students and Staff, COE

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for ME I Semester under Regulations 2019
Information Technology
Branch: M.Tech. Information Technology

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Theory					
1	P19MIT101	Mathematics for Data Analytics	3	1	0	4	60
2	P19MIT102	Big Data Technologies	3	0	0	3	45
3	P19MIT103	Advanced Data Structures and Algorithms	3	0	0	3	45
4	P19GE101	Research Methodology and IPR	2	0	0	2	30
5	P19MIT516	**Elective -** Agile Software Development	3	0	0	3	45
6	P19GE701	**Audit Course** – English for Research Paper Writing	2	0	0	0	30
		Practical					
7	P19MIT104	Big Data and Analytics Laboratory	0	0	4	2	60
8	P19MIT105	Data Structures Laboratory	0	0	4	2	60
					Total Credits	19	

Approved by

Chairperson, Information Technology BoS   **Member Secretary, Academic Council**   **Chairperson, Academic Council & Principal**
    Dr.J.Akilandeswari   **Dr.R.Shivakumar**   **Dr.S.R.R.Senthil Kumar**

Copy to:-
    HOD/IT, First Semester M.Tech IT Students and Staff, COE

P19MIT101   **MATHEMATICS FOR DATA ANALYTICS**   **3 1 0 4**

COURSE OUTCOMES

At the end of the course, the students will be able to,

1. Apply the concept of correlation, fit suitable curve to the given data and analyse the result.
2. Apply the concepts of probability, random variable, moments, moment generating function and their properties to solve the problems.
3. Analyse the characteristics of the estimators, find the estimate of the parameters using maximum likelihood estimation and method of moments.
4. Test the hypothesis about the population using Z, t, F and χ^2-test statistics.
5. Apply the multivariate analysis concept to analyse the given set of data which involves more than one variable

	CO/PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak												
COs	**Programme Outcomes (POs) and Programme Specific Outcome (PSOs)**												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO12	PSO1	PSO2
CO1	3	3	3	3	2	3				2	2		3
CO2	3	3	3	3	2	3				2	2		3
CO3	3	3	3	3	2	3				2	2		3
CO4	3	3	3	3	2	3				2	2		3
CO5	3	3	3	3	2	3				2	2		3

.UNIT – I   CORRELATION, CURVE FITTING AND REGRESSION   12

Simple and rank correlations – Multiple and partial correlations – Curve fitting – Principle of least squares – Fitting a straight line – Fitting a parabola – Fitting an exponential curve – Fitting a curve of the form $y = ax^b$ – Linear regression – Multiple and partial regressions.

UNIT – II   PROBABILITY AND RANDOM VARIABLE   12

Axioms of probability – Conditional probability – Total probability – Baye's theorem – Random variable – Probability mass function, probability density function, moments, moment generating function and their properties.

UNIT – III   ESTIMATION THEORY   12

Estimators – Unbiasedness, consistency, efficiency and sufficiency (definitions and simple problems only) – Maximum likelihood estimation – Method of moments.

UNIT – IV   TESTING OF SIGNIFICANCE   12

Parameter and statistic – Null and alternative hypothesis – Errors in sampling, critical region and level of significance – One tailed and two tailed tests – Large sample tests for proportions, mean,

difference between means, standard deviation – t-test for single mean, difference between means – Paired t-test – χ^2-test for independence of attributes, goodness of fit – F-test.

UNIT – V   **MULTIVARIATE ANALYSIS**   **12**

Random vectors and matrices – Mean vectors and covariance matrices – Multivariate normal density and its properties – Principal components: population components from standardized variables.

THEORY: 45   **TUTORIALS: 15**   **PRACTICAL: -**   **TOTAL: 60 Hours**

TEXT BOOK

1. S. C. Gupta, V. K. Kapoor, "Fundamentals of Mathematical Statistics", Sultan Chand and Sons Publishers, 11th Edition (Reprint), 2019.
2. R. A. Johnson and D. W. Wichern, "Applied Multivariate Statistical Analysis", Pearson Publishers, 6th Edition, 2015.

REFERENCE BOOKS

1. J. L. Devore, "Probability and Statistics for Engineering and the Sciences", Thomson and Duxbury Publishers, 9th Edition, 2015.
2. R. A. Johnson and C. B. Gupta, "Miller and Freund's, Probability and Statistics for Engineers", Pearson Publishers, 9th Edition, 2018.

P19MIT102   **BIG DATA TECHNOLOGIES**   **3   0   0   3**

COURSE OUTCOMES

At the end of the course, the student will be able to

1. Explain the need and challenges of Big data and analytics
2. Apply and write jobs in Hadoop and map reduce framework and configure Hadoop eco systems and work with tools that are handling big data.
3. Create NoSQL database and apply CRUD operations in MongoDB
4. Create database and apply CRUD operations in Cassandra and Hive
5. Write PigLatin scripts for database maintenance and Perform statistical based analysis and describe the data using various graphical methods

<table>
<tr><td colspan="14">CO/PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="13">Programme Outcomes (POs) and Programme Specific Outcome (PSOs)</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>P09</td><td>PO10</td><td>PO12</td><td>PSO1</td><td>PSO2</td></tr>
<tr><td>CO1</td><td>3</td><td>3</td><td>3</td><td>2</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr>
<tr><td>CO2</td><td>3</td><td>3</td><td>2</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr>
<tr><td>CO3</td><td>3</td><td>3</td><td>2</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td></tr>
<tr><td>CO4</td><td>3</td><td>3</td><td>2</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td></tr>
<tr><td>CO5</td><td>3</td><td>3</td><td>2</td><td>2</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td>2</td><td>3</td></tr>
<tr><td colspan="14"></td></tr>
</table>

UNIT I   INTRODUCTION   9

Types of Digital Data – Introduction to Big Data - Big Data Analytics - classification of Analytics - Greatest Challenges that Prevent Businesses from Capitalizing on Big Data - Top Challenges Facing Big Data - Why is Big Data Analytics Important? - Data Science - Terminologies Used in Big Data Environment - Few Top Analytics Tools.

UNIT II   TECHNOLOGIES, HADOOP AND MAP REDUCE   9

The big data technology landscape – NoSQL – Hadoop - Introduction to Hadoop - RDBMS versus Hadoop - RDBMS versus Hadoop - Hadoop Overview - Hadoop Distributed File System - Processing Data with Hadoop - Managing Resources and Application with Hadoop YARN - Hadoop Ecosystem – Introduction to Map reduce Programming

UNIT III   MONGODB   9

Introduction to MongoDB - What is MongoDB? - Why MongoDB? - RDBMS and MongoDB - Data Types in MongoDB – MongoDB Query Langauge

UNIT IV   CASSANDRA AND HIVE   9

Introduction to Cassandra - Features of Cassandra - CQL Data Types – CQLSH – Keyspaces - CRUD – Collections – Alter - Import and Export – querying system tables

Hive Architecture - Hive Data Types - Hive File Format - Hive Query Language- RCFile Implementation – SerDe – User Defined Functions

UNIT V   PIG AND RECENT TRENDS   9

Introduction to Pig - The Anatomy of Pig - Pig on Hadoop - Pig Latin Overview - Data Types - Running Pig - Execution Modes of Pig - HDFS Commands - Relational operators - Eval Function - Complex Data Type - User Defined Function - parameter Substitution - Diagnostic Operator - Word Count Example - When to use Pig? - When NOT to use Pig? - Pig versus Hive - Reporting tool – Trends – Case study

THEORY: 45   TUTORIAL: -   PRACTICAL: TOTAL: 45 Hours

TEXT BOOK

1. Seema Acharya, Subhashini Chellappan, "Big Data and Analytics", Wiley Publication, first edition. Reprint in 2016.

REFERENCES

1. DT Editorial Services, "Black Book- Big Data (Covers Hadoop 2, MapReduce, Hive, Yarn, PIG, R, Data visualization)", Dream tech Press edition 2016.
2. Radha Shankarmani, M Vijayalakshmi, "Big Data Analytics", Wiley Publications, First Edition 2016.
3. Chuck lam, "Hadoop in action", Dream tech Press-2016 reprint edition.
4. O'Reilly Media, Big Data now: Current Perspective from O'Reilly Media, 2013 Edition.
5. Judith Hurwitz, Alan Nugent,Fern Halper, Marcia Kaufman, "Big data for dummies", Wiley, 2013.
6. Anand Rajaraman, Jure Leskovec, and Jeffrey D. Ullman , Mining of massive datasets, 2014.
7. O'Reilly Media, Hadoop: The Definitive Guide, Third Edition, 2012.
8. Vignesh Prajapati, Data analytics with R and Hadoop, 2013, Packt Publishing.
9. Eelco Plugge, Peter Membrey and Tim Hawkins, The Definitive Guide to MongoDB: The NoSQL Database for Cloud and Desktop Computing, 2010.
10. Simon Walkowiak , Big Data Analytics with R.Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
11. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Pearson Education, 2012.

P19MIT103   ADVANCED DATA STRUCTURES AND ALGORITHMS   3 0 0 3

COURSE OUTCOMES
At the end of the course, the student will be able to

1. Design data structures and algorithms to solve computing problems.
2. Implement and analysis of hierarchical data structures and algorithms.
3. Design algorithms using graph structure and various string matching algorithms to solve real-life problems.
4. Apply suitable design strategy for problem solving.
5. Implement approximation algorithms.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO12	PSO1	PSO2
CO1	2	3	3	3	3				2		3	3	2
CO2	2	3	3	3	3				2		3	3	2
CO3	2	3	3	3	3				2		3	3	2
CO4	2	3	3	3	3				2		3	3	2
CO5	2	3	3	3	3				2		3	3	2

Table title (above table):
CO/PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

Programme Outcomes (POs) and Programme Specific Outcome (PSOs)

UNIT I   ROLE OF ALGORITHMS IN COMPUTING   9

Algorithms – Algorithms as a Technology- Insertion Sort – Analyzing Algorithms – Designing Algorithms- Growth of Functions: Asymptotic Notation – Standard Notations – Divide and Conquer- Maximum-subarray problem- Strassen's algorithm- Common Functions- Recurrences: The Substitution Method – The Recursion-Tree Method-The Master method

UNIT II   HIERARCHICAL DATA STRUCTURES   9

Binary Search Trees: Basics – Querying a Binary search tree – Insertion and Deletion- Red-Black trees: Properties of Red-Black Trees – Rotations – Insertion – Deletion- B-Trees: Definition of B trees – Basic operations on B-Trees – Deleting a key from a B-Tree- Fibonacci Heaps: Structure – Heap operations – Decreasing a key and deleting a node – Bounding the maximum degree

UNIT III   GRAPHS   9

Elementary Graph Algorithms: Representations of Graphs – Breadth-First Search – Depth-First Search – Topological Sort – Strongly Connected Components- Minimum Spanning Trees: Growing a Minimum Spanning Tree – Kruskal and Prim- Single-Source Shortest Paths: The Bellman-Ford algorithm – Single-Source Shortest paths in Directed Acyclic Graphs – Dijkstra's Algorithm; All Pairs Shortest Paths: Shortest Paths and Matrix Multiplication – The Floyd-Warshall Algorithm

UNIT IV ALGORITHM DESIGN TECHNIQUES 9

Dynamic Programming: Matrix-Chain Multiplication – Elements of Dynamic Programming –Longest Common Subsequence- Greedy Algorithms: An Activity-Selection Problem – Elements of the Greedy Strategy – Huffman Codes

UNIT V NP COMPLETENESS AND APPROXIMATION ALGORITHMS 9

NP-Completeness: Polynomial Time – Polynomial-Time Verification – NP-Completeness and Reducability – NP-Completeness Proofs – NP-Complete Problems- Approximation Algorithms: Vertex-Cover problem- Travelling-Salesman problem – Subset-sum problem

THEORY: 45   TUTORIAL: -   PRACTICAL: TOTAL: 45 Hours

TEXT BOOK

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, "Introduction to Algorithms", Third Edition, Prentice-Hall.

REFERENCES

1. Robert Sedgewick and Kevin Wayne, "Algorithms", Fourth Edition, Pearson Education.
2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education.
3. Donald E Knuth, "Art of Computer Programming-Volume I- Fundamental Algorithms", Third edition, Addison Wesley.

P19GE101   **RESEARCH METHODOLOGY AND IPR**   **2 0 0 2**

COURSE OUTCOMES

At the end of the course, the student will be able to

1. Review the literature of the research problem
2. Choose appropriate data collection and sampling method according to the research problem.
3. Interpret the results of research and communicate effectively with their peers
4. Explain the Importance of intellectual property rights
5. Evaluate trade mark, develop and register patents

| COs | **CO/PO, PSO Mapping**
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak |

COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO12	PSO1	PSO2
CO1	3	3	3	3	2						3	3	3
CO2	3	3	3	3	2						3	3	3
CO3	3	3	3	3	2						3	3	3
CO4	3	3	3	3	2						3	3	3
CO5	3	3	3	3	2			3			3	3	3

UNIT I   **INTRODUCTION TO RESEARCH METHODS**   **6**

Definition and Objective of Research, Various steps in Scientific Research, Types of Research, Criteria for Good Research, Defining Research Problem, Research Design , Case Study Collection of Primary and Secondary Data, Collection Methods: Observation, Interview, Questionnaires, Schedules,

UNIT II   **SAMPLING DESIGN AND HYPOTHESIS TESTING**   **6**

steps in Sampling Design, Types of Sample Designs, Measurements and Scaling Techniques - Testing of hypotheses concerning means (one mean and difference between two means - one tailed and two tailed tests), concerning variance – one tailed Chi-square test.

UNIT III   **INTERPRETATION AND REPORT WRITING**   **6**

Techniques of Interpretation, Precaution in Interpretation, Layout of Research Report, Types of Reports, Oral Presentation, Mechanics of Writing Research Report

UNIT IV   **INTRODUCTION TO INTELLECTUAL PROPERTY**   **6**

Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights, Innovations and Inventions trade related intellectual property rights.

UNIT V   TRADE MARKS, COPY RIGHTS AND PATENTS   **6**

Purpose and function of trade marks, acquisition of trade mark rights, trade mark registration processes, trademark claims –trademark Litigations- International trademark law

Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

THEORY: 30 Hours   TUTORIAL: -   PRACTICAL: -   TOTAL: 30 Hours

TEXT BOOKS

1. C.R. Kothari, Gaurav Garg, Research Methodology Methods and Techniques ,4th Edition, New Age International Publishers, 2019.

2. Deborah E. Bouchoux, "Intellectual Property: The Law of Trademarks, Copyrights, Patents, and Trade Secrets", Delmar Cengage Learning, 4th Edition, 2012.

3. Prabuddha Ganguli, "Intellectual Property Rights: Unleashing the Knowledge Economy", Tata Mc Graw Hill Education, 1st Edition, 2008.

REFERENCE BOOKS

1. Panneerselvam, R., Research Methodology, Second Edition, Prentice-Hall of India, New Delhi, 2013.

2. Ranjith Kumar, Research Methodology – A step by step Guide for Begineers, 4th edition, Sage publisher, 2014.

3. D Llewelyn & T Aplin W Cornish, "Intellectual Property: Patents, Copyright, Trade Marks and Allied Rights", Sweet and Maxwell, 1st Edition, 2016.

4. Ananth Padmanabhan, "Intellectual Property Rights-Infringement and Remedies", Lexis Nexis, 1st Edition, 2012.

5. Ramakrishna B and Anil Kumar H.S, "Fundamentals of Intellectual Property Rights: For Students, Industrialist and Patent Lawyers", Notion Press, 1st Edition, 2017.

6. M.Ashok Kumar and Mohd.Iqbal Ali :"Intellectual Property Rights" Serials Pub

COURSE OUTCOMES

At the end of the course, the student will be able to

1. Create applications for Big Data analytics

2. Apply data modelling techniques to large data sets

3. Prepare for data summarization, query, and analysis.

| COs | Programme Outcomes (POs) and Programme Specific Outcome (PSOs) | | | | | | | | | | | | |
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO12	PSO1	PSO2
CO1	2	3	3	3	2							3	3
CO2	2	3	3	3	3							3	3
CO3	2	3	3	3	3							3	3

Table title: **CO/PO, PSO Mapping** (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

LIST OF EXPERIMENTS

1. (i) Perform setting up and Installing Hadoop in its two operating modes:

   - Pseudo distributed,

   - Fully distributed.

   (ii) Use web based tools to monitor your Hadoop setup.

2. (i) Implement the following file management tasks in Hadoop:

   • Adding files and directories • Retrieving files • Deleting files

   ii) Benchmark and stress test an Apache Hadoop cluster

3. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

   • Find the number of occurrence of each word appearing in the input file(s)

   • Performing a MapReduce Job for word search count (look for specific keywords in a file)

4. Stop word elimination problem:

   • Input: A large textual file containing one sentence per line

             A small file containing a set of stop words (One stop word per line)

   • Output:

         A textual file containing the same sentences of the large input file without the

words appearing in the small file.

5. Write a Map Reduce program that mines weather data.

   Data available at: https://github.com/tomwhite/hadoopbook/tree/master/input/ncdc/all.

   • Find average, max and min temperature for each year in NCDC data set?

   • Filter the readings of a set based on value of the measurement, Output the line of input files associated with a temperature value greater than 30.0 and store it in a separate file.

6. Purchases.txt Dataset

   a. Instead of breaking the sales down by store, give us a sales breakdown by product category across all of our stores

   b. What is the value of total sales for the following categories? ♣ Toys ♣ Consumer Electronics

   c. Find the monetary value for the highest individual sale for each separate store

   d. What are the values for the following stores? ♣ Reno ♣ Toledo ♣ Chandler

   e. Find the total sales value across all the stores, and the total number of sales.

7. Install and Run MongoDB then use MongoDB to create, alter, and drop databases, tables, views, functions, and indexes

8. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

9. Write a Pig Latin scripts for finding TF-IDF value for book dataset (A corpus of eBooks available at: Project Gutenberg)

10. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

THEORY: -   TUTORIAL: -   PRACTICAL: 60 HOURS   TOTAL: 60 HOURS

P19MIT105   **DATA STRUCTURES LABORATORY**   **0 0 4 2**

COURSE OUTCOMES

At the end of the course, the student will be able to

1. Implement the tree data structure

2. Implement graph algorithms

3. Implement problems in greedy and approximation approach

<table>
<tr><td colspan="14">CO/PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">CO s</td><td colspan="13">Programme Outcomes (POs) and Programme Specific Outcome (PSOs)</td></tr>
<tr><td>PO 1</td><td>PO 2</td><td>PO 3</td><td>PO 4</td><td>PO 5</td><td>PO 6</td><td>PO 7</td><td>PO 8</td><td>P09</td><td>PO1 0</td><td>PO1 2</td><td>PSO1</td><td>PSO2</td></tr>
<tr><td>CO 1</td><td>2</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td>2</td><td></td><td>3</td><td>3</td><td>2</td></tr>
<tr><td>CO 2</td><td>2</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td>2</td><td></td><td>3</td><td>3</td><td>2</td></tr>
<tr><td>CO 3</td><td>2</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td>2</td><td></td><td>3</td><td>3</td><td>2</td></tr>
<tr><td colspan="14"></td></tr>
</table>

LIST OF EXPERIMENTS

1. Implementation of Binary Search Tree

2. Implementation of Fibonacci Heaps

3. Implementation of Red-Black tree

4. Implementation of Spanning Tree

5. Implementation of Shortest Path Algorithms

6. Implementation of Graph Traversals

7. Implementation of Greedy Algorithms

8. Implementation of Approximation Algorithms

THEORY: -   **TUTORIAL: -**   **PRACTICAL: 60**   **TOTAL: 60 Hours**

P19MIT516   **AGILE SOFTWARE DEVELOPMENT**   **3 0 0 3**

COURSE OUTCOMES

At the end of the course, the student will be able to,

1. Explain the genesis of Agile and driving forces for choosing Agile techniques.

2. Comprehend the Agile Scrum framework and development practices.

3. Assess the software product using Agile testing methodologies and perform testing activities
   Within an agile project.

4. Apply software design principles and refactoring techniques to achieve agility.

5. Evaluate the agile approach impact on cutting-edge technologies and also realize the
   business

   value for adopting agile software development.

<table>
<tr><td colspan="14">CO/PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td rowspan="2">COs</td><td colspan="13">Programme Outcomes (POs) and Programme Specific Outcome (PSOs)</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>P09</td><td>PO10</td><td>PO12</td><td>PSO1</td><td>PSO2</td></tr>
<tr><td>CO1</td><td>3</td><td>3</td><td>3</td><td></td><td>3</td><td></td><td>2</td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr>
<tr><td>CO2</td><td>3</td><td>2</td><td>3</td><td></td><td></td><td></td><td>3</td><td></td><td></td><td></td><td></td><td>2</td><td>3</td></tr>
<tr><td>CO3</td><td>3</td><td>2</td><td>3</td><td></td><td>1</td><td></td><td>3</td><td></td><td></td><td></td><td></td><td>1</td><td>3</td></tr>
<tr><td>CO4</td><td>3</td><td>2</td><td>3</td><td></td><td>1</td><td></td><td>2</td><td></td><td></td><td></td><td></td><td>1</td><td>3</td></tr>
<tr><td>CO5</td><td>3</td><td>2</td><td>3</td><td></td><td>1</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td>1</td><td>3</td></tr>
<tr><td colspan="14"></td></tr>
</table>

UNIT I   FUNDAMENTALS OF AGILE   9

The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools

UNIT II   AGILE SCRUM FRAMEWORK   9

Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management

UNIT III   **AGILE TESTING**   **8**

The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester

UNIT IV   **AGILE SOFTWARE DESIGN AND DEVELOPMENT**   **10**
Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control

UNIT V   **INDUSTRY TRENDS**   **9**

Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies

THEORY: 45 Hours   TUTORIAL: -   PRACTICAL: -   TOTAL: 45 Hours

REFERENCES

1. Ken Schwaber, Mike Beedle, "Agile Software Development with Scrum", Pearson, 2014.

2. Robert C. Martin, "Agile Software Development, Principles, Patterns and Practices" Pearson, 2003.

3. Lisa Crispin, Janet Gregory," Agile Testing: A Practical Guide for Testers and Agile Teams" Addison Wesley, 2008.

4. Alistair Cockburn," Agile Software Development: The Cooperative Game" Addison Wesley, second Edition, 2006.

5. Mike Cohn," User Stories Applied: For Agile Software" Addison Wesley, 2004.

P19GE701   **English for Research Paper Writing**

2 0 0 0

Course Outcomes:

At the end of the course, the students will be able to
- Demonstrate research writing skills both for research articles and thesis
- Frame suitable title and captions as sub-headings for articles and thesis
- Write each section in a research paper and thesis coherently
- Use language appropriately and proficiently for effective written communication
- Exhibit professional proof-reading skills to make the writing error free

Unit – I   6
    Planning and preparation, word order, breaking up long sentences, organising ideas into paragraphs and sentences, being concise and avoiding redundancy, ambiguity and vagueness

Unit – II   6

Interpreting research findings, understanding and avoiding plagiarism, paraphrasing sections

of a paper/ abstract.

Unit- III   6

Key skills to frame a title, to draft an abstract, to give an introduction

Unit – IV   6

Skills required to organise review of literature, methods, results, discussion and conclusions

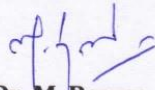**Unit – V**   6

Usage of appropriate phrases and key terms to make the writing effective - proof-reading to ensure error-free writing.

Text Books:

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

REFERENCES

Martin Cutts, Oxford Guide to Plain English, Oxford University Press, Second Edition, 2006

Total: 30 hours

Dr. M. Renuga
BoS – Chairperson,
Science & Humanities
HOD / H&L

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	P19MIT201	High Performance Computing	3	0	0	3	45
2	P19MIT202	Cyber Security	3	0	0	3	45
3	P19MIT501	**Elective -** Internet of Things	3	0	0	3	45
4	P19MIT510	**Elective -** Cloud Computing	3	0	0	3	45
5	P19MIT517	**Elective -** Human Computer Interaction	3	0	0	3	45
6	P19GE702	**Audit Course** – Stress Management by Yoga	2	0	0	0	30
Practical							
7	P19MIT203	Internet of Things Laboratory	0	0	4	2	60
8	P19MIT204	High Performance Computing Laboratory	0	0	4	2	60
					Total Credits	19	

Approved by

Chairperson, Information Technology BoS   **Member Secretary, Academic Council**   **Chairperson, Academic Council & Principal**
        Dr.J.Akilandeswari   **Dr.R.Shivakumar**   **Dr.S.R.R.Senthil Kumar**

Copy to:-
        HOD/IT, Second Semester M.Tech IT Students and Staff, COE

30.05.2022   Regulations-2019

P19MIT201   HIGH PERFORMANCE COMPUTING   3 0 0 3

COURSE OUTCOMES
At the end of the course, the student will be able to
1. Apply the parallel algorithm principles in optimization problems
2. Write programs to implement parallel algorithms on shared memory using Open MP
3. Write programs to implement parallel algorithms on distributed memory using MPI
4. Implement parallel algorithm using Hybridized programming model with OpenMP and MPI
5. Write parallel program in CUDA architecture

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	2								3	3
CO2	3	3	3	3	2								3	3
CO3	3	3	3	3	2								3	3
CO4	3	3	3	3	2								3	3
CO5	3	3	3	3	2								3	3

UNIT I   INTRODUCTION TO PARALLEL ALGORITHM   9
Principles of Parallel Algorithms- Graph Algorithms- Minimum Spanning Tree- Prim's Algorithm - Single-Source Shortest Paths-Dijkstra's Algorithm – All-Pairs Shortest Paths . Algorithms for Sparse Graphs - Search Algorithms for Discrete Optimization Problems - Sequential Search Algorithms - - Parallel Depth-First Search – Parallel Breadth-First Search - Dynamic Programming - Serial Monadic DP Formulations –No serial Monadic DP Formulations - Serial Polyadic DP Formulations.

UNIT II   PARALELL PROGRAMING WITH OPEN MP   9
Shared-memory parallel programming with OpenMP- Introduction to OpenMP – Parallel execution - Data scoping -OpenMP work sharing for loops – Synchronization Reductions - Loop scheduling - Miscellaneous - Case study-OpenMP-parallel Jacobi algorithm - Advanced OpenMP-Wavefront parallelization - Efficient OpenMP programming - Profiling OpenMP programs.

UNIT III   PARALELL PROGRAMING WITH MPI   9
Distributed-memory parallel programming with MPI- Message passing- MPI – example - Messages and point-to-point communication - Collective communication – Non blocking point-to-point communication - Virtual topologies - Example- MPI parallelization of Jacobi solver - Communication parameters -Synchronization serialization- contention - Implicit serialization and synchronization - Contention -Reducing communication overhead - Optimal domain decomposition – Aggregating messages - Non blocking vs. asynchronous communication.

UNIT IV   HYBRID PARALLIZATION MODEL   9
Hybrid parallelization with MPI and OpenMP- Basic MPI/OpenMP programming models - Vector mode implementation - Task mode implementation - Case study- Hybrid Jacobi solver - MPI taxonomy of thread interoperability - Hybrid decomposition and mapping - Potential benefits and drawbacks of hybrid programming.

UNIT V   CUDA PROGRAMMING MODEL   9
CUDA Architecture, Using the CUDA Architecture, Applications of CUDA Introduction to CUDA C-Write and launch CUDA C kernels, Manage GPU memory, Manage communication and synchronization, Parallel programming in CUDA- C

THEORY: 45 Hours   TUTORIAL: -   PRACTICAL:-   TOTAL: 45 Hours

TEXT BOOK

1. Georg Hager and Gerhard Wellein, "Introduction to High Performance Computing for Scientists and Engineers", Chapman & Hall, 2010.
2. Ananth Grama and George Karypis, "Introduction to parallel computing", Addison -Wesley, 2009.

REFERENCES:

1. John Levesque and Gene Wagenbreth, "High Performance Computing: Programming and Applications", Chapman & Hall, 2010.
2. John L. Hennessy and David Patterson, "Computer Architecture- A Quantitative Approach", Elsevier, 2012.
3. Michael Quinn, "Parallel Programming in C with MPI and OpenMP", Indian edition, McGraw Hill Education, 2017.
4. Shane Cook, "CUDA Programming: A Developer's Guide to Parallel Computing with GPUs", Morgan Kaufmann Publishers Inc. San Francisco, CA, USA 2013

COURSE OUTCOMES

At the end of the course, the student will be able to

1. Explain importance of cyber security and its essentials through various examples of cybercrimes in the world.
2. Analyze possible cyber attacks, the security challenges of mobile devices and implement organizational security Policies and measures.
3. Describe tools, methods used by cyber criminals and apply various techniques to protect against the cyber attack.
4. Explain importance of cyber laws, cybercrime scenario in India and amendments made in the Indian ITA.
5. Apply a suitable tools and techniques for analyzing and validating forensics data

COs	CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak													
	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2								2	3
CO2	3	3	3	3	3								3	3
CO3	3	3	3	3	3								3	3
CO4	2	2	2	3	2								2	3
CO5	3	3	3	3	3								3	3

UNIT-1   **INTRODUCTION TO CYBERCRIME**   **9**

Introduction - Cybercrime: Definition - Cybercrime and Information Security- Cybercriminals- Classifications of Cybercrimes - Cybercrime: The Legal Perspectives -Cybercrimes: An Indian Perspective - Cybercrime and the Indian ITA 2000 - A Global Perspective on Cybercrimes- Attacks - Social Engineering - Cyber stalking - Cybercafé and Cybercrimes- Botnets: The Fuel for Cybercrime - Attack Vector - Cloud Computing

UNIT-II   **CYBERCRIME IN MOBILE DEVICES**   **9**

Proliferation of Mobile Devices - Trends in Mobility - Credit Card Frauds in Mobile and Wireless Computing Era- Security Challenges Posed by Mobile Devices -Registry Settings for Mobile Devices - Authentication Service Security - Attacks on Mobile/Cell Phones - Mobile Devices: Security Implications for Organizations - Organizational Measures for Handling Mobile - Organizational Security Policies and Measures in Mobile Computing Era.

UNIT-III   **TOOLS AND METHODS USED IN CYBERCRIME**   **9**

Proxy Servers and Anonymizers - Phishing - Password Cracking -Keyloggers and Spywares - Virus and Worms - Trojan Horses and Backdoors - Steganography - DoS and DDoS Attacks - SQL Injection - Buffer Overflow.

UNIT-IV CYBERCRIMES AND CYBERSECURITY: THE LEGAL PERSPECTIVES 9

Cybercrime and the Legal Landscape around the World -Cyberlaws: The Indian Context -· The Indian IT Act - Challenges to Indian Law and Cybercrime Scenario in India - Consequences of Not Addressing the Weakness

in Information Technology Act - Digital Signatures and the Indian IT Act - Amendments to the Indian IT Act - Cybercrime and Punishment - Cyberlaw, Technology and Students: Indian Scenario.

UNIT-V   UNDERSTANDING COMPUTER FORENSICS   9
Historical Background of Cyberforensics - Digital Forensics Science - The Need for Computer Forensics - Cyberforensics and Digital Evidence - Forensics Analysis of E-Mail - Digital Forensics Life Cycle - Chain of Custody Concept - Network Forensics - Approaching a Computer Forensics Investigation -· Setting up a Computer Forensics Laboratory: Understanding the Requirements - Computer Forensics and Steganography -· Forensics and Social Networking Sites: The Security/Privacy Threats - Computer Forensics from Compliance Perspective - Challenges in Computer Forensics - Special Tools and Techniques - Forensics Auditing – Antiforensics,

THEORY: 45   TUTORIAL: -   PRACTICAL: TOTAL: 45 Hours

REFERENCES

1. Charles J. Brooks, Christopher Grow, Philip Craig, Donald Short "Cyber Security Essentials" Wiley India Publications oct 2018
2. Nina Godbole, Sunit Belapur "Cyber Security"- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives –, Wiley India Publications Released: April 2011
3. MarjieT.Britz, ―"Computer Forensics and Cyber Crime‖: An Introduction"‖, 3rd Edition, Prentice Hall, 2013.
4. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs , Jeffrey Schmidt, Joseph Weiss "Cyber Security Policy Guidebook" John Wiley & Sons 2012.
5. Rick Howard "Cyber Security Essentials" Auerbach Publications 2011.
6. Richard A. Clarke, Robert Knake "Cyberwar: The Next Threat to National Security & What to Do About It" Ecco 2010.

P19MIT203   INTERNET OF THINGS LABORATORY   0   0   4   2

COURSE OUTCOMES

At the end of the course, the student will be able to

1. Interface various sensors with Arduino and Raspberry pi boards.

2. Implement the control applications using Arduino programming

3. Experiment the different IoT applications with Raspberry pi using Python Programming.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1		3	3	2	2									3
CO2		3	3	2	2									3
CO3		3	3	2	2									3

LIST OF EXPERIMENTS

1. Installation of Arduino IDE and Blink LED

2. Creating different LED Patterns using Loops and functions

3. Interfacing Arduino Nano with Joystick

4. Control the brightness of an LED by using PWM

5. Control servo motor using Joystick

6. Control LED, Buzzer and Relay from smart phone using Bluetooth Module.

7. Interface DHT 11 sensor with Arduino Nano and upload the humidity and temperature on the cloud.

8. Familiarization of Raspberry pi by blink LED program

9. Interface PIR sensor with Raspberry pi for motion detection.

10. Control the stepper motor using Raspberry pi based on specific input

11. Measure the humidity and temperature using DHT sensor and display the data readings on the LCD screen.

12. Build a secret code based security system using Raspberry pi

13. Interface ultrasonic sensor with Rapberry pi for distance measurement

THEORY: -   TUTORIAL: -   PRACTICAL: 60   TOTAL: 60 Hours

P19MIT204   HIGH PERFORMANCE COMPUTING LABORATORY   0 0 4 2

COURSE OUTCOMES

1. Write programs to implement parallel algorithms using Open MP and MPI

2. Implement parallel algorithm using Hybridized programming model with OpenMP and MPI

3. Write parallel program in CUDA architecture

<table>
<tr><td colspan="15">CO / PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td colspan="15"></td></tr>
<tr><td rowspan="2">COs</td><td colspan="14">Programme Outcomes (POs) and Programme Specific Outcome (PSOs)</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>P09</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td></tr>
<tr><td>CO1</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr>
<tr><td>CO2</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr>
<tr><td>CO3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr>
</table>

LIST OF EXPERIMENTS

1. Implement the parallel breadth first and depth first search using OPEN MP
2. Implement the sequential search algorithm using OPEN MP
3. Implement the parallelization of Jacobi solver using MPI
4. Demonstrate how non-blocking and asynchronous communication can be achieved using MPI
5. Implement the Matrix factorization in hybrid programming model of OPEN MP and MPI.
6. Demonstrates how to use GPU assert in a CUDA C program.
7. Demonstrates Parallel Reduction using Min, Max, Sum and Average operations
8. Demonstrates Parallel Binary search for sorted array using CUDA
9. Demonstrates an advanced quicksort implemented using CUDA
10. Demonstrates an advanced bubble sort implemented using CUDA
11. Demonstrates an advanced Merge sort implemented using CUDA
12. Demonstrates the use of OpenMP and CUDA streams with Unified Memory on a single GPU.
13. Demonstrates compilation of matrix multiplication CUDA kernel at runtime using libNVRTC.
14. Demonstrates compilation of CUDA kernel performing vector addition at runtime using libNVRTC.

THEORY: -   TUTORIAL: -   PRACTICAL: 60   TOTAL: 60 Hours

P19MIT501   **INTERNET OF THINGS**   **3 0 0 3**

COURSE OUTCOMES

At the end of the course, the student will be able to,
1. Explain the concept of IoT and identify the functions of different actuators and sensors.
2. Analyze various protocols for IoT.
3. Design an IoT system using Rasperry Pi/Arduino
4. Implement web based services on IoT devices
5. Analyze applications of IoT in real time scenario

COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	2	2	2								2	2
CO2	3	3	3	3	3								3	3
CO3	3	3	3	3	3								3	3
CO4	3	3	3	3	2								3	3
CO5	3	3	3	3	2			2					3	3

Table title:
CO / PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

UNIT I   FUNDAMENTALS OF IoT   9
Evolution of Internet of Things – Enabling Technologies – IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack -– Fog, Edge and Cloud in IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects

UNIT II   IoT PROTOCOLS   9
IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT

UNIT III   DESIGN AND DEVELOPMENT   9
Design Methodology – Embedded computing logic – Microcontroller, System on Chips – IoT system building blocks – Arduino – Board details, IDE programming – Raspberry Pi – Interfaces and Raspberry Pi with Python Programming.

UNIT IV   IoT PHYSICAL SERVERS AND CLOUD OFFERINGS   9
 Introduction to Cloud Storage models and communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework designing a RESTful web API

UNIT V   CASE STUDIES/INDUSTRIAL APPLICATIONS   9
Cisco IoT system – IBM Watson IoT platform – Manufacturing – Converged Plantwide Ethernet Model (CPwE) – Power Utility Industry – GridBlocks Reference Model – Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

---

THEORY: 45 Hours   TUTORIAL: -   PRACTICAL: -   TOTAL: 45 Hours

TEXTBOOK:

1. Arshdeep Bahga, Vijay Madisetti, ―Internet of Things – A hands-on approach, Universities Press, 2015

REFERENCES:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, ―IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017
2. Olivier Hersent, David Boswarthick, Omar Elloumi , ―The Internet of Things – Key applications and Protocols, Wiley, 2012 (for Unit 2).
3. Jan Ho¨ ller, Vlasios Tsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Elsevier, 2014.
4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), ―Architecting the Internet of Things, Springer, 2011.
5. Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O'Reilly Media, 2011.

P19MIT510   **CLOUD COMPUTING**   **3   0   0   3**

COURSE OUTCOMES

At the end of the course, the student will be able to

1. Explain the need and challenges of cloud computing
2. Explain the technologies and services associated with cloud computing
3. Describe the types of abstraction and virtualization management in the cloud
4. Explain the concepts for managing and securing in the cloud
5. Explain the different framework and analyze the tools available for creating cloud environment.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	3	2										3
CO2	2	3	3	3	3									3
CO3	2	3	2	3	3								3	3
CO4	2	3	3	3	3								3	3
CO5	2	3	3	3	3								3	3

UNIT I   **INTRODUCTION TO CLOUD COMPUTING**   **9**

Introduction to Cloud Computing: Overview, Roots of Cloud Computing, Layers and Types of Cloud, Desired Features of a Cloud, Benefits and Disadvantages of Cloud Computing, Challenges and Risks, Assessing the role of Open Standards

UNIT II   **CLOUD ARCHITECTURE, SERVICES AND APPLICATIONS**   **9**

Exploring the Cloud Computing Stack, Connecting to the Cloud, Infrastructure as a Service, Platform as a Service, Using PaaS Application Frameworks, Software as a Service, Saas vs. Paas, Identity as a Service, Compliance as a Service

UNIT III   **ABSTRACTION AND VIRTUALIZATION**   **9**

Introduction to SAN, Introduction to Virtualization Technologies, Load Balancing and Virtualization, Understanding Hyper visors, Understanding Machine Imaging, Porting Applications, Virtual Machines Provisioning and Manageability Virtual Machine Migration Services, Virtual Machine Provisioning and Migration in Action

UNIT IV   **MANAGING & SECURING THE CLOUD**   **9**

Administrating the Clouds, Cloud Management Products, Emerging Cloud Management Standards, Securing the Cloud, Securing Data, Establishing Identity and Presence

UNIT V   **CASE STUDIES**   **9**

Case study in Open Stack, Google Cloud, Amazon Web Services, Salesforce.

THEORY: 45   **TUTORIALS: -**   **PRACTICAL:**   **TOTAL: 45 Hours**

REFERENCES

1. Sosinsky B., "Cloud Computing Bible", Wiley India Pvt Ltd, 2017.

2. Buyya R., Broberg J., Goscinski A.,"Cloud Computing : Principles and Paradigm", Wiley, 2013.

3. Shroff G., "Enterprise Cloud Computing", Cambridge University Press, 2010.

4. Smooth S., Tan N., "Private Cloud Computing", 1st Edition, Morgan Kauffman, 2011.

COURSE OUTCOMES

At the end of the course, the student will be able to,

1. Identify the importance and usability levels for interactive systems.
2. Analyze the development process involved in user interface.
3. Develop skills in handling virtual environments and its exploitation.
4. Comprehend the diverse input methods available for interfacing.
5. Explain the recent technologies and its application of HCI.

CO / PO, PSO Mapping (3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3		3	3	3		2						3	3
CO2	3		3	3	3		3						2	3
CO3	3		3	2	2		3						2	3
CO4	3		3	3	1		2						1	3
CO5	3		3	3	1		3						1	3

UNIT I   IMPORTANCE OF USER INTERFACE   10
Definition - importance of good design - Benefits of good design - History of Screen design. The graphical user interface – popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface Design process – Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, and understanding business junctions.

UNIT II   SCREEN DESIGNING   10
Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition– amount of information – focus and emphasis – presentation information simply and meaningfully– information retrieval on web – statistical graphics – Technological consideration in interface design.

UNIT III   VIRTUAL ENVIRONMENT   9
Windows – New and Navigation schemes selection of window, selection of devices based and screen based controls. Components – text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors- Virtual Augmented Reality techniques.

UNIT IV   INTERACTION DEVICES   8
Interaction Devices –Keyboard and function keys – pointing devices – speech recognition digitization and generation –image and video displays – drivers.

UNIT V   TECHNOLOGIES FOR HCI   8
HCI and related fields – Cognition Theory – A.I. – Accessibility Issues – Assistive Technologies- Technologies for HCI – Research Directions in HCI.

THEORY: 45 Hours   TUTORIAL: -   PRACTICAL: -   TOTAL: 45 Hours

REFERENCES

1. Wilbert O. Galiz, "The Essential guide to User Interface Design", Wiley Dreamtech, 2018.
2. Alan Cooper, "The Essentials of User Interface Design", Wiley India Pvt. Ltd, 4th edition 2016
3. Ben Shneiderman, Plaisant, Cohen, Jacobs, "Designing the User Interface", 5th Edition, Addison-Wesley, 2014.
4. Julie A. Jacko (Ed), "The Human-Computer Interaction Handbook", 3rd edition, CRC Press, 2012.
5. Jonathan Lazar, Jinjuan Heidi Feng, & Harry Hochheiser, "Research Methods in Human Computer Interaction", Wiley, 2010
6. Helen Sharp; Yvonne Rogers; Jenny Preece, "Interaction Design", Wiley Dreamtech,2nd edition, 2007
7. Soren Lauesen,"User Interface Design", Pearson Education, 2005.
8. Alan Dix, Janet Finlay, Gregory Abowd & Russell Beale, "Human-Computer Interaction", 3rd Edition. Prentice Hall, 2004.
9. Barfied, Lon, "The User Interface: Concepts and Design", Addison –Wesley, 2004.

2 0 0 0

Course Outcomes:

At the end of completion of this course, students will be able to
1. Develop physical and mental health thus improving social health
2. Increase immunity power of the body and prevent diseases
3. Accelerate memory power
4. Achieve the set goal with confidence and determination
5. Improve stability of mind, pleasing personality and work with awakened wisdom

UNIT – I   6

Yoga-Introduction - Astanga Yoga- 8 parts-Yam and Niyam etc.- Do`s and Don'ts in life-Benefits of Yoga and Asana- Yoga Exercise- and benefits- Pranayam Yoga- Nadi suthi, Practice and Spinal Sclearance Practice- Regularization of breathing techniques and its effects-Practice and kapalapathy practice.

UNIT – II   6

Neuromuscular breathing exercise and Practice- Magarasa Yoga, 14 points Acupressure techniques and practice- Body relaxation practice and its benefits- Raja Yoga- 1.Agna – explanation and practice- Activation of Pituitary- Raja Yoga- 2. Santhi Yoga-Practice-Balancing of physical and mental power.

UNIT – III   6

Raja Yoga- 3. Sagasrathara yoga –practice- Activation of dormant brain cells-Kayakalpa-theory- Kayakalpa –practice-Yogic exercise to improve physical and mental health and practice-Asanas –explanation-Practice-benefits

UNIT –IV   6

Sun namaskar- 12 poses-explanation and practice-Yoga –Asana-Padmasana, vajrasana,chakrasana, viruchasana etc-Stress management with Yoga-Role of women and Yoga

Equality, nonviolence, Humanity, Self- control- Food and yoga Aware of self-destructive habits

Avoid fault thinking (thought analysis-Practice)-Yoga Free from ANGER (Neutralization of anger)& practice
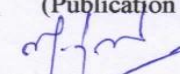
UNIT – V   6

Moralisation of Desire & practice- Punctuality-Love-Kindness-Compassion Eradication of worries-Practice -Personality development, positive thinking-Good characters to lead a moral life

How to clear the polluted mind- Benefits of blessing- Five- fold culture –explanation- Karma Yoga Practice In Geetha- Sense of duty-Devotion, self- reliance, confidence, concentration, truthfulness, cleanliness.

Reference Books
1. 'Yogic Asanas for Group Tarining-Part-I" Janardan Swami Yogabhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, AdvaitaAshrama (Publication Department), Kolkata

                                                                      Total: 30 hours

Dr. M. Renuga
BoS – Chairperson,
Science & Humanities
HOD / H&L

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
Theory							
1	P19MIT519	**Professional Elective-** Multimedia communication	3	0	0	3	45
2	P19ISE601	**Open Elective–** Transport Safety	3	0	0	3	45
Practical							
3	P19MIT301	Project Phase - I	0	0	16	8	240
					Total Credits	**14**	

Approved by

Chairperson, Information Technology BoS **Member Secretary, Academic Council** **Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari **Dr.R.Shivakumar** **Dr.S.R.R.Senthil Kumar**

Copy to:-
        HOD/IT, Third Semester M.Tech IT Students and Staff, COE

P19MIT519   **MULTIMEDIA COMMUNICATION**   **3 0 0 3**

COURSE OUTCOMES

At the end of the course, the student will be able to,

1. Explain the relevance and underlying infrastructure of the multimedia systems.

2. Comprehend core multimedia audio and video compression techniques

3. Apply the concepts of compression in different methods.

4. Explain the voice over IP architecture and Quality of services.

5. Explain the concepts of Multimedia networking applications.

<table>
<tr><td colspan="15">CO / PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak</td></tr>
<tr><td colspan="15"></td></tr>
<tr><td rowspan="2">COs</td><td colspan="14">Programme Outcomes (POs) and Programme Specific Outcome (PSOs)</td></tr>
<tr><td>PO1</td><td>PO2</td><td>PO3</td><td>PO4</td><td>PO5</td><td>PO6</td><td>PO7</td><td>PO8</td><td>P09</td><td>PO10</td><td>PO11</td><td>PO12</td><td>PSO1</td><td>PSO2</td></tr>
<tr><td>CO1</td><td>3</td><td>2</td><td>3</td><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr>
<tr><td>CO2</td><td>3</td><td>3</td><td>2</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr>
<tr><td>CO3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr>
<tr><td>CO4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>2</td></tr>
<tr><td>CO5</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3</td></tr>
</table>

UNIT I   MULTIMEDIA COMPONENTS   9
Introduction - Multimedia skills - Multimedia components and their characteristics - Text, sound, images, graphics, animation, video, hardware.

UNITII   AUDIO AND VIDEO COMPRESSION   9
Audio compression–DPCM-Adaptive PCM –adaptive predictive coding-linear Predictive coding-code excited LPC-perpetual coding, MP3; Video compression – principles-H.261-H.263-MPEG 1, 2, 4.

UNIT III   LOSSLESS COMPRESSION   9
Compression principles-source encoders and destination encoders--entropy encoding –source encoding -text compression –static Huffman coding dynamic coding –arithmetic coding –Lempel Ziv-Welch Compression.

UNIT IV   VoIP TECHNOLOGY   9
Basics of IP transport, VoIP challenges, H.323/ SIP –Network Architecture, Protocols, Call establishment and release, VoIP and SS7, Quality of ServiceCODEC Methods-VOIP applicability

UNIT V   MULTIMEDIA NETWORKING   9
Multimedia networking -Applications-streamed stored and audio-making the best Effort service-protocols for real time interactive Applications-distributing multimedia beyond best effort service-secluding and policing Mechanisms-integrated services differentiated Services-RSVP.

THEORY: 45 Hours   TUTORIAL: -   PRACTICAL: -   TOTAL: 45 Hours

REFERENCES BOOKS;

1. Tay Vaughan, "Multimedia: Making It Work", Seventh Edition, Tata Mc- Graw hill, New Delhi, Ninth edition,2019.

2. Kurose and W.Ross, "Computer Networking –A top down approach" ,Pearson education, Seventh edition, 2017.

3. Fred Halshall, "Multimedia communication - applications, networks, protocols and standards", Pearson education, 2008.

4. Marcus Gonzalves, "Voice over IP Networks", McGraw Hill,1998.

5. KR. Rao,Z S Bojkovic, D A Milovanovic, "Multimedia Communication Systems: Techniques, Standards, and Networks", Pearson Education 2017

6. R. Steimnetz, K. Nahrstedt, "Multimedia Computing, Communications and Applications", Pearson Education, First ed, 1995.

P19MIT601   **PYTHON PROGRAMMING**   **3   0   0   3**

PREAMBLE

Python is an easy to learn, powerful programming language. It has efficient high-level data structures. It is a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms. This programming language has become a preferred development technology in IT industries.

Python can be integrated with many other technologies also. It is rapidly becoming a de-facto language for data analytics and / or machine learning as many packages are added to perform more complex tasks. This course aims to teach everyone the basics of programming using Python.

COURSE OUTCOMES

At the end of the course, the student will be able to
1. Write simple applications
2. Develop programs using loops
3. Create applications using functions
4. Develop application using files
5. Create application using Python and MySQL

CO / PO, PSO Mapping														
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak														
COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3									3	3	3
CO2	3	3	3									3	3	3
CO3	3	3	3									3	3	3
CO4	3	3	3									3	3	3
CO5	3	3	3									3	3	3

UNIT I   INTRODUCTION   9

The way of programming-What is programming- debugging – formal and natural languages - Python: Features - Installing - Running – The Basics-variables-Operators and Expressions

UNIT II   CONTROL FLOW   9

Control Flow: introduction- if – else – while statement – do while – for loop –break – continue

UNIT III   PYTHON FUNCTIONS   9

Sequences: String - List – Tuple – Dictionary - Functions – Function Parameters, Local and Global Variables, Default Arguments, Keyword Arguments, Return Statements.

UNIT IV   PYTHON MODULES, PACKAGES AND FILES   9

Introduction – Byte files – from import – making own modules – Files and Input/Output: File Objects and Built in functions – Command line Arguments – Packages.

UNIT V   PYTHON DATABASE CONNECTIVITY   9

SQL Introduction – simple queries – create - insert – update – delete, MySQL Introduction – connecting python and MySQL database.

Total Hours: 45 hours

TEXT BOOK

1.   Swaroop C N, " A Byte of Python ", ebshelf Inc., 1st Edition, 2013.

REFERENCES

1.   Wesley J. Chun, "Core Python Programming", Pearson, 2nd Edition, 2006.

2.   Allen B.Downey, "Think Python: How to Think Like a Computer Scientist", O'Reilly Media, 2nd Edition, 2015.

PREAMBLE

Machine Learning has become an important course which has to be learned by engineering graduates from any engineering programme. Now many industries are developing more robust machine learning models capable of analyzing bigger and more complex data while delivering faster, more accurate results on vast scales. Machine Learning tools enable organizations to more quickly identify profitable opportunities and potential risk.

This course aims to teach everyone the basics of Machine Learning (ML) and ML algorithms related to supervised and unsupervised learning techniques which are most commonly used in the Industry for solving the problems.

COURSE OUTCOMES

At the end of the course, the student will be able to

1. Explain the concepts of different types of learning and apply linear regression
2. Summarize the concepts of logistic regression and implement the same with python
3. Explain and apply the concepts of Neural networks and support vector machines
4. Evaluate the hypothesis based on factors like bias and variance
5. Explain the concepts of clustering, dimensionality reduction and anomaly detection.

CO / PO, PSO Mapping
(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs) and Programme Specific Outcome (PSOs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	1	1	1				1	1		1	2	2
CO2	3	3	3	3	3				1	1		1	2	2
CO3	3	3	3	3	3				1	1		1	2	2
CO4	3	3	3	1	1				1	1		1	2	2
CO5	3	3	1	1	1				1	1		1	2	2

UNIT I   INTRODUCTION AND LINEAR REGRESSION   9

Introduction to Artificial Intelligence - What is machine learning? – Supervised Learning – unsupervised learning – Linear Regression – cost function – gradient descent algorithm – normal equation - Gradient descent for multiple variables – feature scaling – learning rate – polynomial regression – normal equation

UNIT II   LOGISTIC REGRESSION   9

Hypothesis representation – decision boundary – nonlinear decision boundaries – cost function – gradient descent – advanced optimizations – multi class classification problems – **Regularization -** Problem of overfitting – cost function optimization for regularization – regularized linear regression – regularization with normal equation - regularized logistic regression

UNIT III   NEURAL NETWORKS AND SUPPORT VECTOR MACHINES   9

Overview and summary – neurons and brain – model representation – artificial neural networks representation – example – multiclass classification – cost function – back propagation algorithm – gradient checking – random initialization – Support vector machines – optimization objective – cost function – large margin intuition – decision boundary – kernels – adapting to nonlinear classifiers - implementation

UNIT IV   ADVICE FOR APPLYING MACHINE LEARNING   9

Debugging a learning algorithm – evaluating a hypothesis – model selection and training, validation test sets – bias Vs variance – regularization and bias/variance – learning curves machine learning system design

UNIT V   OTHER TOPICS   9

Unsupervised learning – k-means algorithm – optimization objective – choosing number of clusters - Dimensionality reduction – principle component analysis - Anomaly detection – algorithm – developing and evaluating the algorithm – anomaly detection Vs supervised algorithm -Case study – recommender system – collaborative filtering - Large scale machine learning – online learning – map reduce and parallelism.

Total Hours: 45 hours

REFERENCES

1. Stanford's machine learning course presented by Professor Andrew Ng – online resource - http://www.holehouse.org/mlclass/

2. James, G., Witten, D., Hastie, T., Tibshirani, R, "An Introduction to Statistical Learning with Applications in R", Springer, 2013.

3. Tom M. Mitchell, "Machine Learning", 1st edition, McGraw Hill Education, 2017.

4. Ethem Alpaydın, "Introduction to Machine Learning", The MIT Press, 2nd edition, 2013.

5. Christopher M. Bishop, "Pattern Recognition and Machine Learning", Springer, 2007.

6. Sebastianraschka, "Python Machine Learning", Packt Publishing Ltd., 2017.

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for ME IV Semester under Regulations 2019
Information Technology
Branch: M.Tech. Information Technology

S. No	Course Code	Course Title	Lecture	Tutorial	Practical	Credit	Total Contact Hours
		Practical					
1	P19MIT401	Project Phase – II	0	0	28	14	420
					Total Credits	**14**	

Approved by

Chairperson, Information Technology BoS   **Member Secretary, Academic Council**   **Chairperson, Academic Council & Principal**
Dr.J.Akilandeswari   **Dr.R.Shivakumar**   **Dr.S.R.R.Senthil Kumar**

Copy to:-
HOD/IT, Fourth Semester M.Tech IT Students and Staff, COE