

SONA COLLEGE OF TECHNOLOGY, SALEM-5

(An Autonomous Institution)

M.E- Computer Science and Engineering

(Dept of CSE)

CURRICULUM and SYLLABI

[For students admitted in 2024-2025]

PG Regulations 2023

Approved by BOS and Academic Council meetings

Sona College of Technology, Salem

(An Autonomous Institution)

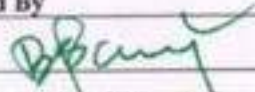
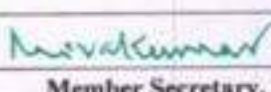
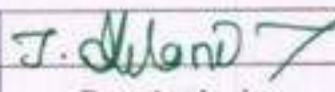

Courses of Study for M.E/M.Tech. Semester I under Regulations 2023 (CBCS)

Branch: M.E Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*	
Theory courses											
1.	P23MAT101A	Mathematical Foundations of Computer Science	3	1	0	0	4	FC	60	TT	
2.	P23CSE101	Advanced Data Structures and Algorithms	3	0	0	0	3	PC	45	T	
3.	P23CSE102	Advanced Computer Architecture	3	0	0	0	3	PC	45	T	
4.	P23CSE103	Advanced Operating Systems	3	0	0	0	3	PC	45	T	
5.	P23GE101	Research Methodology and IPR	3	0	0	0	3	PC	45	T	
6.	P23GE702	Audit Course: Stress Management by Yoga	2	0	0	0	0	AC	30	T	
Practical courses											
7.	P23CSE104	Advanced Data Structures and Algorithms Laboratory	0	0	2	2	2	PC	60	LP	
8.	P23CSE105	Advanced Operating Systems laboratory	0	0	2	2	2	PC	60	LP	
Total Credits							20				

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L- Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

Approved By

			
Chairperson, CSE BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr. B. Sathiyabhama	Dr. R. Shivakumar	Dr. J. Akilandeswari	Dr. S. R. R. Senthil Kumar

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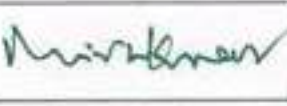
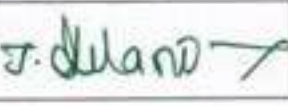

HOD/ Computer Science and Engineering, First Semester M.E. CSE Students and Staff, COE

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for M.E/M.Tech. Semester II under Regulations 2023 (CBCS)
Branch: Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*	
Theory courses											
1.	P23CSE201	Advanced Databases	3	0	0	0	3	PC	45	T	
2.	P23CSE202	Advanced Network Design	3	0	0	0	3	PC	45	T	
3.	P23CSE522	Elective: Software Testing and Quality Assurance	3	0	0	0	3	PE	45	T	
4.	P23CSE525	Elective: Foundations of Data Science	3	0	0	0	3	PE	45	T	
5.	P23CSE535	Elective: Healthcare Data Analytics	3	0	0	0	3	PE	45	T	
6.	P23GE701	Audit Course: English for Research Paper Writing	2	0	0	0	0	AC	30	T	
Practical courses											
7.	P23CSE203	Advanced Databases Laboratory	0	0	2	2	2	PC	60	LP	
8.	P23CSE204	Advanced Network Design Laboratory	0	0	2	2	2	PC	60	LP	
Total Credits							19				

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

Approved By

			
Chairperson, Computer Science and Engineering BoS Dr. B. Sathyabhama	Member Secretary, Academic Council Dr. R. Shivakumar	Dean-Academics Dr. J. Akilandeswari	Chairperson, Academic Council & Principal Dr. S. R. R. Senthil Kumar

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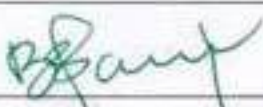
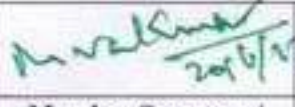
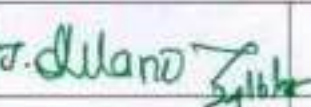

HOD/ Computer Science and Engineering, Second Semester M.E CSE Students and Staff, COE

Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for M.E/M.Tech. Semester III under Regulations 2023 (CBCS)
Branch: Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*	
Theory courses											
1.	P23CSE512	Elective: Information Retrieval	3	0	0	0	3	PE	45	T	
2.	P23CSE518	Elective: Software Security	3	0	0	0	3	PE	45	T	
3.	P23CSE524	Elective: Visualization Techniques	3	0	0	0	3	PE	45	T	
Practical courses											
4.	P23CSE301	Project Work -I	0	0	0	16	08	PC	240	P	
Total Credits							17				

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project, P- Project.

Approved By

	 20/6/23		
Chairperson -- CSE BoS	Member Secretary/ Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.B.Sathiyabhama	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

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HOD/ CSE, Third Semester ME CSE Students and Staff, COE



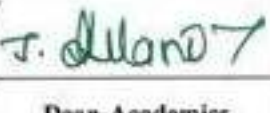

Sona College of Technology, Salem
(An Autonomous Institution)

Courses of Study for M.E/M.Tech. Semester IV under Regulations 2023 (CBCS)
Branch: Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*	
Practical courses											
1.	P23CSE401	Project Work-II	0	0	0	28	14	PC	420	P	
Total Credits							14				

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

Approved By

			
Chairperson, Computer Science and Engineering BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.B.Sathiyabhama	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

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HOD/ Computer Science and Engineering, Fourth Semester M.E CSE Students and Staff, COE

Sona College of Technology, Salem

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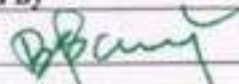
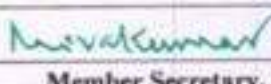
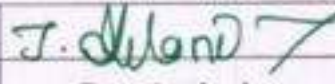

Courses of Study for M.E/M.Tech. Semester I under Regulations 2023 (CBCS)

Branch: M.E Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*	
Theory courses											
1.	P23MAT101A	Mathematical Foundations of Computer Science	3	1	0	0	4	FC	60	TT	
2.	P23CSE101	Advanced Data Structures and Algorithms	3	0	0	0	3	PC	45	T	
3.	P23CSE102	Advanced Computer Architecture	3	0	0	0	3	PC	45	T	
4.	P23CSE103	Advanced Operating Systems	3	0	0	0	3	PC	45	T	
5.	P23GE101	Research Methodology and IPR	3	0	0	0	3	PC	45	T	
6.	P23GE702	Audit Course: Stress Management by Yoga	2	0	0	0	0	AC	30	T	
Practical courses											
7.	P23CSE104	Advanced Data Structures and Algorithms Laboratory	0	0	2	2	2	PC	60	LP	
8.	P23CSE105	Advanced Operating Systems laboratory	0	0	2	2	2	PC	60	LP	
Total Credits							20				

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L- Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project



Approved By

			
Chairperson, CSE BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr. B. Sathiyabhama	Dr. R. Shivakumar	Dr. J. Akilandeswari	Dr. S. R. R. Senthil Kumar

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HOD/ Computer Science and Engineering, First Semester M.E. CSE Students and Staff, COE

COMPUTER SCIENCE AND ENGINEERING					
M. E. / COMPUTER SCIENCE AND ENGINEERING					
SEMESTER - I	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE				
P23MAT101A	L	T	P	J	C
	3	1	0	0	4
Course Outcomes					
At the end of the course, the student will be able to					
CO1:	apply the concept of set theory in machine learning, databases, class-based object-oriented systems and data structures.				
CO2:	apply the concept of logical theory to validate the correctness of software specifications.				
CO3:	analyse the computational processes using combinatorial techniques.				
CO4:	apply the concept of automata, formal languages and turing machines in text processing, compilers, hardware design, programming languages and artificial intelligence.				
CO5:	apply the concept of graph theory in networks of communication, data organization, computational devices and the flow of computation.				
Pre-requisites:					
<ul style="list-style-type: none"> Basics of elementary algebra Basics of calculus 			<ul style="list-style-type: none"> Basics of geometry Basics of discrete mathematics 		
CO/PO, PSO Mapping					
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak					
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5
CO1	3	3	2	3	3
CO2	3	3	2	3	3
CO3	3	3	2	3	3
CO4	3	3	2	3	3
CO5	3	3	2	3	3
Course assessment methods [Theory]					
Direct			Indirect		
CIE test I (10) (Theory) CIE test II (10) (Theory) CIE test III (10) (Theory) Assignment / Problem-solving / Seminar (10)			Total CIE: 40 marks Semester End Examination: 60 marks		Course end survey
Unit 01	FUNDAMENTAL STRUCTURES				12 Hours
Set theory – relationships between sets – operations on sets – set identities – principle of inclusion and exclusion – relations – binary relations – partial orderings – equivalence relations.					
Unit 02	LOGIC				12 Hours
Propositional logic – logical connectives – truth tables – normal forms (conjunctive and disjunctive) – proof techniques – direct – proof by contradiction – proof by reduction.					

Unit 03	COMBINATORICS			12 Hours
Sum-rule – product-rule – permutations – combinations – mathematical induction – Pigeon-hole principle – principle of inclusion-exclusion – recurrence relations – generating functions.				
Unit 04	MODELING COMPUTATION AND LANGUAGES			12 Hours
Finite state machines – deterministic and non-deterministic finite state machines – formal languages – classes of grammars – context sensitive – context free – regular grammars.				
Unit 05	GRAPHS			12 Hours
Introduction to graphs – graph terminology – representation of graphs – graph isomorphism – connectivity – Euler and Hamilton Paths – shortest path algorithms – spanning trees – minimum spanning tree.				
Theory: 45 Hrs Tutorial: - 15 Hrs Practical: Project:- Total Hours: 60 Hrs				
TEXT BOOK:				
1.	J. P. Trembley and R. Manohar, "Discrete Mathematical Structures with Applications to Computer Science" McGraw Hill Publishers, 1 st Edition 2017.			
REFERENCE BOOKS:				
1.	K. H. Rosen, "Discrete Mathematics and its Applications", McGraw Hill Publishers, 8 th Edition, 2019.			
2.	R. P. Grimaldi, "Discrete and Combinatorial Mathematics", Pearson Publishers, 5 th Edition, 2006.			
3.	T. Veerarajan, "Discrete Mathematics", McGraw Hill Publishers, 13 th Reprint 2011.			
 Dr. S. JAYABHARATHI ASSOCIATE PROFESSOR & HEAD DEPARTMENT OF MATHEMATICS, SONA COLLEGE OF TECHNOLOGY, SALEM-636 005, Tamilnadu. Ph: 0427 - 4099999.		 Dr. M. RENUGA, Professor & Head, Department of Humanities & Languages, Sona College of Technology, SALEM - 636 005.		
HoD / Mathematics		BoS – Chairperson / Science and Humanities		

P23CSE101	ADVANCED DATA STRUCTURES AND ALGORITHMS	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

- CO1: Design algorithms to solve real-time problems
- CO2: Design and develop algorithms using various hierarchical data structures
- CO3: Develop Graph algorithms to solve real-life problems
- CO4: Apply suitable design strategy for problem solving
- CO5: Analyse various NP hard and NP complete problems

Pre-requisite:

CO/PO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)				
	PO1	PO2	PO3	PO4	PO5
CO1	1	3	1	1	2
CO2	1	1	2	2	1
CO3	1	3	2	3	2
CO4	1	2	2	3	2
CO5	1	2	2	3	2

Course Assessment methods

Direct		Indirect
CIE test I (10)	Assignment / Problem-solving / Seminar (10) Total CIE: 40 marks Semester End Examination: 60 marks	Course end survey
CIE test II (10)		
CIE test III (10)		

Unit 01: ROLE OF ALGORITHMS IN COMPUTING

9 Hours

Algorithms – Algorithms as a Technology- Insertion Sort – Analyzing Algorithms – Designing Algorithms- Growth of Functions: Asymptotic Notation – Standard Notations and Common Functions- Recurrences: The Substitution Method – The Recursion-Tree Method

Unit 02: HIERARCHICAL DATA STRUCTURES

9 Hours

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 Btrees – Basic operations on B-Trees – Deleting a key from a B-Tree- Fibonacci Heaps: structure – Mergeable-heap operations- Decreasing a key and deleting a node-Bounding the maximum degree.

Unit 03: GRAPHS

9 Hours

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 FloydWarshall Algorithm.				
Unit 04: ALGORITHM DESIGN TECHNIQUES				9 Hours
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 05: NP COMPLETE AND NP HARD				9 Hours
NP-Completeness: Polynomial Time – Polynomial-Time Verification – NP- Completeness and Reducibility – NP-Completeness Proofs – NP-Complete Problems				
Theory: 45 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 45 Hrs
REFERENCES				
1.	Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, Data Structures and Algorithms, Pearson Education, Reprint 2006.			
2.	S.Sridhar, Design and Analysis of Algorithms, First Edition, Oxford University Press, 2014.			
3.	Robert Sedgewick and Kevin Wayne, —ALGORITHMS, Fourth Edition, Pearson Education, 2011.			
4.	Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, —Introduction to Algorithms, Third Edition, Prentice-Hall, 2011.			
5.	Anany Levitin, Introduction to the Design and Analysis of Algorithms, Pearson Education, Third Edition 2017.			
6.	Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Fundamentals of Data Structures in C, Universities Press; Second edition, 2008.			

P23CSE102	ADVANCED COMPUTER ARCHITECTURE		L	T	P	J	C
			3	0	0	0	3
Course Outcomes							
At the end of the course, the student will be able to							
CO1:	Discuss the issues related to multiprocessing and suggest solutions						
CO2:	Discuss the salient features of different multicore architectures and how they exploit parallelism.						
CO3:	Discuss the various techniques used for optimising the cache performance						
CO4:	Design hierarchal memory system						
CO5:	Analyze how data level parallelism is exploited in architectures						
Pre-requisite:							
CO/PO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak							
COs	Programme Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5		
CO1	1	3	1	1	2		
CO2	1	1	2	2	1		
CO3	1	3	2	3	2		
CO4	1	2	2	3	2		
CO5	1	2	2	3	2		
Course Assessment methods							
Direct				Indirect			
CIE test I (10) CIE test II (10) CIE test III (10)	Assignment / Problem-solving / Seminar (10) Total CIE: 40 marks Semester End Examination: 60 marks			Course end survey			
Unit 01: FUNDAMENTALS OF COMPUTER DESIGN AND ILP						9 Hours	
Fundamentals of Computer Design – Measuring and Reporting Performance – Instruction Level Parallelism and its Exploitation – Concepts and Challenges –Exposing ILP - Advanced Branch Prediction - Dynamic Scheduling - Hardware-Based Speculation - Exploiting ILP - Instruction Delivery and Speculation - Limitations of ILP – Multithreading							
Unit 02: MEMORY HIERARCHY DESIGN						9 Hours	
Introduction – Optimizations of Cache Performance – Memory Technology and Optimizations – Protection: Virtual Memory and Virtual Machines – Design of Memory Hierarchies – Case Studies.							
Unit 03: MULTIPROCESSOR ISSUES						9 Hours	
Introduction- Centralized, Symmetric and Distributed Shared Memory Architectures –Cache Coherence Issues – Performance Issues – Synchronization – Models of Memory Consistency – Case Study- Interconnection Networks – Buses, Crossbar and Multi-stage Interconnection Networks							

Unit 04: MULTICORE ARCHITECTURES				9 Hours
Homogeneous and Heterogeneous Multi-core Architectures – Intel Multicore Architectures – SUN CMP architecture – IBM Cell Architecture, Introduction to Warehouse-scale computers Architectures- Physical Infrastructure and Costs- Cloud Computing –Case Study- Google Warehouse-Scale Computer				
Unit 05: VECTOR, SIMD AND GPU ARCHITECTURES				9 Hours
Introduction-Vector Architecture – SIMD Extensions for Multimedia – Graphics Processing Units – Case Studies – GPGPU Computing – Detecting and Enhancing Loop Level Parallelism-Case Studies				
Theory: 45 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 45 Hrs
REFERENCES				
1.	Darryl Gove, "Multicore Application Programming: For Windows, Linux, and Oracle Solaris", Pearson, 2011			
2.	David B. Kirk, Wen-mei W. Hwu, "Programming Massively Parallel Processors", Morgan Kaufman, 2010			
3.	David E. Culler, Jaswinder Pal Singh, "Parallel computing architecture : A hardware/software approach" , Morgan Kaufmann /Elsevier Publishers, 1999			
4.	John L. Hennessy and David A. Patterson, "Computer Architecture – A Quantitative Approach", Morgan Kaufmann / Elsevier, 5th edition, 2012.			
5.	Kai Hwang and Zhi. Wei Xu, "Scalable Parallel Computing", Tata McGraw Hill, NewDelhi, 2003			

P23CSE103	ADVANCED OPERATING SYSTEMS	L	T	P	J	C
		3	0	0	0	3
Course Outcomes						
At the end of the course, the student will be able to						
CO1:	Apply the operating system concepts to a distributed environment and identify the features specific to distributed systems.					
CO2:	Demonstrate the Mutual exclusion, Deadlock detection and agreement protocols of Distributed operating systems.					
CO3:	Discuss the different consistency model, replacement strategy in distributed shared memory.					
CO4:	Apply the distributed system concepts for any scenario.					
CO5:	Analyze the role of operating systems in cloud and mobile environment.					
Pre-requisite:						
CO/PO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak						
COs	Programme Outcomes (POs)					
	PO1	PO2	PO3	PO4	PO5	
CO1	1	3	2	2	1	
CO2	2	2	3	2	1	
CO3	1	1	1	3	2	
CO4	1	1	2	1	2	
CO5	1	2	2	1	1	
Course Assessment methods						
Direct			Indirect			
CIE test I (10)	Assignment / Problem-solving / Seminar (10)			Course end survey		
CIE test II (10)	Total CIE: 40 marks					
CIE test III (10)	Semester End Examination: 60 marks					
Unit 01: INTRODUCTION					9 Hours	
Distributed Operating Systems – Issues – Communication Primitives – Limitations of a Distributed System – Lamport’s Logical Clocks – Vector Clocks – Causal Ordering of Messages						
Unit 02: DISTRIBUTED OPERATING SYSTEMS					9 Hours	
Distributed Mutual Exclusion Algorithms – Classification – Preliminaries – Simple Solution – Lamport’s Algorithm – Ricart-Agrawala Algorithm – Suzuki-Kasami’s Broadcast Algorithm –Raymond’s Tree-Based Algorithm – Distributed Deadlock Detection – Preliminaries – Centralized Deadlock Detection Algorithms – Distributed Deadlock Detection Algorithms – Path Pushing Algorithm – Edge Chasing Algorithm – Hierarchical Deadlock Detection Algorithms – Agreement Protocols – Classification – Solutions to the Byzantine Agreement Problem – Lamport- Shostak Pease Algorithm						
Unit 03: DISTRIBUTED RESOURCE MANAGEMENT					9 Hours	
Distributed File Systems – Design Issues – Google File System – Hadoop Distributed File System – Distributed Shared Memory – Algorithms for Implementing Distributed Shared Memory – Load Distributing						

4.8.2023

Version 1.0

Programme: M.E (CSE)

PG Regulations- 2023


Dr. B. SATHIYABHAMA, B.E., M.Tech., Ph.D.
 PROFESSOR & HEAD,
 Dept. of Computer Science and Engineering
 SONA COLLEGE OF TECHNOLOGY
 SALEM - 636 005

Algorithms – Synchronous and Asynchronous Check Pointing and Recovery – Fault Tolerance – Two-Phase Commit Protocol – Nonblocking Commit Protocol				
Unit 04: REAL TIME OPERATING SYSTEMS				9 Hours
Basic Model of Real - Time Systems – Characteristics – Application of Real - Time Systems – Real - Time Task Scheduling— Handling Resource Sharing –Case Study –Minix OS				
Unit 05: MOBILE AND CLOUD OPERATING SYSTEM				9 Hours
Android – Overall Architecture – Linux Kernel – Hardware Support – Native User-Space – Dalvik and Android's Java –System Services – Introduction to Cloud Operating Systems.				
Theory: 45 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 45 Hrs
REFERENCES				
1.	Mukesh Singhal, Niranjana G.Shivaratri, "Advanced concepts in operating systems: Distributed, Database and multiprocessor operating systems", TMH, 2001			
2.	Rajib Mall, "Real-Time Systems: Theory and Practice", Pearson Education India, 2006.			
3.	Karim Yaghmour, "Embedded Android", O'Reilly, First Edition, 2013.			
4.	Nikolay Elenkov, "Android Security Internals: An In-Depth Guide to Android's Security Architecture", No Starch Press,2014			


P23CSE104	ADVANCED DATA STRUCTURES AND ALGORITHMS LABORATORY				L	T	P	J	C
					0	0	2	2	2
Course Outcomes									
At the end of the course, the student will be able to									
CO1:	Design and implement basic and advanced data structures for real applications								
CO2:	Design algorithms using graph structures								
CO3:	Implement for real applications using design techniques								
Pre-requisite:									
CO/PO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak									
COs	Programme Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5				
CO1	1	3	2	2	1				
CO2	2	2	3	2	1				
CO3	1	1	1	3	2				
Course Assessment methods									
Direct					Indirect				
CIE test I (10)-Laboratory Quiz 1 (5)		CIE(10)-Project Record(10)			Course end survey				
CIE test II (10)- Laboratory Quiz 1 (5)		Total CIE: 50 marks Semester End Examination (50)							
		SEE :Laboratory							
List of Experiments:									
<ol style="list-style-type: none"> 1. Implementation of Merge Sort and Quick Sort-Algorithms 2. Implementation of a Binary Search Tree 3. Red-Black Tree Implementation 4. Heap Implementation 5. Fibonacci Heap Implementation 6. Graph Traversals 7. Spanning Tree Implementation 8. Shortest Path Algorithms (Dijkstra's algorithm, Bellmann Ford Algorithm) 9. Implementation of Matrix Chain Multiplication 10. Activity Selection and Huffman Coding Implementation. <p>Design and develop application with suitable data structures for the use cases</p> <ul style="list-style-type: none"> • Snakes Game (Arrays) • Sudoku (Backtracking) • Travel Planner (Graphs) • Cash Flow Minimiser (Graphs/Multisets/Heaps) • Text Editor Cut, Copy, Paste (Stack) • File Zipper (Greedy Huffman Encoder) • CB Mario (Dynamic Programming Optimisation in Game) • Jump Froggy (Greedy Optimisation in Game) 									
Theory: 0		Tutorial: 0		Practical: 30		Project: 30		Total Hours: 60 Hrs	

4.8.2023

Version 1.0

Programme: M.E (CSE)

PG Regulations- 2023


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P23CSE105	ADVANCED OPERATING SYSTEMS LABORATORY		L	T	P	J	C
			0	0	2	2	2
Course Outcomes							
At the end of the course, the student will be able to							
CO1:	Design and implement basic distributed operating systems concepts						
CO2:	Design algorithms using shared memory						
CO3:	Develop capabilities to work at systems level						
Pre-requisite:							
CO/PO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak							
COs	Programme Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5		
CO1	1	3	2	2	1		
CO2	2	2	3	2	1		
CO3	1	1	1	3	2		
Course Assessment methods							
Direct				Indirect			
CIE test I (10)-Laboratory Quiz 1 (5) CIE test II (10)- Laboratory Quiz 1 (5)	CIE(10)-Project Record(10) Total CIE: 50 marks Semester End Examination (50) SEE :Laboratory			Course end survey			
List of Experiments:							
<ol style="list-style-type: none"> 1. Implementation of non token based algorithm for Mutual Exclusion 2. Implementation of Lamport's Logical Clock 3. Implementation of edge chasing distributed deadlock detection algorithm. 4. Implementation of locking algorithm 5. Incrementing a counter in shared memory. 6. Implementation of Remote Method Invocation. 7. Implementation of Remote Procedure Call. 8. Implementation of Chat Server 							
Case Studies							
<ol style="list-style-type: none"> 1. Development of a reasonably sized dynamically loadable kernel module for Linux kernel 2. Study educational operating systems such as Minix (http://www.minix3.org/), Weenix (http://weenix.cs.brown.edu/mediawiki/index.php/Weenix) and develop reasonably sized interesting modules for them 3. Study the Android open source operating system for mobile devices (http://source.android.com/) and develop / modify some modules. 4. Study any embedded and real-time operating system such as eCos (http://ecos.sourceforge.org/) and develop / modify some modules. 							
Theory: 0	Tutorial: 0	Practical: 30	Project: 30	Total Hours: 60 Hrs			

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.

CO/PO, PSO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak					
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)				
	PO1	PO2	PO3	PO4	PO5
CO1	2	3	3	3	3
CO2	2	3	3	3	3
CO3	2	3	3	3	3
CO4	2	3	3	3	3
CO5	3	3	3	3	3

Course Assessment methods

Direct	Indirect
CIE test I (10) (Theory) CIE test II (10) (Theory) CIE test III (10) (Theory)	Assignment / Problem –Solving /Seminar (10) Total CIE: 40 Marks Semester End Examination : 60 Marks
	Course end survey

UNIT I INTRODUCTION TO RESEARCH METHODS

9

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

9

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 II INTERPRETATION AND REPORT WRITING

9

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

9

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

S. Padma
4.8.23

UNIT V TRADE MARKS, COPY RIGHTS AND PATENTS**9**

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

Lecture: 45, Tutorial: 0, Total: 45 Hours**TEXT BOOKS**

1. C.R. Kothari, Gaurav Garg, Research Methodology Methods and Techniques An 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

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P23GE702	Stress Management by Yoga	L	T	P	J	C
		2	0	0	0	0
Course Outcomes						
At the end of the course, the student will be able to						
CO1:	Develop physical and mental health thus improving social health					
CO2:	Increase immunity power of the body and prevent diseases					
CO3:	Accelerate memory power					
CO4:	Achieve the set goal with confidence and determination					
CO5:	Improve stability of mind, pleasing personality and work with awakened wisdom					
Course Assessment methods						
Direct				Indirect		
CIE test I (30)	Total CIE: 100 marks			Course end survey		
CIE test II (30)	Semester End Examination: NIL					
CIE test III (40)						
Unit 01:				6 Hours		
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 02:				6 Hours		
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 03:				6 Hours		
Raja Yoga- 3. Sagarathara 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 04:				6 Hours		
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 05:				6 Hours		
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.						
Theory: 30 Hrs		Tutorial: --	Practical: --	Project:--	Total Hours: 30 Hrs	
REFERENCES						
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					


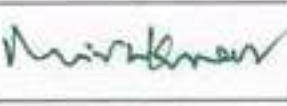
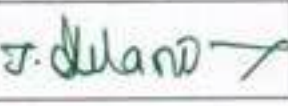


 HOD
Dr. M. RENUGA,
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Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for M.E/M.Tech. Semester II under Regulations 2023 (CBCS)
Branch: Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*	
Theory courses											
1.	P23CSE201	Advanced Databases	3	0	0	0	3	PC	45	T	
2.	P23CSE202	Advanced Network Design	3	0	0	0	3	PC	45	T	
3.	P23CSE522	Elective: Software Testing and Quality Assurance	3	0	0	0	3	PE	45	T	
4.	P23CSE525	Elective: Foundations of Data Science	3	0	0	0	3	PE	45	T	
5.	P23CSE535	Elective: Healthcare Data Analytics	3	0	0	0	3	PE	45	T	
6.	P23GE701	Audit Course: English for Research Paper Writing	2	0	0	0	0	AC	30	T	
Practical courses											
7.	P23CSE203	Advanced Databases Laboratory	0	0	2	2	2	PC	60	LP	
8.	P23CSE204	Advanced Network Design Laboratory	0	0	2	2	2	PC	60	LP	
Total Credits							19				

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

Approved By

			
Chairperson, Computer Science and Engineering BoS Dr. B. Sathyabhama	Member Secretary, Academic Council Dr. R. Shivakumar	Dean-Academics Dr. J. Akilandeswari	Chairperson, Academic Council & Principal Dr. S. R. R. Senthil Kumar

Copy to:-

HOD/ Computer Science and Engineering, Second Semester M.E CSE Students and Staff, COE

P23CSE201	ADVANCED DATABASES				L	T	P	J	C
					3	0	0	0	3
Course Outcomes									
At the end of the course, the student will be able to									
CO1:	Comprehend the various database revolution								
CO2:	Work with NoSQL databases to analyze the big data for useful business Applications.								
CO3:	Analyze the different data models based on data representation methods and storage needs								
CO4:	Design and develop using application programming interface with SQL and NoSQL databases								
CO5:	Discover the survey on future generation databases								
CO/PO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak									
Cos	Programme Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5				
CO1	2	2	2	3	2				
CO2	2	1	3	2	2				
CO3	3	1	3	3	2				
CO4	3	1	3	2	2				
CO5	3	1	3	3	3				
Course Assessment methods									
Direct					Indirect				
CIE test I (10)	Assignment / Problem-solving / Seminar (10)				Course end survey				
CIE test II (10)	Total CIE: 40 marks								
CIE test III (10)	Semester End Examination: 60 marks								
Unit 01: INTRODUCTION								9 Hours	
Database Revolutions- System Architecture- Relational Database- Database Design Data Storage- Transaction Management- Data warehouse and Data Mining- Information Retrieval									
Unit 02: Document Databases								9 Hours	
Big Data Revolution- CAP Theorem- Birth of NoSQL- Document Database—XML Databases- JSON Document Databases- Graph Databases. Column Databases— Data Warehousing Schemes- Columnar Alternative- Sybase IQ- C-store and Vertica- Column Database Architectures- SSD and In-Memory Databases— In Memory Databases- Berkeley Analytics Data Stack and Spark									
Unit 03: Distributed Database Patterns								9 Hours	
Distributed Relational Databases- Non-relational Distributed Databases- MongoDB - Sharing and Replication- HBase- Cassandra Consistency Models— Types of Consistency- Consistency MongoDB- HBase Consistency- Cassandra Consistency.									

Unit 04: Data Models and Storage				9 Hours
SQL- NoSQL APIs- Return SQL- Advance Databases-PostgreSQL- Riak-HBase-MongoDB-Cassandra Query Language-MapReduce-Pig-DAG-Cascading-Spark- CouchDB- NEO4J- Redis				
Unit 05: Future Database				9 Hours
Database of Future-Key value database-Distributive transaction-Other Convergent Databases- Disruptive Database Technologies-Storage Technologies-BlockChain-Quantum Computing.				
Theory: 45 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 45 Hrs
REFERENCES				
1.	Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", Sixth Edition, Me Graw Hill Education,2013			
2.	Guy Harrison, "Next Generation Databases", Apress, 2015			
3.	Eric Redmond, Jim R Wilson, "Seven Databases in Seven Weeks", LLC. 2012			
4.	Dan Sullivan, "NoSQL for Mere Mortals", Addison-Wesley, 2015			
5.	Adam Fowler, "NoSQL for Dummies ", John Wiley & Sons, 2015			

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Semester II PG Regulations- 2023 (ME/M.Tech)

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P23CSE202	ADVANCED NETWORK DESIGN				L	T	P	J	C
					3	0	0	0	3
Course Outcomes									
At the end of the course, the student will be able to									
CO1:	Describe the fundamental concepts of computer networks								
CO2:	Analyze the QoS properties in BE and GS models								
CO3:	Describe the basic working principles of LTE networks								
CO4:	Analyze the performance of SDN								
CO5:	Analyze the performance of NGN								
CO/PO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak									
Cos	Programme Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5				
CO1	2	-	2	3	2				
CO2	3	-	3	2	2				
CO3	3	1	2	3	3				
CO4	2	1	3	2	3				
CO5	3	1	3	3	3				
Course Assessment methods									
Direct					Indirect				
CIE test I (10)	Assignment / Problem-solving / Seminar (10)				Course end survey				
CIE test II (10)	Total CIE: 40 marks								
CIE test III (10)	Semester End Examination: 60 marks								
Unit 01: INTRODUCTION TO COMPUTER NETWORKING								9 Hours	
Communication Networks –Network Elements –Switched Networks and Shared media Networks – Probabilistic Model and Deterministic Model –Datagrams and Virtual Circuits –Multiplexing–Switching - Error and Flow Control –Congestion Control –Layered Architecture –Network Externalities –Service Integration.									
Unit 02: QUALITY OF SERVICE								9 Hours	
Traffic Characteristics and Descriptors –Quality of Service and Metrics –Best Effort model and guaranteed Service Model –Limitations of IP networks –Scheduling and Dropping Policies for BE and GS models – Traffic Shaping Algorithms–End to End Solutions –Laissez Faire Approach –Possible improvements in TCP –Significance of UDP in Inelastic Traffic									

Unit 03: SOFTWARE DEFINED NETWORKING					9 Hours
Evolution of SDN -Control Plane - Control and data plane separation - Network Virtualization - Data Plane - Programming SDNs - Verification and Debugging - Openflow networks.					
Unit 04: INTERNET OF THINGS					9 Hours
Introduction - Definition and Characteristics of IoT - Physical design - IoT Protocols - Logical design - IoT communication models-IoT Communication APIs - Enabling technologies - Wireless Sensor Networks-Cloud Computing-Big data analytics, Communication protocols-Embedded Systems. IoT Levels and Templates - Domain specific IoTs - IoT Architectural view.IoT systems management – Needs – NETCONF-YANG - IoT design methodology-Case studies					
Unit 05: NEXT GENERATION NETWORKS					9 Hours
Next Generation Wireless Networks: GSM Evolution - WiMAX Networks - Long Term Evolution (LTE) - 5G architecture: Basics about RAN architecture, High-level requirements for the 5G architecture - Integration of LTE and new air interface to fulfill 5G Requirements - Physical architecture and 5G deployment.					
Theory: 45 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 45 Hrs	
REFERENCES					
1.	James Macfarlane," Network Routing Basics: Understanding IP Routing in Cisco Systems", Wiley edition 1 2006				
2.	Jean Warland and Pravin Vareya, „High Performance Networks", Morgan Kauffman Publishers, 2002				
3.	Larry L Peterson and Bruce S Davie, „Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufman Publishers, 2012				
4.	Jingming Li Salina, Pascal Salina "Next Generation Networks-perspectives and potentials" Wiley, January 2008.				
5.	Madhusanga Liyanage, Andrei Gurtov, Mika Ylianttila, "Software Defined Mobile Networks beyond LTE Network Architecture", Wiley, June 2015				
6.	Thomas Nadeau, Ken Gray, "SDN - Software Defined Networks", O'reilly Publishers, 2013.				
7.	Savo G Glisic," Advanced Wireless Networks- Technology and Business models", Wiley, 3rd edition- 2016.				
8.	Thomas Plavky, —Next generation Telecommunication Networks, Services and Management, Wiley & IEEE Press Publications, 2010.				
9.	Afif Osseiran, Jose F. Monserrat, Patrick Marsch, "5G Mobile and Wireless Communications Technology", 1 st edition, Cambridge University Press, 2016				
10.	Arshdeep Bahga, Vijay Madisetti, "Internet of Things-A hands-on approach", Universities Press, 2015.				
11.	Surya Durbha and Jyoti Joglekar, "Internet of Things", Oxford University Press, 2021				

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Semester II

PG Regulations- 2023 (ME/M.Tech)


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P23CSE522	SOFTWARE TESTING AND QUALITY ASSURANCE		L	T	P	J	C
			3	0	0	0	3
Course Outcomes							
At the end of the course, the student will be able to							
CO1:	Develop Quality plans and use SQA components in project life cycle.						
CO2:	Analyze the product Quality.						
CO3:	Judge the use of infrastructure components and use configuration items for Quality control.						
CO4:	Use various testing methods and verify.						
CO5:	Assess Quality standards of various software products						
CO/PO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak							
COs	Programme Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5		
CO1	3	-	3	1	1		
CO2	3	-	3	2	1		
CO3	3	-	3	2	1		
CO4	3	1	3	2	1		
CO5	3	1	3	2	1		
Course Assessment methods							
Direct				Indirect			
CIE test I (10)	Assignment / Problem-solving / Seminar (10)			Course end survey			
CIE test II (10)	Total CIE: 40 marks						
CIE test III (10)	Semester End Examination: 60 marks						
UNIT 01 INTRODUCTION						9 Hours	
Introduction to Software Quality - Challenges – Quality Factors – Testing Activities – Test Case Selection – Power of Test – Components of SQA – SQA Components in Project Life Cycle – TestGroups – Software Quality Assurance Group – Reviews							
UNIT 02 TESTING METHODOLOGIES						9 Hours	
Basics of Software Testing – Test Generation from Requirements – Finite State Models – Combinatorial Designs - Test Selection, Minimization and Prioritization for Regression Testing – Test Adequacy, Assessment and Enhancement							
UNIT 03 TEST STRATEGIES						9 Hours	
Testing Strategies – White Box and Black Box Approach – Integration Testing – System and Acceptance Testing – Performance Testing – Regression Testing - Internationalization Testing – Ad-hoc Testing – Website Testing – Usability Testing – Accessibility Testing.							

Unit 04: TEST AUTOMATION AND MANAGEMENT					9 Hours
Test plan – Management – Execution and Reporting – Software Test Automation – Automated Testing tools - Hierarchical Models of Software Quality – Configuration Management – Documentation Control.					
Unit 05: SOFTWARE QUALITY ASSURANCE					9 Hours
Project progress control – costs – quality management standards – project process standards – management and its role in SQA – SQA unit.					
Theory: 45 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 45 Hrs	
REFERENCES					
1.	Yogesh Singh, "Software Testing", Cambridge University Press, 2012				
2.	Daniel Galin, "Software Quality Assurance – from Theory to Implementation" Pearson Education, 2009				
3.	Aditya Mathur, "Foundations of Software Testing", Pearson Education, 2008				
4.	Srinivasan Desikan, Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2006				
5.	Ron Patton, "Software Testing" , Second Edition, Pearson Education, 2007				

P23CSE525	FOUNDATIONS OF DATA SCIENCE	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Define the data science process.
CO2:	Understand different types of data description for data science process
CO3:	Gain knowledge on relationships between data
CO4:	Use the python libraries for data wrangling
CO5:	Apply visualization libraries in python to interpret and explore data

CO/PO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

Cos	Programme Outcomes (POs)				
	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	1	3	2	2
CO3	3	1	3	3	2
CO4	3	1	3	2	2
CO5	3	1	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (10) CIE test II (10) CIE test III (10)	Assignment / Problem-solving / Seminar (10) Total CIE: 40 marks Semester End Examination: 60 marks	Course end survey

Unit 01: INTRODUCTION **9 Hours**

Data Science: Benefits and uses – facets of data – Data Science Process: Overview – Defining research goals – Retrieving data – Data preparation – Exploratory Data analysis – build the model– presenting findings and building applications – Data Mining – Data Warehousing – Basic Statistical descriptions of Data

Unit 02: DESCRIBING DATA **9 Hours**

Types of Data – Types of Variables -Describing Data with Tables and Graphs –Describing Data with Averages – Describing Variability – Normal Distributions and Standard (z) Scores

Unit 03: DESCRIBING RELATIONSHIPS **9 Hours**

Correlation –Scatter plots –correlation coefficient for quantitative data –computational formula for correlation coefficient – Regression –regression line –least squares regression line – Standard error of


estimate – interpretation of r^2 –multiple regression equations –regression towards the mean				
Unit 04: PYTHON LIBRARIES FOR DATA WRANGLING				9 Hours
Basics of Numpy arrays –aggregations –computations on arrays –comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – Hierarchical indexing – combining datasets – aggregation and grouping – pivot tables				
Unit 05: DATA VISUALIZATION				9 Hours
Foundation for a Science of Data Visualization – Environment- Optics –Optimal Display – Overview about Lightness, Brightness, Contrast, Constancy, Color –Visual attention that Pops Out - Importing Matplotlib – Line plots – Scatter plots – three dimensional plotting – Geographic Data with Basemap – Visualization with Seaborn.				
Theory: 45 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 45 Hrs
REFERENCES				
1.	David Cielen, Arno D. B, Meysman and Mohamed Ali, “Introducing Data Science”, Manning Publications, 2016.			
2.	Robert S. Witte and John S. Witte, “Statistics”, Eleventh Edition, Wiley Publications, 2017.			
3.	Jake Vander Plas, “Python Data Science Handbook”, O’Reilly, 2016.			
4.	Matthew O. Ward, George Grinstein, Daniel Keim, “Interactive Data Visualization: Foundation, Techniques and Applications”, Second Edition, A. K. Peters/CRC Press, 2015			

P23CSE535	HEALTHCARE DATA ANALYTICS				L	T	P	J	C
					3	0	0	0	3
Course Outcomes									
At the end of the course, the student will be able to									
CO1:	Select appropriate analytical techniques to analyze health care data using								
CO2:	Apply analytics for decision making in medical images processing and social media healthcare data								
CO3:	Predict the risk analytics for healthcare domain								
CO4:	Analyze the various predictions models used in Clinical data processing								
CO5:	Apply data mining and analytics techniques to integrate health data from multiple sources and develop efficient clinical decision support systems								
CO/PO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak									
Cos	Programme Outcomes (POs)								
	PO1	PO2	PO3	PO4	PO5				
CO1	2	2	2	3	2				
CO2	3	1	3	2	2				
CO3	3	1	3	3	2				
CO4	3	1	3	2	2				
CO5	3	1	3	3	3				
Course Assessment methods									
Direct					Indirect				
CIE test I (10)		Assignment / Problem-solving / Seminar (10)			Course end survey				
CIE test II (10)		Total CIE: 40 marks							
CIE test III (10)		Semester End Examination: 60 marks							
Unit 01: INTRODUCTION								9 Hours	
Introduction to Healthcare Data Analytics- Electronic Health Records - Components of EHR- Coding Systems- Benefits of EHR- Barrier to Adopting EHR- Challenges- Phenotyping Algorithms									
Unit 02: ANALYSIS								9 Hours	
Biomedical Image Analysis- Mining Of Sensor Data In Healthcare - Biomedical Signal Analysis - Genomic Data Analysis For Personalized Medicine. Analytics: Natural Language Processing And Data Mining For Clinical Text- Mining The Biomedical - Social Media Analytics For Healthcare.									
Unit 03: RISK ANALYTICS FOR HEALTHCARE DOMAIN								9 Hours	
Introduction to Healthcare Sector; HIPAA, Four Enterprise Disciplines of Health Analytics, Health Outcome Analysis, Health Value and Cost; Customer Insights, Actuary Services, Framework for Customer Analytics;									

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Semester II

PG Regulations- 2023 (ME/M.Tech)


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Risk Management.				
Unit 04: ADVANCED DATA ANALYTICS				9 Hours
Advanced Data Analytics for Healthcare - Review of Clinical Prediction Models - Temporal Data Mining for Healthcare Data- Visual Analytics for Healthcare- Predictive Models for Integrating Clinical and Genomic Data - Information Retrieval for Healthcare - Privacy-Preserving Data Publishing Methods in Healthcare.				
Unit 05: APPLICATIONS				9 Hours
Applications and Practical Systems for Healthcare - Data Analytics for Pervasive Health- Fraud Detection in Healthcare - Data Analytics for Pharmaceutical Discoveries - Clinical Decision Support Systems - Computer-Assisted Medical Image Analysis Systems - Mobile Imaging and Analytics for Biomedical Data.				
Theory: 45 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 45 Hrs
REFERENCES				
1.	Chandan K. Reddy and Charu C Aggarwal, "Healthcare data analytics", Chapman and Hall/CRC; 1st edition, 2015.			
2.	Hui Yang and Eva K. Lee, "Healthcare Analytics: From Data to Knowledge to Healthcare Improvement, Wiley-Blackwell, 1st edition, 2016.			
3.	Laura B. Madsen, "Data-Driven Healthcare: How Analytics and BI are Transforming the Industry (WILEY Big Data Series)", Wiley, 2015.			
4.	Jason Burke, "Health Analytics: Gaining the Insights to Transform Healthcare", John Wiley & Sons Inc., 2013, ISBN: 978-1-118-38304-9.			
5.	Trevor L. Strome, "Healthcare Analytics for Quality and Performance Improvement", John Wiley & Sons, 1st edition, 2013.			

P23CSE203	ADVANCED DATABASES LABORATORY	L	T	P	J	C
		0	0	2	2	2

Course Outcomes

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

CO1:	Create and work on distributed, object oriented and parallel databases
CO2:	Experiment on active and deductive database
CO3:	Design the database using XML for real time application

CO/PO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

Cos	Programme Outcomes (POs)				
	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	3	2	3	2	2
CO3	3	1	3	3	2
CO4	3	3	3	2	2
CO5	3	3	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (10) -Laboratory Quiz 1 (5) CIE test II (10) -Laboratory Quiz 2 (5)	CIE test III (10) -Project Record (10) Total CIE: 50 marks Semester End Examination: 50 marks SEE :Laboratory	Course end survey

List of Experiments:


1. Distributed Database design for real time application
2. Deadlock Detection Algorithm for distributed database using wait- for graph
3. Experiment using Object Oriented Database – Extended Entity Relationship (EER)
4. Design Parallel Database for real time application
5. Parallel Database – Implementation of Parallel Join and Parallel Sort
6. Active Database – Implementation of Triggers & Assertions for Bank Database
7. Model building and interpretation of results using WEKA tool
8. Implementation of an Efficient Query Optimization
9. Designing XML Schema for a given database
10. Integrate Node.js with SQL Database (MySQL/PostgreSQL/Oracle)
11. Integrate Node.js with No SQL Database (MongoDB/Cassandra)

Theory: 0	Tutorial: 0	Practical: 30	Project: 30	Total Hours: 60 Hrs
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Semester II

PG Regulations- 2023 (ME/M.Tech)


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P23CSE204	ADVANCED NETWORK DESIGN LABORATORY		L	T	P	J	C
			0	0	2	2	2
Course Outcomes							
At the end of the course, the student will be able to							
CO1:	Design and develop TCP/UDP client – server applications using java						
CO2:	Develop client – server applications using Python						
CO3:	Simulate network applications using ns2						
CO/PO Mapping (3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak							
Cos	Programme Outcomes (POs)						
	PO1	PO2	PO3	PO4	PO5		
CO1	2	2	2	3	2		
CO2	2	2	3	2	2		
CO3	3	3	3	3	2		
CO4	3	3	3	2	2		
CO5	3	3	3	3	3		
Course Assessment methods							
Direct				Indirect			
CIE test I (10) -Laboratory Quiz 1 (5) CIE test II (10) -Laboratory Quiz 2 (5)		CIE test III (10) -Project Record (10) Total CIE: 50 marks Semester End Examination: 50 marks SEE :Laboratory		Course end survey			
List of Experiments:							
<ol style="list-style-type: none"> Design a TCP client/server application Design a UDP client/server application Design an Iterative UDP server with 2 or 3 clients Build client applications for major APIs (Amazon S3, Twitter etc) in Python Design an application that interacts with e-mail servers in python Design applications that work with remote servers using SSH, FTP etc in Python Create a LAN Network and compare the performance between MAC protocols using ns-2 Simulate DVR and LSR routing using ns-2 Create a wireless network environment with mobile nodes and transfer the data using AODV using ns-2 Projects using CISCO packet tracer 							
Theory: 0 Hrs		Tutorial: 0		Practical: 30		Project:30	
Total Hours: 60 Hrs							

P23GE701	English for Research Paper Writing		L	T	P	J	C
			2	0	0	0	0
Course Outcomes							
At the end of the course, the student will be able to							
CO1:	Demonstrate research writing skills both for research articles and thesis						
CO2:	Frame suitable title and captions as sub-headings for articles and thesis						
CO3:	Write each section in a research paper and thesis coherently						
CO4:	Use language appropriately and proficiently for effective written communication						
CO5:	Exhibit professional proof-reading skills to make the writing error free						
Course Assessment methods							
Direct				Indirect			
CIE test I (30)		Total CIE: 100 marks		Course end survey			
CIE test II (30)		Semester End Examination: NIL					
CIE test III (40)							
Unit 01:						6 Hours	
Planning and preparation, word order, breaking up long sentences, organising ideas into paragraphs and sentences, being concise and avoiding redundancy, ambiguity and vagueness							
Unit 02:						6 Hours	
Interpreting research findings, understanding and avoiding plagiarism, paraphrasing sections of a paper/ abstract.							
Unit 03:						6 Hours	
Key skills to frame a title, to draft an abstract, to give an introduction							
Unit 04:						6 Hours	
Skills required to organise review of literature, methods, results, discussion and conclusions							
Unit 05:						6 Hours	
Usage of appropriate phrases and key terms to make the writing effective - proof-reading to ensure error-free writing							
Theory: 30 Hrs		Tutorial: --		Practical: --		Project:--	
Total Hours: 30 Hrs							
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							
1	Martin Cutts, Oxford Guide to Plain English, Oxford University Press, Second Edition, 2006						

M. Renuga
HOD

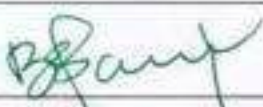
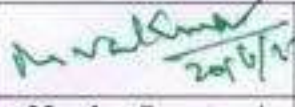
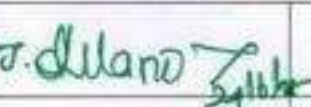

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Sona College of Technology, Salem
(An Autonomous Institution)
Courses of Study for M.E/M.Tech. Semester III under Regulations 2023 (CBCS)
Branch: Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*	
Theory courses											
1.	P23CSE512	Elective: Information Retrieval	3	0	0	0	3	PE	45	T	
2.	P23CSE518	Elective: Software Security	3	0	0	0	3	PE	45	T	
3.	P23CSE524	Elective: Visualization Techniques	3	0	0	0	3	PE	45	T	
Practical courses											
4.	P23CSE301	Project Work -I	0	0	0	16	08	PC	240	P	
Total Credits							17				

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project, P- Project.

Approved By

			
Chairperson -- CSE BoS	Member Secretary/ Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.B.Sathiyabhama	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

Copy to:-

HOD/ CSE, Third Semester ME CSE Students and Staff, COE

P23CSE512	INFORMATION RETRIEVAL	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Build an Information Retrieval system using the available tools.
CO2:	Identify and design the various components of an Information Retrieval system.
CO3:	Measure effectiveness and efficiency of information retrieval techniques.
CO4:	Use parallel Information Retrieval approaches in real world problems.
CO5:	Design an efficient search engine and analyze the Web content structure

CO/PO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

Cos	Programme Outcomes (POs)				
	PO1	PO2	PO3	PO4	PO5
CO1	2	-	2	3	2
CO2	3	-	3	2	2
CO3	3	1	2	3	3
CO4	2	1	3	2	3
CO5	3	1	3	3	3

Course Assessment methods

Direct

CIE test I (10)	Assignment / Problem-solving / Seminar (10) Total CIE: 40 marks Semester End Examination: 60 marks
CIE test II (10)	
CIE test III (10)	

Indirect

Course end survey

Unit 01: INTRODUCTION

9 Hours

Basic Concepts – Practical Issues – Retrieval Process – Architecture – Boolean Retrieval Retrieval Evaluation – Open Source IR Systems–History of Web Search – Web Characteristics– The impact of the web on IR –IR Versus Web Search–Components of a Search engine

Unit 02: RETRIEVAL MODELING

9 Hours

Taxonomy and Characterization of IR Models – Boolean Model – Vector Model – Term Weighting-Scoring and Ranking –Language Models – Set Theoretic Models – Probabilistic Models – Algebraic Models – Structured Text Retrieval Models – Models for Browsing

Unit 03: INDEXING

9 Hours

Static and Dynamic Inverted Indices – Index Construction and Index Compression. Searching – Sequential Searching and Pattern Matching. Query Operations –Query Languages – Query

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Programme: ME CSE PG Regulations- 2023 (ME/M.Tech)

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Processing – Relevance Feedback and Query Expansion – Automatic Local and Global Analysis – Measuring Effectiveness and Efficiency

Unit 04: EVALUATION AND PARALLEL INFORMATION RETRIEVAL **9 Hours**

Traditional Effectiveness Measures – Statistics in Evaluation – Minimizing Adjudication Effect – Nontraditional Effectiveness Measures – Measuring Efficiency – Efficiency Criteria–Queueing Theory – Query Scheduling – Parallel Information Retrieval – Parallel Query Processing – MapReduce

Unit 05: SEARCHING THE WEB **9 Hours**

Searching the Web –Structure of the Web –IR and web search – Static and Dynamic Ranking – Web Crawling and Indexing – Link Analysis – XML Retrieval Multimedia IR: Models and Languages – Indexing and Searching Parallel and Distributed IR – Digital Libraries

Theory: 45 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 45 Hrs
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REFERENCES

1. Ricardo Baeza – Yates, Berthier Ribeiro – Neto, “Modern Information Retrieval: The Concepts and Technology behind Search”, (ACM Press Books), Second Edition, 2011.
2. Chrstopher D. Manning, Prabhakar Raghavan, Hinrich Schutze, “Introduction to Information Retrieval”, Cambridge University Press, First South Asian Edition, 2008.
3. Stefan Butcher, Charles L. A. Clarke, Gordon V. Cormack, “Information Retrieval Implementing and Evaluating Search Engines”, The MIT Press, Cambridge, Massachusetts London, England, 2010.

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Programme: ME CSE PG Regulations- 2023 (ME/M.Tech)
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P23CSE518	SOFTWARE SECURITY	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Comprehend various vulnerabilities related to memory attacks.
CO2:	Apply security principles in software development.
CO3:	Evaluate the extent of security risks
CO4:	Analyze selection of testing techniques related to software security in the testing phase of software development.
CO5:	Implement the tools for securing software

CO/PO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

COs	Programme Outcomes (POs)				
	PO1	PO2	PO3	PO4	PO5
CO1	3	-	3	1	1
CO2	3	-	3	2	1
CO3	3	-	3	2	1
CO4	3	1	3	2	1
CO5	3	1	3	2	1

Course Assessment methods

Direct		Indirect
CIE test I (10) CIE test II (10) CIE test III (10)	Assignment / Problem-solving / Seminar (10) Total CIE: 40 marks Semester End Examination: 60 marks	Course end survey

Unit 01: LOW-LEVEL ATTACKS

9 Hours

Need for Software Security – Memory-Based Attacks – Low-Level Attacks Against Heap And Stack-Stack Smashing – Buffer Overflow – Code Injection - Format String Attacks – ROP (Return Oriented Programming) – Defense against Memory-Based Attacks – Stack Canaries – Non-Executable Data - Address Space Layout Randomization (ASLR)- Memory-Safety Enforcement - Control-Flow Integrity (CFI) – Randomization

Unit 02: WEB SECURITY AND SECURE DESIGN

9 Hours

SQL Injection - Session Hijacking – Cross-Site Scripting (XSS), Cross-Site Forgery (CSRF) – Database Security – File Security - Secure Design - Threat Modeling and Security Design Principles - Good and Bad Software Design

Unit 03: SECURITY RISK MANAGEMENT

9 Hours

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Programme: ME CSE PG Regulations- 2023 (ME/M.Tech)

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Risk Management Life Cycle – Risk Profiling – Risk Exposure Factors – Risk Evaluation and Mitigation – Risk Assessment Techniques – Threat and Vulnerability Management

Unit 04: SECURITY TESTING

9 Hours

Traditional Software Testing – Comparison - Secure Software Development Life Cycle - Risk Based Security Testing – Prioritizing Security Testing with Threat Modeling – Shades of Analysis: White, Grey, and Black Box Testing.

Unit 05: PENETRATION TESTING

9 Hours

Advanced Penetration Testing – Planning And Scoping – DNS Groper – DIG (Domain Information Graph) – Enumeration – Remote Exploitation – Web Application Exploitation - Exploits And Client Side Attacks – Post Exploitation – Bypassing Firewalls and Avoiding Detection - Tools for Penetration Testing

Theory: 45 Hrs

Tutorial: 0

Practical: 0

Project: 0

Total Hours: 45 Hrs

REFERENCES

1. Robert C. Seacord, "Secure Coding in C and C++ (SEI Series in Software Engineering)", Addison-Wesley Professional, 2005.
2. Jon Erickson, "Hacking: The Art of Exploitation", 2nd Edition, No Starch Press, 2008.
3. Mike Shema, "Hacking Web Apps: Detecting and Preventing Web Application Security Problems", First edition, Syngress Publishing, 2012
4. Bryan Sullivan and Vincent Liu, "Web Application Security, A Beginner's Guide", Kindle Edition, McGraw Hill, 2012
5. Evan Wheeler, "Security Risk Management: Building an Information Security Risk Management Program from the Ground Up", First edition, Syngress Publishing, 2011
6. Chris Wysopal, Lucas Nelson, Dino Dai Zovi, and Elfriede Dustin, "The Art of Software Security Testing: Identifying Software Security Flaws (Symantec Press)", Addison-Wesley Professional, 2006
7. Lee Allen, "Advanced Penetration Testing for Highly-Secured Environments: The Ultimate Security Guide (Open Source: Community Experience Distilled)", Kindle Edition, Packt Publishing, 2012.

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Programme: ME CSE, PG Regulations- 2023 (ME/M.Tech)

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Dept. of Computer Science and Engineering

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SALEM - 636 005

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P23CSE524	VISUALIZATION TECHNIQUES	L	T	P	J	C
		3	0	0	0	3

Course Outcomes

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

CO1:	Apply mathematics and basic science knowledge for designing information visualizing System.
CO2:	Collect data ethically and solve engineering problem in visualizing the information.
CO3:	Implement algorithms and techniques for interactive information visualization.
CO4:	Conduct experiments by applying various modern visualization tool and solve the space layout problem.
CO5:	Analyze and design system to visualize multidisciplinary multivariate Data individually or in teams

CO/PO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

Cos	Programme Outcomes (POs)				
	PO1	PO2	PO3	PO4	PO5
CO1	2	2	2	3	2
CO2	2	1	3	2	2
CO3	3	1	3	3	2
CO4	3	1	3	2	2
CO5	3	1	3	3	3

Course Assessment methods

Direct		Indirect
CIE test I (10)	Assignment / Problem-solving / Seminar (10) Total CIE: 40 marks Semester End Examination: 60 marks	Course end survey
CIE test II (10)		
CIE test III (10)		

Unit 01: INTRODUCTION **9 Hours**

Introduction – Visualization Stages – Computational Support – Issues – Different Types of Tasks – Data representation – Limitation: Display Space, Rendering Time, Navigation Link.

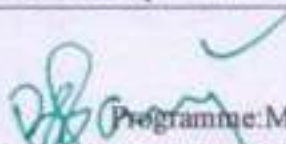
Unit 02: DATA REPRESENTATION - I **9 Hours**

Human Factors – Foundation for Science of Data Visualization – Environment- Optics – Optimal Display – Overview about Lightness, Brightness, Contrast, Constancy, Color – Visual attention that Pops Out – Types of Data – Data Complexity – The Encoding of Values – Encoding of Relation – Relation and Connection – Alternative Canvass

Unit 03: DATA REPRESENTATION - II **9 Hours**

Human Vision – Space Limitation – Time Limitations – Design – Exploration of Complex Information Space – Figure Caption in Visual Interface – Visual Objects and Data Objects – Space Perception and Data in Space – Images, Narrative and Gestures for Explanation.


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Programme: ME CSE PG Regulations- 2023 (ME/M.Tech)

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Unit 04: INTERACTION AND DESIGN				9 Hours
Norman's Action Cycle – Interacting with Visualization – Interaction for Information Visualization – Interaction for Navigation – Interaction with Models – Interacting with Visualization – Interactive 3D Illustrations with Images and Text– Personal View – Attitude – userperspective – Convergence – Sketching – Evaluation				
Unit 05: CURRENT TRENDS				9 Hours
Design – Virtual Reality: Interactive Medical Application – Tactile Maps for Visually Challenged People – Animation Design for Simulation – Integrating Spatial and Nonspatial Data – Innovating the Interaction- Small Interactive Calendars – Selecting One from Many – Web Browsing Through a Key Hole – Communication Analysis – Archival Galaxies.				
Theory: 45 Hrs	Tutorial: 0	Practical: 0	Project: 0	Total Hours: 45 Hrs
REFERENCES				
1.	Robert Spence, "Information Visualization An Introduction", Third Edition, Pearson Education, 2014.			
2.	Colin Ware, "Information Visualization Perception for Design", Third edition, Morgan Kaufmann Publishers, 2012.			
3.	Robert Spence, "Information Visualization Design for Interaction", Second Edition, Pearson Education, 2006.			
4.	Benjamin B. Bederson and Ben shneiderman, "The Craft of Information Visualization", Morgan Kaufmann Publishers, 2003.			
5.	Thomas strothotte, "Computational Visualization: Graphics, Abstraction and Interactivity", Springer, 1998.			
6.	Matthew O. Ward, George Grinstein, Daniel Keim, "Interactive Data Visualization: Foundation, Techniques and Applications", Second Edition, A. K. Peters/CRC Press, 2015.			
7.	Joerg Osarek, "Virtual Reality Analytics", Gordon's Arcade, 2016.			


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P23CSE301	PROJECT WORK -I	L	T	P	J	C
		0	0	0	16	8

Course Outcomes

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

CO1:	Identify the research problems addressing emerging challenges and opportunities in the computer science engineering field
CO2:	Design and develop innovative solution to solve the research problem identified with latest technology and tools
CO3:	Apply analytical methods to assess and improve project outcomes and processes

CO/PO Mapping

(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak

Cos	Programme Outcomes (POs)				
	PO1	PO2	PO3	PO4	PO5
CO1	3	2	3	3	2
CO2	3	3	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	2	3	2	3

Course Assessment methods

Direct		Indirect
Review I -5 marks Review II -10 marks Review III -15 marks Final Project Report -10 marks	Total CIE: 40 marks Semester End Examination: 60 marks	Course end survey

In Project work-I each student focuses on fundamental skills and research area. They acquire proficiency in research methodologies, conducting surveys, and reviewing literature to recognize challenges. Additionally, they cultivate skills in project planning and execution. Students also learn to select computational tools for system analysis and to design experiments. The importance of communication skills, both oral and written, is stressed to enhance the ability to convey technical content effectively. This introductory stage establishes the foundation for advanced project work, blending theoretical knowledge with practical applications in computer science engineering.

Theory: 0 Hrs	Tutorial: 0	Practical: 0	Project: 240 Hrs	Total Hours: 240 Hrs
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Dept. of Computer Science and Engineering

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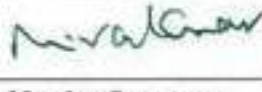

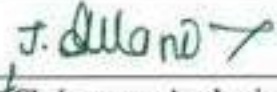
Sona College of Technology, Salem
(An Autonomous Institution)

Courses of Study for M.E/M.Tech. Semester IV under Regulations 2023 (CBCS)
Branch: Computer Science and Engineering

S.No	Course Code	Course Title	L	T	P	J	C	Category	Total Contact Hours	Course Type*	
Practical courses											
1.	P23CSE401	Project Work-II	0	0	0	28	14	PC	420	P	
Total Credits							14				

*T- Theory, TT- Theory with Tutorial, TL- Theory with Laboratory, TP- Theory with Project, TLP- Theory with Laboratory and Project, L-Laboratory, LT- Laboratory with Theory, LP- Laboratory with Project

Approved By


			
Chairperson, Computer Science and Engineering BoS	Member Secretary, Academic Council	Dean-Academics	Chairperson, Academic Council & Principal
Dr.B.Sathiyabhama	Dr.R.Shivakumar	Dr.J.Akilandeswari	Dr.S.R.R.Senthil Kumar

Copy to:-

HOD/ Computer Science and Engineering, Fourth Semester M.E CSE Students and Staff, COE

P23CSE401	PROJECT WORK-II				L	T	P	J	C	
					0	0	0	28	14	
Course Outcomes										
At the end of the course, the student will be able to										
CO1:	Identify the research problems addressing emerging challenges and opportunities in the computer science engineering field									
CO2:	Design and develop innovative solution to solve the research problem identified with latest technology and tools									
CO3:	Apply analytical methods to assess and improve project outcomes and processes									
Pre-requisite:										

CO/PO, PSO Mapping										
(3/2/1 indicates the strength of correlation) 3-Strong, 2-Medium, 1-Weak										
COs	Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)									
	PO1	PO2	PO3	PO4	PO5					
CO1	3	2	3	3	2					
CO2	3	3	3	3	3					
CO3	3	3	3	2	3					
CO4	3	3	3	3	3					
CO5	3	2	3	2	3					
Course Assessment methods										
Direct					Indirect					
Review I - 5 Marks Review II -10 Marks Review III-15 Marks Final Project Report – 10 Marks					Total CIE: 40 marks Project Viva voce (60) Course end survey					
<ol style="list-style-type: none"> 1. Project Work-II, which is a continuation of Project Work-I, (except when project work II is carried out in the industry) is to be undertaken during Semester IV 2. Every student must submit a project report at the end of Semester IV for evaluation. 3. Three reviews must be conducted by a committee consisting of the Project Coordinator (appointed by HOD), Project supervisor and one senior faculty member of the respective department will carry out the CIE assessment. 4. Each student of M. E / M. Tech shall publish at least ONE paper in Refereed International Journals (Scopus Indexed) / International Conferences (Scopus Indexed) during Project work Phase-II. 										
Theory: -		Tutorial: --		Practical: --		Project:420		Total Hours: 420 Hrs		


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 PG Regulations 2023 (M.E/M.Tech)