

PONDICHERRY ENGINEERING COLLEGE, PUDUCHERRY – 605 014

CURRICULUM AND SYLLABI FOR AUTONOMOUS STREAM

**MASTER OF COMPUTER APPLICATIONS (M.C.A) COURSE
(FOR STUDENTS ADMITTED FROM ACADEMIC YEAR 2015-16 ONWARDS)**

CURRICULUM

I SEMESTER

Subject Code	Subject	Category	Periods			Marks			Credit
			L	T	P	CA	SE	TM	
MA153	Mathematical Foundation of Computer Science	TY	3	1	-	40	60	100	4
CA151	Digital System Design	TY	3	1	-	40	60	100	4
CA152	Data Structures	TY	3	1	-	40	60	100	4
CA153	Problem Solving and Programming	TY	3	1	-	40	60	100	4
CA154	Operating Systems	TY	3	1	-	40	60	100	4
CA155	C and Data Structures Laboratory	LB	-	-	3	60	40	100	2
CA156	Operating Systems Laboratory	LB	-	-	3	60	40	100	2
Total Credits									24

II SEMESTER

Subject Code	Subject	Category	Periods			Marks			Credit
			L	T	P	CA	SE	TM	
CA157	Design and Analysis of Algorithms	TY	3	1	-	40	60	100	4
CA158	Object Oriented Programming	TY	3	1	-	40	60	100	4
CA159	Computer Organization and Architecture	TY	3	1	-	40	60	100	4
CA160	Business Process	TY	3	1	-	40	60	100	4
CA161	Computer Graphics and Animation	TY	3	1	-	40	60	100	4
CA162	Algorithms Laboratory	LB	-	-	3	60	40	100	2
CA163	Object Oriented Programming Laboratory	LB	-	-	3	60	40	100	2
Total Credits									24

III SEMESTER

Subject Code	Subject	Category	Periods			Marks			Credit
			L	T	P	CA	SE	TM	
CA164	Database Management Systems	TY	3	1	-	40	60	100	4
CA165	Computer Networks	TY	3	1	-	40	60	100	4
CA166	Platform Technologies	TCM	3	-	2	50	50	100	4
-	Elective – I	TY	3	-	-	40	60	100	3
-	Elective - II	TY	3	-	-	40	60	100	3
CA167	Database Management Systems Laboratory	LB	-	-	3	60	40	100	2
CA168	Computer Networks Laboratory	LB	-	-	3	60	40	100	2
HS151	Communication Skills	PR	-		3	100	-	100	1
Total Credits								23	

IV SEMESTER

Subject Code	Subject	Category	Periods			Marks			Credit
			L	T	P	CA	SE	TM	
CA169	Web Technologies	TY	3	1	-	40	60	100	4
CA170	Theory of Computation	TY	3	1	-	40	60	100	4
CA171	Software Engineering	TY	3	1	-	40	60	100	4
-	Elective – III	TY	3	-	-	40	60	100	3
-	Elective - IV	TY	3	-		40	60	100	3
CA172	Web Technologies Laboratory	LB	-	-	3	60	40	100	2
CA173	CASE Tools Laboratory	LB	-	-	3	60	40	100	2
Total Credits								22	

V SEMESTER

Subject Code	Name of the Subject	Category	Periods			Marks			Credit
			L	T	P	CA	SE	TM	
CA174	Mobile Computing	TY	3	1	-	40	60	100	4
CA175	Management Concepts and Strategies	TY	3	1	-	40	60	100	4
-	Elective - V	TY	3	-	-	40	60	100	3
-	Elective – VI	TY	3	-	-	40	60	100	3
-	Elective - VII	TY	3	-	-	40	60	100	3
CA176	Mobile Application Development Laboratory	LB	-	-	3	60	40	100	2
CA177	Mini Project	PR	-	-	3	60	40	100	2
CA178	Comprehensive Test and Viva - Voce	PR	-	-	3	60	40	100	1
Total Credits									22

VI SEMESTER

Subject Code	Name of the Subject	Category	Periods			Marks			Credit
			L	T	P	CA	SE	TM	
CA179	Project Work	PR	-	-	-	150	150	300	10
-	Professional Development Courses(Two one credit courses)	PR	-	-	-	200	-	200	2
Total Credits									12

A representative list of *Professional Development Courses* is given below (Limited to one credit):

- a) Industrial Training
- b) Specific Field Knowledge Training
- c) Seminar related with directed study
- d) Foreign Language Learning Certificate - offered by the college or by a recognized agency duly approved by the college

CA – Continuous Assessment, **SE** – Semester Examination, **TM** – Total Marks

* **TY** – Theory, **LB** – Laboratory, **PR**–Practice, **TCM** – Theory combined with Mini Project

LIST OF ELECTIVES

Sl.No.	Subject Code	Subject	Category
1	CAE51	Object Oriented Analysis and Design	TY
2	CAE52	System Software	TY
3	CAE53	Information Security	TY
4	CAE54	Cloud Computing	TY
5	CAE55	Hardware and Troubleshooting	TY
6	CAE56	Accounting and Financial Management	TY
7	CAE57	Resource Management Techniques	TY
8	CAE58	Agent Technologies	TY
9	CAE59	UNIX Internals	TY
10	CAE60	Software Architecture	TY
11	CAE61	Social Network Analysis	TY
12	CAE62	Advanced Java Programming	TY
13	CAE63	Data Mining and Warehousing	TY
14	CAE64	Artificial Intelligence	TY
15	CAE65	Principles of Distributed Systems	TY
16	CAE66	Distributed Database System	TY
17	CAE67	Software Testing and Quality Assurance	TY
18	CAE68	Software Project Management	TY
19	CAE69	Parallel Computing	TY
20	CAE70	Big Data Analytics	TY
21	CAE71	User Interface Design	TY
22	CAE72	Multimedia Systems and Applications	TY
23	CAE73	Microprocessors and Assembly Language Programming	TY

SYLLABUS (Core Subjects)

Department : Mathematics		Programme : Master of Computer Application													
Semester : One		Category : TY													
Subject Code	Subject			Hours / Week		Credit	Maximum Marks								
		L	T	P	C	CA	SE	TM							
MA153	Mathematical Foundation of Computer Science	3	1	-	4	40	60	100							
Prerequisite	-														
Objectives	<p>To familiarize the students with</p> <ul style="list-style-type: none"> • Rules and Techniques to recognize valid logical argument. • The basic idea of logic with the algebra of proposition and predicate logic. • The idea of sets, functions and basic Graph theory. 														
Outcomes	<p>On successful completion of this course, students will be able to</p> <ul style="list-style-type: none"> • Develop knowledge of logical connectivity, compound propositions, formal. • Symbols of propositional logic and find exact value of expressions. • Use the formal symbol to predicate logic. • Apply graph theory in real time network problems, data structures etc 														
UNIT – I	Mathematical Logic							Hours: 10							
Connectives- Negation, Conjunction, Disjunction, Statement formula and TT - Conditional, Biconditional, Well-formed formulas- Tautologies, Equivalence of statement formula - Duality law - Tautological implications- Functionally complete set of connectives - NAND and NOR connectives.															
UNIT – II	Normal Forms and Inference Theory							Hours: 09							
Principal conjunctive and disjunctive normal forms- The theory of Inference for statement calculus – validity of conclusion using truth table – Rules of inference – Consistency of premises – Derivation process – Conditional proof – Indirect method of proof – Derivation of validity of conclusion by these methods															
UNIT – III	Predicate Calculus							Hours: 09							
Predicates- The statement function, variables and quantifiers-Predicate formulas-symbolizing the statement - Inference theory of the predicate calculus-Rules of specification and generalization-Derivation of conclusion using the rules of inference theory.															
UNIT - IV	Set Theory							Hours: 10							
Basic concepts of set theory- Notation, Inclusion and equality, Power set, Operations on sets, set identities, cartesian product – Relations, relation matrix and graph of a relation – Partial order and equivalence relations- Partial ordered set – Functions, composition and Inverse functions.															
UNIT - V	Graph Theory							Hours: 10							
Definition of a graph – Incidence and degree – Pendant and isolated vertices – Number of odd vertices in a graph – Isomorphism of graphs- subgraphs – Walks, paths and circuits – Connected and disconnected graphs – components – Euler graphs – More on Euler graphs – Konigsberg bridge problem – Hamilton paths and circuits (Definitions and Examples) – Some application of Graph Theory															
Total Contact Hours: 48	Total Tutorials: 12	Total Practical Classes: -			Total Hours: 60										
Text Books:															
1. J.P.Tremblay and R.Manohar, Discrete Mathematical Structures with applications to Computer science, Tata McGraw-Hill Publishing company Pvt. Ltd. New Delhi, First Edition 2008. 2. NarsinghDeo, Graph Theory with applications to Engineering and Computer science, Prentice-Hall of India Pvt. Ltd., New Delhi, Second Edition, 2002.															
Reference Books:															
1. Kenneth H.Rosen, Discrete Mathematics and its Applications, Fifth Edition, Tata McGraw-Hill Publishing company Pvt. Ltd., New Delhi, 2003. 2. C.L.Liu, Elements of Discrete Mathematics, Second Edition, McGraw-Hill Book Company, New York 1988. 3. F. Harary, Graph Theory, Narosa Publishing House, New Delhi –Chennai- Mumbai, Second Edition, 1988. 4. Douglas B.West, Introduction to Graph Theory, Second Edition (Indian) Pearson Education Singapore) Pvt. Ltd, 2002.															
Websites: -															

Department : Computer Science and Engineering		Programme : Master of Computer Application															
Semester : One		Category : TY															
Subject Code	Subject	Hours / Week			Credit	Maximum Marks											
		L	T	P	C	CA	SE	TM									
CA151	Digital System Design	3	1	-	4	40	60	100									
Prerequisite	-																
Objectives	<ul style="list-style-type: none"> • To introduce the fundamentals of digital system design. • To lay strong foundation in combinational and sequential logic fundamentals. • To educate from basic concepts to advanced system design. 																
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Understand the binary number systems and Boolean algebra. • Design any combinational logic using only of universal gates, MSI gates and PLDs • Design and implement sequential logic circuits of any complexity. • Simulate and validate the correctness of the digital circuits using VHDL packages. 																
UNIT – I	Number Systems and Boolean Algebra						Hours: 09										
² Revision of RTL, DTL, I L, TTL, ECL, MOS, CMOS logic families - Binary number systems and conversion - Binary arithmetic-Binary codes - Boolean algebra - Basic operations - Basic Theorems - Boolean functions-Canonical forms - Simplification of Boolean functions-Karnaugh maps - Tabulation method.																	
UNIT – II	Combinational Logic						Hours: 09										
Adders – subtractors – code converters – binary parallel adder –decimal adder – magnitude comparator – encoders – decoders – multiplexers – de-multiplexers- Binary Multiplier – Parity generator and checker.																	
UNIT – III	Sequential Circuits						Hours: 09										
Sequential Circuits -latches – flip flops – analysis of clocked sequential circuits – state reduction and assignments. Registers and Counters: Registers – shift registers – ripple counters – synchronous counters – other counters																	
UNIT – IV	Memory and Programmable Logic						Hours: 09										
Random access memory – memory decoding - error detection and correction – Read only memory – Programmable Logic Array – Programmable Array Logic. Introduction to CPLDs, FPGAs. Asynchronous Sequential Logic:Analysis procedure – circuits with Latches – Design procedure – Reduction of state and Flow tables – Race-Free state assignment – Hazards.																	
UNIT – V	Introduction to VHDL						Hours: 09										
introduction – VHDL Design flow, program structure, types and constants, functions and procedures, libraries and packages – VHDL for combinational circuits, Sequential Circuits, Registers and Counters, VHDL description for binary multiplier.																	
Total contact Hours: 45		Total Tutorials:15		Total Practical Classes: -		Total Hours: 60											
Text Books:																	
<ol style="list-style-type: none"> 1. M. Morris Mano and Michael D. Ciletti, Digital Systems: With an Introduction to the Verilog HDL, Fifth Edition, Prentice Hall of India, 2012 2. Samir Palnitkar, VERILOG HDL – A Guide to Digital Design and Synthesis, Pearson Education Inc., Second Edition, 2012. 3. J. Bhasker, VHDL Primer, Prentice Hall of India Pvt. Ltd, Third Edition, 2006. 																	
Reference Books:																	
<ol style="list-style-type: none"> 1. Thomas L. Floyd and R.P. Jain, Digital Fundamentals, Pearson Education, Tenth edition, 2008. 2. Leach Malvino, Digital Principles and Applications, Tata McGraw Hill, Fifth edition, 2005. 3. Charles H. Roth, Fundamentals of Logic Design, Thomson Brooks/Cole, Fifth edition, 2003. 4. Thomas C Bartee, Computer Architecture and Logic Design, McGraw Hill, Singapore, 2002. 																	
Websites:																	
<ol style="list-style-type: none"> 1. http://www.nptel.iitm.ac.in/video.php?subjectId=117106086 2. http://www.xilinx.com 3. http://www.electronics-lab.com/downloads/datasheets/ic_digital.html 																	

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : One		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CA152	Data Structures	3	1	-	4	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> To gain knowledge about storage and manipulation of data used for programming. To emphasize the concept of data abstraction and the problem of building implementations of abstract data types 														
Outcomes	<p>On successful completion of the module students will be able to:</p> <ul style="list-style-type: none"> Select relevant data structures and combinations of relevant data structures for the given problems in terms of memory and run time efficiency. Apply data abstraction in solving programming problems. 														
UNIT – I	Arrays and Searching Algorithms							Hours: 09							
Algorithmic notation – Programming principles – Creating programs- Analyzing programs. Arrays: One dimensional array, multidimensional array, pointer arrays. Searching: Linear search, Binary Search, Fibonacci search.															
UNIT – II	Linear Data Structures							Hours: 09							
Stacks: Primitive operations, Application of stacks. Queues: Primitive operations - Priority queues –Dequeues – Applications. Linked list: Singly Linked List, Doubly Linked List, Circular Linked List, linked stacks, Linked queues, Applications of Linked List –Dynamic storage management – Generalized list - Garbage Collection and Compaction															
UNIT – III	Non-Linear Data Structures							Hours: 09							
Trees: Binary tree, Terminology, Representation, Traversal, Types, Applications. Graph: Terminology, Representation, Traversals – Applications - spanning trees, shortest path and Transitive closure, Topological sort.															
UNIT – IV	Hash Tables and Search Trees							Hours: 09							
Hash Table: Hash Functions, Collision Resolution Strategies, Hash Table, Implementation. Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.															
UNIT – V	File Structures							Hours: 09							
Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files- Read/Write Operations, Indexing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Comparison of Hashing and Indexing techniques.															
Total contact Hours: 45	Total Tutorials: 15	Total Practical Classes: -			Total Hours: 60										
Text Books:															
<ol style="list-style-type: none"> Ellis Horowitz, Sartaj Sahni and Fred Fundamentals of Data Structures in C, Second Edition, Universities Press, 2008. D. Samanta, Classic Data Structures, Second Edition, Prentice-Hall of India Pvt. Ltd., 2012. 															
Reference Books:															
<ol style="list-style-type: none"> Robert Kruse, C.L. Tondo and Bruce Leung, Data Structures and Program Design in C, Prentice-Hall of India, Pvt. Ltd., Second edition, 2007. Mark Allen Weiss, Data Structures and Algorithm Analysis in C, Pearson Education, Second Edition, 2006. 															
Websites:															
<ol style="list-style-type: none"> http://www.cse.unt.edu http://nptel.iitm.ac.in 															

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : One		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CA153	Problem Solving and Programming	3	1	-	4	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> To introduce basic understanding of design, and implementation of computing, programming and problem-solving. To develop basic programming skills (logic, ability) to solve problems & practice of program writing 														
Outcome	<ul style="list-style-type: none"> Selection of appropriate language constructs, design and implementation of problem solving 														
UNIT – I	Introduction to Problem Solving							Hours: 09							
Problem solving strategies, Problem identification, Problem understanding, Algorithm development, Solution planning (flowcharts, pseudo - code, etc.), Modular programming design. Basic program structure in C, Simple data types, variables, constants, operators, comments, Control Flow; if, while, for, do - while, switch.															
UNIT – II	Functions, Arrays and Pointers							Hours: 09							
Types, parameters, prototypes, recursion. Arrays & Pointers: Array usage, Pointers, addresses and types, call by reference. Pointer – array duality. Strings – arrays of pointers. Arguments to main. Pointers to functions															
UNIT – III	Structures and Linked Lists							Hours: 09							
Member accessing, pointers to structures, Structures and functions, Arrays of structures, linked lists, trees. Other Data Types: Unions, enumerations and bit fields															
UNIT – IV	Bitwise Operators, Dynamic Allocation and Pre-processors							Hours: 09							
Bitwise Operators: Usage, device accessing. Type manipulation: Coercion, typedef, initialization, Static, global, external, register. Dynamic Allocation: Uses, pitfalls. The Pre-processor directives- macro definitions and usage															
UNIT – V	File Operations							Hours: 09							
Input and Output: Concepts, Character and File I/O, Simple File I/O, File modes, Standard I/O Routines, Standard Libraries.															
Total contact Hours: 45	Total Tutorials: 15	Total Practical Classes: -			Total Hours: 60										
Text Books:															
<ol style="list-style-type: none"> Stephen G. Kochan, Programming in C , Third Edition, Pearson Education India, 2005. Byron Gottfried, Programming with C, Second Edition, (Indian Adapted Edition), TMH Publications, 2006. Dromey, How To Solve It By Computer, Dorling Kindersley PvtLtd,Second Edition, 2008. 															
Reference Books:															
<ol style="list-style-type: none"> E.Balagurusamy, Computing fundamentals and C Programming, Tata McGraw-Hill Publishing Company Limited, First Edition,2008. BehrouzA.Forouzan and Richard F. Gilberg, A Structured Programming Approach Using C, Second Edition, Brooks - Cole Thomson Learning Publications, 2007. 															
Websites:															
<ol style="list-style-type: none"> http://www.cse.unt.edu http://nptel.iitm.ac.in 															

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : One		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CA154	Operating Systems	3	1	-	4	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> To be aware of the evolution and fundamental principles of operating system, processes and their communication To understand the various operating system components like process management, memory management and file management 														
Outcomes	<p>On successful completion of the module students will be able to:</p> <ul style="list-style-type: none"> Understand the operating system components and its services. Realize the intricacies of Process Synchronization. Demonstrate the mapping between the physical memory and virtual memory. 														
UNIT – I	Introduction							Hours: 09							
Introduction -Types of operating systems-operating systems structures-Systems components- operating systems services-System calls-Systems programs-Processes-process concept- process scheduling-operation on processes-co-operating processes-Inter process communications-CPU Scheduling-Scheduling criteria-Scheduling algorithms-Multiple-processor Scheduling															
UNIT – II	Process Synchronization							Hours: 09							
Process Synchronization –Critical Section problem – Semaphores-Classical problems of synchronization-critical regions-Monitors-Deadlock Characterization-Deadlock handling-Deadlock Prevention-Deadlock avoidance-Deadlock Detection-Deadlock Recovery –Threads-Multithreading Models															
UNIT – III	Memory Management							Hours: 09							
Memory Management-Swapping-Contiguous Memory allocation-Paging-Segmentation-Virtual Memory-Demand paging-Page Replacement-Thrashing															
UNIT – IV	Disk Management							Hours: 09							
Disk Structures-Disk Scheduling-File Systems Interface-File concepts-Access methods-Directory Structures-File System Implementation-File Systems structures-Directory Implementation-Allocation Methods-Free Space management															
UNIT – V	Case Studies							Hours: 09							
Linux System-design Principles- process management-File Systems-Windows Vista-Systems Structures-Process management-memory management-Android OS-Virtual machine OS															
Total contact Hours: 45	Total Tutorials: 15	Total Practical Classes: -			Total Hours: 60										
Text Books:															
1. Abraham Silberschatz, Peter B Galvin and Gagne, Operating Systems Concepts, Seventh Edition, Addison Wesley Publishing,2010.															
Reference Books:															
1. Andrew S.Tanenbaum, Modern operating Systems, Third Edition, PHI Learning Pvt.Ltd., 2008 2. William Stallings, Operating Systems: Internals and Design Principles, Seventh Edition, Prentice Hall, 2011. 3. H M Deital, P J Deital and D R Choffnes, Operating Systems ,Third edition, Pearson Education, 2011. 4. D M Dhamdhere, Operating Systems: A Concept-based Approach, Second Edition, Tata McGraw-Hill Education, 2007.															
Websites:															
1. http://nptel.ac.in/courses/Webcoursecontents/IIScBANG/Operating%20Systems/New_index1.html															

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : One		Category : LB													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CA155	C and Data Structures Laboratory	-	-	3	2	60	40	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> • To develop skills to design and analyze simple linear and non linear data structures • To Strengthen the ability to identify and apply the suitable data structure for the given real world problem • To Gain knowledge in practical applications of data structures 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • To design and analyze the time and space efficiency of the data structure • To identity the appropriate data structure for given problem • Employ a deep knowledge of various data structures when constructing a program. 														
Cycle - I															
		Hours: 12													
<ol style="list-style-type: none"> 1. C Programs – Arrays, Strings, Structures, Functions and Files 2. Searching algorithms - sequential, binary and Fibonacci search algorithms on an ordered list. Compare the number of key comparisons made during the searches 3. Sorting algorithms :Insertion Sort, Selection Sort, Bubble Sort and Quick Sort 															
Cycle - II															
		Hours: 33													
<ol style="list-style-type: none"> 1. Sparse matrix representation and find its transpose. 2. Evaluation of arithmetic expression to postfix expression. 3. Queue, circular queue 4. Singly Linked List, Doubly Linked List, Circular Linked List 5. Concatenation of linked lists. 6. Tree traversals - insertions and deletions 7. Graph traversals 8. Implementation of Hash tables 															
Total contact Hours: -	Total Tutorials: -	Total Practical Classes: 45				Total Hours: 45									

Department : Computer Science and Engineering		Programme : Master of Computer Application						
Semester : One		Category : LB						
Subject Code	Subject	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CA156	Operating Systems Laboratory	-	-	3	2	60	40	100
Prerequisite	-							
Objectives	<ul style="list-style-type: none"> • Learn shell programming in the UNIX environment. • Be exposed to programming in C using system calls. • Be exposed to process creation and inter process communication. • Be familiar with implementation of CPU Scheduling Algorithms, page replacement algorithms and Deadlock avoidance 							
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Implement deadlock avoidance. • Compare the performance of various CPU Scheduling Algorithms. • Critically analyze the performance of the various page replacement algorithms. • Create processes and implement IPC with process synchronization. 							
Cycle - I	Fundamentals						Hours: 21	
	<ol style="list-style-type: none"> 1. Learn the use of basic UNIX commands. 2. Shell Programming. 3. Implement the following CPU scheduling algorithms a) Round Robin b) SJF c) FCFS d) Priority 4. Implement all file allocation strategies a) Sequential b) Indexed c) Linked 5. Implement all File Organization Techniques a) Single level directory b) Two level c) Hierarchical d) DAG 6. Implement Bankers Algorithm for Dead Lock Avoidance 7. Implement all page replacement algorithms a) FIFO b) LRU c) LFU 							
Cycle - II	Inter Process Communication and Process Synchronization						Hours: 24	
	<ol style="list-style-type: none"> 1. File system related system calls. (Learn to create, open, read, write, seek into, close files; open, read, write, search, close directories) 2. Process management – Fork, Exec (Learn to create a new process and to overlay an executable binary image on an existing process) 3. Inter-process communication between related processes using pipes. 4. Inter-process communication unrelated processes using Shared memory. 5. Process synchronization using semaphores. 							
Total contact Hours: -	Total Tutorials: -				Total Practical Classes: 45			Total Hours: 45

Department : Computer Science and Engineering		Programme : Master of Computer Application															
Semester : Two		Category : TY															
Subject Code	Subject	Hours / Week			Credit	Maximum Marks											
		L	T	P	C	CA	SE	TM									
CA157	Design and Analysis of Algorithms	3	1	-	4	40	60	100									
Prerequisite	-																
Objectives	<ul style="list-style-type: none"> • To Introduce Problem Solving and design techniques • To analyze the asymptotic performance of algorithms • To apply important algorithmic design paradigms 																
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Select appropriate algorithm techniques for real time problems • Analyze algorithm efficiency and complexity 																
UNIT – I	Introduction to Algorithmic Analysis						Hours: 09										
Definitions and notations: Standard notations – asymptotic notations – worst case, best case and average case analysis; big oh, small oh, omega and theta notations; Recursive algorithms, analysis of non-recursive and recursive algorithms, solving recurrence equations, analyzing control structures. Heap, shell, radix, insertion, selection and bubble sort; sequential, binary and Fibonacci search.																	
UNIT – II	Divide and Conquer and Greedy method						Hours: 09										
Divide and Conquer: General Method – binary search – finding maximum and minimum – merge sort and quick sort – Strassen's Matrix multiplication. Greedy Method: General method – knapsack problem – minimum spanning tree algorithms – single source shortest path algorithm – scheduling, optimal storage on tapes, optimal merge patterns.																	
UNIT – III	Dynamic Programming and Basic Traversal Techniques						Hours: 09										
Dynamic Programming: General Method – Multi-Stage Graphs – All Pairs Shortest Paths algorithm – 0/1 Knapsack and Traveling Salesman problem – Chained Matrix Multiplication – Approaches using recursion – Memory functions. Basic Search and Traversal Technique: Techniques for Binary Trees and Graphs – AND/OR Graphs – Biconnected Components – Topological Sorting.																	
UNIT – IV	Backtracking						Hours: 09										
Backtracking: The general method – 8-queen problem – sum of subsets – graph coloring – Hamiltonian cycle – Knapsack problem.																	
UNIT – V	Branch and Bound Method						Hours: 09										
Branch and Bound Method: Least Cost (LC) search – 15-puzzle problem – control abstractions for LC-Search – Bounding – FIFO Branch-and-Bound – 0/1 Knapsack problem – Traveling Salesman Problem. Introduction to NP-Hard and NP-Completeness.																	
Total contact Hours: 45		Total Tutorials: 15		Total Practical Classes: -		Total Hours: 60											
Text Books:																	
1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Fundamentals of Computer Algorithms, Second edition, Galgotia Publications Pvt. Ltd., 2008.																	
Reference Books:																	
1. Anany Levitin, Introduction to the Design and Analysis of Algorithms, Second edition, Pearson Education, 2005. 2. Gilles Brassard and Paul Bratley, Fundamentals of Algorithms, Second edition, Prentice-Hall of India, 1997. 3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Introduction to Algorithms, Prentice-Hall of India, Second Edition, 2003. 4. Richard Johnsonbaugh and Marcus Schaefer, Algorithms, First edition, Pearson Education, 2004.																	
Websites:																	
1. http://www.cse.unt.edu 2. http://nptel.iitm.ac.in																	

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : Two		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CA158	Object Oriented Programming	3	1	-	4	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> • To introduce the basics of Object Oriented Programming. • To educate the programming skill in C++ and Java. • To practice the object oriented concepts using C++ and Java. 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Understand the Object Oriented Programming Concepts. • Design and develop real world problem using C++ and Java. 														
UNIT – I															
Limitations in structured programming - Characteristics of Object Oriented Language - Data types - Loops - Functions - Classes Objects - Constructors and Destructors - Operator Overloading and Type Conversion.								Hours: 09							
UNIT – II															
Inheritance – Polymorphism - Pointers – Virtual Function – Console I/O Operations – Strings -Working with Files - Templates – Exception Handling class Hierarchies - library Organization – Object Oriented Design and Programming.															
UNIT – III															
Java vs. C++ -Introduction to Java - Java on the Internet - Java Data types - Java keywords and Flow Control – Methods - Polymorphism- Exception handling - Multithreading -Persistence - Garbage collection.								Hours: 09							
UNIT – IV															
Final declaration - Packages -Interfaces and Inner Class - Java I/O System - Run time type identification - User Interface design basics with swing.															
UNIT – V															
Network programming - Applets class - Architecture - Applet Programs - Abstract window tool kit.															
Total contact Hours: 45	Total Tutorials: 15	Total Practical Classes: -			Total Hours: 60										
Text Books:															
<ol style="list-style-type: none"> 1. BjarneStroustrup, The C++ Programming Language, Third Special Edition, Addison Wesley, 2000. 2. Bruce Eckel, Thinking in Java, Third Edition, Prentice Hall PTR, 2002. 3. E.Balaguruswamy, Object Oriented Programming with C++, Tata McGraw Hill Publications Limited, Fourth Edition, 2008. 															
Reference Books:															
<ol style="list-style-type: none"> 1. Robert Lafore, Object Oriented Programming in C++, Galgotia publications, Fourth Edition, 2002. 2. E.Balaguruswamy, Programming with Java, Tata McGraw Hill Publications Limited, Fourth Edition, 2008. 															
Websites:-															
<ol style="list-style-type: none"> 1. http://nptel.ac.in 															

Department : Computer Science and Engineering		Programme : Master of Computer Application															
Semester : Two		Category : TY															
Subject Code	Subject			Hours / Week		Credit	Maximum Marks										
		L	T	P	C	CA	SE	TM									
CA159	Computer Organization and Architecture	3	1	-	4	40	60	100									
Prerequisite	-																
Objectives	<ul style="list-style-type: none"> • To provide an overview of computer hardware and software. • To give a methodical treatment of machine instructions, addressing techniques, and instruction sequencing. • To explain the basics of I/O data transfer synchronization and a series of complex data structures. 																
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Gain knowledge regarding the ways for increasing main memory bandwidth. • Understand Processor implementation by both hardwired and Micro programmed control. 																
UNIT – I	Basic Computer Organization and Design						Hours: 09										
Instruction Codes – Computer Registers – Computer Instructions – Computer Instructions – Timing and Control – Instruction Cycle – Memory reference Instructions - Input – Output and Interrupt Design of Basic Computer – Design of Accumulator logic.																	
UNIT – II	Micro-programmed Control and Processor Organization						Hours: 09										
Control Memory-Address sequencing- Micro program Example – Design of control unit. Processor Organization: general register organization – stack organization – instruction formats – addressing modes – data transfer and manipulation – program control. Computer Arithmetic: Addition, Subtraction, Multiplication, Division algorithms- Floating point arithmetic operations- Decimal arithmetic operations																	
UNIT – III	Memory Organization						Hours: 09										
Memory hierarchy – main memory – auxiliary memory –Associate memory – Cache memory – Virtual memory.																	
UNIT – IV	Input-Output Organization						Hours: 09										
Input-output interface – asynchronous data transfer - modes of transfer – priority interrupt – DMA – IOP – serial communication.																	
UNIT – V	Parallel Processing						Hours: 09										
Multiple processor organizations – Symmetric Multi processors – Cache coherence and MESI protocol – Clusters – Non Uniform Memory Access – Vector Computation.																	
Total contact Hours: 45	Total Tutorials: 15	Total Practical Classes: -			Total Hours: 60												
Text Books:																	
<ol style="list-style-type: none"> 1. M. Morris Mano, Computer System Architecture, Prentice-Hall of India, Pvt. Ltd., Third edition, 2008. 2. William Stallings, Computer Organization and Architecture, Prentice-Hall of India, Pvt. Ltd., Seventh edition, 2005. 																	
Reference Books:																	
<ol style="list-style-type: none"> 1. Carl Hamacher, Zvonko G. Vranesic and Safwat G. Zaky, Computer Organization, McGraw-Hill, Fifth edition, 2011. 2. John P. Hayes, Computer Architecture and Organisation, McGraw Hill, 1998. 3. P. Pal Chaudhuri, Computer Organization and Design, Prentice-Hall of India, Pvt. Ltd., Second edition, 2002. 																	
Websites:																	
<ol style="list-style-type: none"> 1. http://www.nptel.iitm.ac.in 2. http://dspace.utamu.ac.ug 																	

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : Two		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CA160	Business Process	3	1	-	4	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> To introduce the core business process management concepts as applied to a variety of organizational processes and workflows. To understand the role of business process management in operations improvement strategies and to understand the role of organizational culture and change management during business process improvement 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> Understand the basics concepts of business processes using their key operations characteristics Have the ability to understand the fundamental of business process management (BPM) and its relationships with Total Quality Management (TQM), Business Process Reengineering (BPR) and Enterprise Resource Planning (ERP). 														
UNIT – I	Business Organizations							Hours: 09							
Nature, Types and Structure of Business Organization – Formalization – Departmentation – Organizational Relationship – Organizational culture – IT industry and Organization Improvement.															
UNIT – II	Business Organization and Process Model							Hours: 09							
Outcomes of Business Organization: Leadership – Communication – Decision making – Organizational Change – Inter-organization Relationship. Building the Business Process model: Need for process model – Overview of ERP implementation – Benefits of ERP – ERP Implementation Technology – Case Study.															
UNIT – III	Business Process and Total Quality							Hours: 09							
Business Process Management (BPM): Introduction to BPM – Lifecycle of BPM – Six Sigma in BPM – Case Study. Total Quality Management (TQM) – Concept – Systems model of Quality – Deming's approach – TQM as a business Strategy.															
UNIT – VI	Business Process Reengineering							Hours: 09							
Business Process Reengineering (BPR): Introduction, Need, characteristics, Framework for BPR – BPR and IT Industry - Case Study on Business Process empowering through IT.															
UNIT – V	Introduction to e-Business							Hours: 09							
Nature and Scope, Types, Advantages, E-business Architecture – E-Business vs E-commerce – Electronic Data Interchange (EDI), Electronic Payment System – Cybercash, Smart card, Electronic Fund Transfer (EFT).															
Total contact Hours: 45	Total Tutorials: 15	Total Practical Classes: -				Total Hours: 60									
Text Books:															
<ol style="list-style-type: none"> 1. T.A.Venkatachalam, C.M.Sellappan, Business Process, PHI Learning Pvt.Ltd, 2011 2. M. S. Jayaraman, Business Process Reengineering, Tata McGraw Hill publications, 2001. 3. R. Kalakota and M. Robinson,E-Business : Roadmap for Success, Pearson Education, 2000. 															
Reference Books:															
<ol style="list-style-type: none"> 1. Richard H. Hall, Organizations, Structures, Processes, and Outcomes, Pearson Education, 2001. 															
Websites:-															

Department : Computer Science and Engineering		Programme : Master of Computer Application															
Semester : Two		Category : TY															
Subject Code	Subject	Hours / Week			Credit	Maximum Marks											
		L	T	P	C	CA	SE	TM									
CA161	Computer Graphics and Animation	3	1	-	4	40	60	100									
Prerequisite	-																
Objectives	<ul style="list-style-type: none"> • To learn Graphical devices and use them for developing software applications • To learn, develop, design and implement two dimensional graphical structures. • To understand the components of Graphics and Animation applications. • To design innovative applications such as animation. 																
Outcomes	<p>On successful completion of this course</p> <ul style="list-style-type: none"> • The students will get acquainted Graphics domains. • They will understand major intricacies of Graphics systems and animation applications. • They will be able to convert verbal descriptions to animations and vice versa. 																
UNIT – I	Graphics Systems and Graphical User Interface						Hours: 09										
Introduction to Graphical systems - Pixel – Resolution– types of video display devices – Graphical input devices – output devices – Hard copy devices – Direct screen interaction – Logical input function and devices – GKS User dialogue – Interactive picture construction techniques - .																	
UNIT – II	Display Primitives and Transformations						Hours: 09										
Geometric Display Primitives and Attributes: Geometric display primitives – Points– Lines and Polygons – Point display method – DDA and Bresenham Line drawing methods – Midpoint Circle Algorithm – curve functions – Scanline polygon fill algorithm – boundary fill algorithm – fill area functions – attributes for output primitives - Line types – text filling – antialiasing area boundaries.																	
UNIT – III	2D Transformations and Viewing						Hours: 09										
Basic 2D Transformations – matrix representation – Concatenation of matrices – translation - Scaling– Rotation – Shearing– Mirroring– Homogeneous Coordinates - general composite transformation – raster methods for transformations.Window to view port Transformations: Windowing And Clipping: Point– Lines– Polygons - boundary intersection methods.																	
UNIT – IV	3D Concepts Representations and Transformations						Hours: 09										
3D projections – Depth Cueing – visible lines – surface rendering – cutaway views – stereoscopic views – 3D polygons – curved surfaces and continuity – Octrees – BSP trees - fractal methods – visualization data sets – 3D transformations – modeling coordinate transformations – viewing pipeline – parallel projections – view volumes.																	
UNIT – V	Computer Animation						Hours: 09										
Design of animation sequences – animation functions – raster animations – animation languages – key frame sequences – simulating accelerations – motion specifications																	
Total contact Hours: 45	Total Tutorials:15	Total Practical Classes: -			Total Hours: 60												
Text Books:																	
<ol style="list-style-type: none"> 1. Donald D. Hearn and M. Pauline Baker, Computer Graphics C Version, Second Edition, Pearson Education, 2006. 2. Pakhira Malay K, Computer Graphics, Multimedia and Animation, Second Edition, 2010. 																	
Reference Books:																	
<ol style="list-style-type: none"> 3. Anil Jain K, Fundamentals of Digital Image Processing, Prentice-Hall of India, Fourth Edition, 1989. 4. Gonzalez R. C and Woods R.E., Digital Image Processing, Pearson Education, Second edition, 2002. 5. Newmann W.M. and Sproull R.F., Principles of Interactive Computer Graphics, Tata McGraw-Hill, Second Edition, 2000. 																	
Websites:																	
<ol style="list-style-type: none"> 1. http://nptel.ac.in/courses/106106090/ 2. http://nptel.ac.in/courses/106105032/ 																	

Department : Computer Science and Engineering		Programme : Master of Computer Application						
Semester : Two		Category : LB						
Subject Code	Subject	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CA162	Algorithms Laboratory	-	-	3	2	60	40	100
Prerequisite	Programming with C							
Objectives	<ul style="list-style-type: none"> To design and implement algorithms of different problems with different algorithm techniques To analyze various algorithmic techniques 							
Outcomes	<ul style="list-style-type: none"> Selection of relevant algorithm technique and data structures for the given problems in terms of memory and run time efficiency. Have the analysis of different techniques. 							
Cycle -I								Hours: 21
	<ol style="list-style-type: none"> Implementation of sorting algorithms with analysis of time and space complexity. Implementation of searching algorithms with analysis of time and space complexity Solving problems using Divide-and-Conquer technique. Solving problems using Greedy technique. 							
Cycle -II								Hours: 24
	<ol style="list-style-type: none"> Solving problems using Dynamic Programming technique. Implementation of Traversal techniques. Implementation of Backtracking. Implementation of Branch-and-Bound technique. Solving NP-Complete problems (using heuristics). 							
Total contact Hours: -	Total Tutorials: -	Total Practical Classes: 45			Total Hours: 45			

Department : Computer Science and Engineering		Programme : Master of Computer Application						
Semester : Two		Category : LB						
Subject Code	Subject	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CA163	Object Oriented Programming Laboratory	-	-	3	2	60	40	100
Prerequisite	C Programming							
Objectives	<ul style="list-style-type: none"> • To introduce the basics of Object Oriented Programming. • To educate the programming skill in C++ and Java. • To practice the object oriented concepts using C++ and Java. 							
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Understand the Object Oriented Programming Concepts. • Have the ability to design and develop real world problem using C++ and Java. 							
Cycle – I	C++ Programming						Hours: 21	
<ol style="list-style-type: none"> 1. Program to implement Class and Object 2. Program to implement Constructor Overloading 3. Program to implement Inheritance <ol style="list-style-type: none"> a. Single Inheritance b. Multiple Inheritance c. Multi-level Inheritance d. Hybrid Inheritance 4. Program to implement Polymorphism 5. Program to implement Virtual Function 6. Program to implement Operator Overloading Function 7. Program to implement Templates 8. Program to implement Exception Handling 								
Cycle -II	JAVA Programming						Hours: 24	
<ol style="list-style-type: none"> 1. Program to implement Class and Object 2. Program to implement Constructor Overloading 3. Program to implement Inheritance <ol style="list-style-type: none"> a. Single Inheritance b. Multi-level Inheritance c. Hybrid Inheritance 4. Program to implement Multithreading 5. Program to implement Exception Handling 6. Program to implement Java Swing 7. Program to implement Applets 8. Network Programming 								
Total contact Hours: -		Total Tutorials: -		Total Practical Classes:45			Total Hours: 45	

Department : Computer Science and Engineering		Programme : Master of Computer Application															
Semester : Three		Category : TY															
Subject Code	Subject	Hours / Week			Credit	Maximum Marks											
		L	T	P	C	CA	SE	TM									
CA164	Database Management Systems	3	1	-	4	40	60	100									
Prerequisite	-																
Objectives		<ul style="list-style-type: none"> Understand the role of a database management system in an organization. Understand basic database concepts, including the structure and operation of the relational data model. Understand and successfully apply logical database design principles, including E-R diagrams and database normalization. Construct simple and moderately advanced database queries using Structured Query Language (SQL). 															
Outcome		<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> Gain knowledge regarding the design, management and manipulate the databases Able to design the various applications that includes Databases and able to manage the data effectively. 															
UNIT – I	Introduction of Database Systems and E-R Model						Hours: 09										
Overview – Data Models – Database System Architecture – History of Database Systems. Entity – Relationship Model : Basic Concepts – Constraints – Keys – Design Issues – Entity Relationship Diagram – Weak Entity Sets – Extended E-R Features – Design of an E-R Database Schema – Reduction of E-R Schema of Tables																	
UNIT – II	Relational Model and SQL						Hours: 09										
Structure of Relational Databases – Relational Algebra – Extended Relational Algebra Operations – Modification of Database – Views – Tuple Relational Calculus – Domain Relational Calculus. SQL : Background – Basic Structure – Set Operations – Aggregate Functions – Null Values – Nested Subqueries – Views – Complex Queries – Modification of the database – Joined Relations – Data-Definition Language – Embedded SQL – Dynamic SQL – Other SQL Features. Other Relational Languages: Query – by – Example, Quel.																	
UNIT – III	Integrity, Security and Relational Database Design						Hours: 09										
Domain Constraints – Referential Integrity – Assertions – Triggers – Security and Authorization – Authorization in SQL – Encryption and Authentication. Relational Database Design: First Normal Form – Second Normal Form – Boyce-Codd Normal Form – Third Normal Form – Fourth Normal Form																	
UNIT – IV	Storage, File Structures, Indexing and Hashing						Hours: 09										
Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary Storage – Storage Access – File Organization – Organization of Records in Files – Data-Dictionary Storage. Indexing and Hashing: Basic Concepts – Ordered Indices – B ⁺ -Tree Index Files – B-Tree Index Files – Static Hashing – Dynamic Hashing Index Definition in SQL – Multiple-Key Access																	
UNIT – V	Transactions and Concurrency Control						Hours: 09										
Transaction Concept – Transaction State – Implementation of Atomicity and Durability – Concurrent Executions – Serializability – Recoverability – Implementation of Isolation – Transaction Definition in SQL – Testing for Serializability. Concurrency Control: Lock-Based Protocols – Timestamp-Based Protocols – Validation-Based Protocols – Multiple Granularity – Deadlock Handling – Insert and Delete Operations.																	
Total contact Hours: 45	Total Tutorials: 15	Total Practical Classes: -			Total Hours: 60												
Text Books:																	
1. Abraham Silberschatz, Henry F. Korth and S.Sudarshan, Database System Concepts, Fifth edition McGraw-Hill International Inc., 2006																	
Reference Books:																	
1. Fred R McFadden, Jeffery A Hoffer, Mary B.Prescott, Modern Database Management, Fifth Edition, Addison Wesley, 2000. 2. ElmasriNavathe, Fundamentals of Database Systems, Third Edition, Addison Wesley, 2000. 3. Jefrey D. Ulman, Jenifer Widom, A First Course in Database Systems, Pearson Education Asia, 2001. 4. Bipin C Desai, An Introduction to Database Systems, Galgotia Publications Pvt. Limited, 2001.																	
Websites:																	
1. http://cs.ulb.ac.be/public/_media/teaching/infoh303/dbmsnotes.pdf 2. http://engineeringppt.net/database-management-system-ppt-pdf-lecture-notes																	

3. <http://codex.cs.yale.edu/avi/db-book/db6/slide-dir>

Department : Computer Science and Engineering		Programme : Master of Computer Application															
Semester : Three		Category : TY															
Subject Code	Subject	Hours / Week			Credit	Maximum Marks											
		L	T	P		CA	SE	TM									
CA165	Computer Networks	3	1	-	4	40	60	100									
Prerequisite	-																
Objectives	<ul style="list-style-type: none"> To familiarize the students with the basic taxonomy and terminology of networks To introduce networks technologies, application protocols, e-mail and communication protocols. 																
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> Understand the details and functionality of layered network architecture. Identify the different types of network topologies and protocols 																
UNIT – I	Introduction to Computer Networks						Hours: 09										
Goals and Applications of Networks -Uses of Computer Networks-Network Hardware-Network Software-Reference Models- Example Networks-Network Standardization. Data Communication: Guided Transmission Media- Wireless Transmission-Digital Modulation and Multiplexing-Switching Methods- ISDN- Terminal Handling																	
UNIT – II	Data Link Layer						Hours: 09										
Data Link Layer Design Issues-Error Detection and Correction-Elementary Data Link Protocols-Sliding Window Protocols-SONET-ADSL-Channel Allocation Problem-Multiple Access Protocols-Ethernet-Wireless LANs-Bluetooth																	
UNIT – III	Network Layer						Hours: 09										
Network Layer Design Issues-Routing Algorithms-Quality of Service-Internetworking																	
UNIT – IV	Transport Layer and Presentation Layer						Hours: 09										
Transport Service-Elements of Transport Protocols - Congestion Control - Internet Transport Protocols: UDP & TCP- Performance Issues-Delay-Tolerant Networking. PresentationLayer:Design issues - Data compression techniques - Window Management.																	
UNIT – V	Application Layer						Hours: 09										
DNS - Electronic Mail - World Wide Web - Streaming Audio and Video-Content Delivery. Network Security: Symmetric- Key Algorithms- Public-Key Algorithms - Digital Signatures-Communication Security-Authentication Protocols-Email Security-Web Security.																	
Total contact Hours: 45		Total Tutorials: 15		Total Practical Classes: -		Total Hours: 60											
Text Books:																	
<ul style="list-style-type: none"> Andrew S. Tanenbaum, Computer Networks, Fifth edition, Prentice-Hall of India, 2010. 																	
Reference Books:																	
<ol style="list-style-type: none"> Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", Elsevier, Fourth edition, 2007. James F. Kurose and Keith W. Ross, Computer Networking: A Top-Down Approach Featuring the Internet, Fourth edition, Pearson Education, 2002. 																	
Websites: -																	
<ol style="list-style-type: none"> http://www.tutorialspoint.com/computer_fundamentals/computer_networking.htm http://nptel.ac.in/video.php?subjectId=106105081 																	

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : Three		Category : TCM													
Subject Code	Course Name	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CA166	Platform Technologies	3	-	2	4	50	50	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> • To understand the foundations of CLR execution. • To know the object oriented aspects of C#. • To learn web based applications on .NET (ASP.NET). 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Gain knowledge of application development using .NET. • Design and develop Web based applications on .NET 														
UNIT – I	Introduction to C#							Hours: 09							
Introducing C#, Understanding .NET, overview of C#, Literals, Variables, Data Types, Operators, checked and unchecked operators, Expressions, Branching, Looping, Methods, implicit and explicit casting, Constant, Arrays, Array Class, Array List, String, String Builder, Structure, Enumerations, boxing and unboxing.															
UNIT – II	Object Oriented Aspects of C#							Hours: 09							
Class, Objects, Constructors and its types, inheritance, properties, indexers, index overloading, polymorphism, sealed class and methods, interface, abstract class, abstract and interface, operator overloading, delegates, events, errors and exception, Threading.															
UNIT – III	Application Development on .NET							Hours: 09							
Building windows application, Creating our own window forms with events and controls, menu creation, inheriting window forms, SDI and MDI application, Dialog Box(Modal and Modeless), accessing data with ADO.NET, DataSet, typed dataset, Data Adapter, updating database using stored procedures, SQL Server with ADO.NET, handling exceptions, validating controls, windows application configuration.															
UNIT – IV	Web Based Application Development on .NET							Hours: 09							
Programming web application with web forms, ASP.NET introduction, working with XML and .NET, Creating Virtual Directory and Web Application, session management techniques, web.config, web services, passing datasets, returning datasets from web services, handling transaction, handling exceptions, returning exceptions from SQL Server.															
UNIT – V	CLR and .NET Framework							Hours: 09							
Assemblies, Versioning, Attributes, reflection, viewing meta data, type discovery, reflection on type, marshalling, remoting, security in .NET															
Mini Project :															
The students are to be made of batches of two or three members in a team. Each team should select an appropriate project, which should be implemented in .NET framework. At the end of the project each team should prepare a report which consists of at least the following. Abstract, Introduction, Problem Statement, Design Document, Results, Interpretation of the Results															
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes: 30			Total Hours: 75										
Text Books:															
<ol style="list-style-type: none"> 1. Herbert Schildt, The Complete Reference: C# 4.0, Tata McGraw Hill, 2012. 2. Christian Nagel, Bill Evjen, Jay Glynn and, Karli Watson, Professional C# 2012 with .NET 4.5, Wiley India, 2012. 															
Reference Books:															
<ol style="list-style-type: none"> 1. Andrew Troelsen ,Pro C# 2010 and the .NET 4 Platform, Fifth edition, A Press, 2010. 2. Ian Griffiths, Matthew Adams, Jesse Liberty, Programming C# 4.0, Sixth Edition, O'Reilly, 2010. 															
Websites:-															
<ol style="list-style-type: none"> 1. www.w3.org/standards 															

Department : Computer Science and Engineering		Programme : Master of Computer Application							
Semester : Three		Category : LB							
Subject Code	Subject		Hours / Week		Credit	Maximum Marks			
			L	T	P	C	CA	SE	
CA167	Database Management Systems Laboratory		-	-	3	2	60	40	100
Prerequisite	-								
Objectives	<ul style="list-style-type: none"> • To understand basic concepts in all advanced aspects as well as to get some practical hand-on experience with commercial database management systems • To design and implement database application system 								
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Design databases using data modeling and data normalization techniques • Create databases using popular database management system products • Solve problems by constructing database queries using the Structured Query Language • Develop insights into future data management tool and technique trends 								
Cycle - I									Hours: 30
<ol style="list-style-type: none"> 1. Study of Database Concepts: Relational model – table – operations on tables – index – table space – clusters – synonym – view – schema – data dictionary – privilege – role – transactions. 2. Study of SQL: Primitive Data Types – User Defined data Types – Built-in Functions – Parts of Speech of create, alter, drop, select, insert, delete, update, commit, rollback, save point, grant, revoke. 3. Study of Query Types: Queries involving Union, Intersection, Difference, Cartesian product, Divide Operations – Sub Queries – Join Queries – Nested Queries – Correlated, Queries – Recursive Queries. 4. Study of Procedural Query Language: Blocks, Exception Handling, Functions, Procedures, Cursors, Triggers, Packages 									
Cycle - II									Hours: 15
<ol style="list-style-type: none"> 1. Application: Design and develop any two of the following: <ol style="list-style-type: none"> a. Library Information System b. Logistics Management System c. Students' Information System d. Ticket Reservation System e. Hotel Management System f. Hospital Management System g. Inventory Control h. Retail Shop Management i. Employee Information System j. Payroll System k. Any other Similar System 									
Total contact Hours: -	Total Tutorials: -			Total Practical Classes:45			Total Hours: 45		

Department : Computer Science and Engineering		Programme : Master of Computer Application						
Semester : Three		Category : LB						
Subject Code	Subject	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CA168	Computer Networks Laboratory	-	-	3	2	60	40	100
Prerequisite	-							
Objectives	<ul style="list-style-type: none"> • To give them hands-on experience on networking • To gain knowledge about routing protocols and encryption algorithms. • To practice performance evaluation of network protocols 							
Outcomes	On successful completion of the course, students will be able to: <ul style="list-style-type: none"> • Understand Network protocols • Encryption Algorithms will create security awareness among students • Develop services that are required for network management. 							
Cycle - I								Hours: 24
	1. Implementation of peer to peer communication using UDP 2. Implementation of socket program for UDP Echo Client and Echo Server 3. Implementation of Client Server Communication Using TCP 4. Implementation of CRC 5. Message passing using Message Window 6. Implementation of port scanner 7. Implementation of Sliding Window Protocol 8. Create a socket using HTTP for web page upload and download.							
Cycle - I								Hours: 21
	1. Create a socket using HTTP for web page upload and download. 2. Implementation of Subnetting 3. Implement a Routing Protocol like DSR / AODV for transmitting up of data between sender and receiver (Using Network Simulators like NS2 or Glomosim) 4. Implementation of RPC 5. Implementation of DES 6. Implementation of RSA 7. Implementation of image Steganography 8. Implementation of Email							
Total contact Hours: -	Total Tutorials: -	Total Practical Classes: 45				Total Hours: 45		

Department : Humanities and Social Sciences		Programme : Master of Computer Application													
Semester : Three		Category : PR													
Subject Code	Subject	Hours / Week		Credit	Maximum Marks										
		L	T	P	C	CA	SE	TM							
HS151	Communication Skills	-	-	3	1	100	-	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> • To assist the students to develop their communication skills and communicate with confidence • To enhance the student's employability prospects by sharpening their skills 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Interact with ease without any inhibitions • Acquire the much needed confidence to converse in English fluently • Imbibe the requisite skills for facing the interview and group discussion 														
<ul style="list-style-type: none"> • Session I: Communication: Concepts and definition - Importance - Process- communication - Model - Types - Mode of communication - Objectives - Inter, Intra personal Communication - Barriers - Commandments of communication. • Session II: Developing Communication Skills: a) Reading: Preparation - Reading Styles - Linear reading - Faster Reading - Reading Techniques b) Writing: Effective writing - Report writing - Speech Writing - Minutes - Communication aids - Agenda Writing - Letters - Article writing - Improving English language Writing - When to write and when not to write. • Session III: Listening and Speaking: a) Listening: Listening - Importance - Art of Listening -Advantages - Mode of expression - Listening tests b) Speaking: Art of conversation – Using telephone - Methods of asking questions - Brain Storming - Presenting reports –Improving speech delivery - Expressing Techniques • Session-IV: Interviews Techniques: What and Why? - Types of Interviews - Understanding the intricacies - Planning for interviews - Answering skills – Effective Communication during interviews - TIPS - Mock Interview. • Session V: Group Discussion: Group Discussion - Purpose - Process of Group Discussion - Preparation - Getting Started - Art of guiding and controlling discussion - Personality test through group discussion - Lateral thinking - Participation techniques - mock G.D. • Session VI: Body Language: Origin and development of body language - Tool for personality identification - Analysis of body language - Types - Desirable body language - Attitude and body language - Body language as a powerful communication. • Session VII: Negotiation Techniques: Meaning - Importance - Fundamentals - Preparation - Techniques of Negotiation - Managing process of negotiation - Inter-personal behaviour – Case Study - Mock negotiations • Session VIII: Meetings: Meaning - Importance - Objectives - Leading and participating in meetings - Success indicators - Understanding the process of meetings – Communication skills for meetings - Mock Meetings - Seminars. • Session-IX: Management Communication Relationships: Communication in Management - Semantics - Employee and Employer communication - Communication within Management - Downward and Upward communication - Communication by specialists - The Union's role in communication. • Session-X: Presentation: Meaning and types of presentation - Understanding the audience - Planning - Designing - Written and oral - Making use of notes and outlines _ Techniques for delivering presentation - personal style - A postscript - model presentation • Session - XI: A whole review of the ten sessions and evaluation of the students. • Session XII: Practical communication with a cross section of the society. 															
Total contact Hours: -	Total Tutorials: -	Total Practical Classes: 3			Total Hours: 45										
Text Books:															
1. Sanjay Kumar and PushpaLatha, Communicative Skills, Oxford University Press,2011. 2. Jeff Butterfield, Soft Skills for Everyone, CengageLeaving , 2010.															
Reference Books:															
1. Barun. K and Mitra, Personality Development and Soft Skills, Oxford University, 2011. 2. Shirley Taylor, Communication for Business, Pearson Ltd, Third Print, 2003.															
Websites:-															

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : Four		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CA169	Web Technologies	3	1	-	4	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> • To learn web programming languages features. • To understand the major components of Internet and associated protocols. • To design innovative applications for web. • To familiarize the latest web technologies. 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Acquaint with client side and server side programming languages for web. • Understand the major components and protocols of Internet application. • Design web applications and services using latest technologies. 														
UNIT – I	Internet Protocols, HTML 5.0 and JavaScript							Hours: 09							
Internet Principles and Components: Internet protocols – HTTP, SMTP, POP3, MIME, and IMAP. Domain Name Server, Web Browsers and Web Servers, Evolution of Web. HTML and CSS: HTML 5.0, CSS 3. Client-Side Programming: JavaScript in Perspective-Syntax-Variables and Data Types-Statements- Functions-Objects-Arrays-Regular Expression.															
UNIT – II	Servlets and JSP							Hours: 09							
Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions- Session Handling- Understanding Cookies- database connectivity: JDBC perspectives, JDBC program example - JSP: Understanding Java Server Pages- Creating HTML forms by embedding JSP code.															
UNIT – III	PHP and XML							Hours: 09							
An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions-Connecting to Database – JSON(basics) - XML: Basic XML- Document Type Definition- XML Schema, DOM .															
UNIT – IV	Multimedia and E-Business							Hours: 09							
Multimedia and Web Application: Multimedia in web design, Audio and video speech synthesis and recognition - Electronic Commerce – E-Business Model – E-Marketing – Online Payments and Security – N-tier Architecture.															
UNIT – V	Introduction To AJAX And Web Services							Hours: 09							
AJAX: Ajax Client Server Architecture; Web Services: Introduction to Web Services, UDDI, SOAP, WSDL, Web Service Architecture, Developing and deploying web services.															
Total contact Hours: 45	Total Tutorials: 15	Total Practical Classes: --				Total Hours: 60									
Text Books:															
<ol style="list-style-type: none"> 1. Deitel and Deitel, Goldberg, Internet and World Wide Web – How to Program, Pearson Education Asia, Second Edition, 2001. 2. UttamK.Roy, Web Technologies, Oxford University Press, First Edition, 2012. 3. Eric Newcomer, Understanding Web Services: XML, WSDL, SOAP, and UDDI, Addison-Wesley, Platinum Edition, 2002. 															
Reference Books:															
<ol style="list-style-type: none"> 1. Phillip Hanna, JSP 2.0 - The Complete Reference, McGraw-Hill, 2003. 2. Mathew Eernisse, Build Your Own AJAX Web Applications, SitePoint, 2006. 3. Ron Schmelzer, Travis Vandersypen, Jason Bloomberg, MadhuSiddalingaiah, Sam hunting, MichealD.Qualls, David Houlding, Chad Darby, Diane Kennedy, XML and Web Services, Sams, February, 2002. 															
Websites: -															
<ol style="list-style-type: none"> 1. www.webtechnologies.co.tz 2. www.w3schools.com 															

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : Four		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CA170	Theory of Computation	3	1	-	4	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> • Present the theory of finite automata, as the first step towards learning advanced topics, such as compiler design. • Discussing the applications of finite automata towards text processing. • Develop an understanding of computation. 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Develop a clear understanding of problem solvability and undecidability. • Understand the equivalence between Non-deterministic Finite State Automata and Deterministic Finite State Automata. • Understand the design and implementation of Lexical Analyzer and Parser. • Appreciate the power of the Turing Machine, as an abstract automaton, that describes computation, effectively and efficiently. 														
UNIT – I	Finite Automata and Regular Expressions							Hours: 09							
Formal Languages and Regular expressions, Regular Expressions in programming languages, Deterministic and Non-Deterministic Finite Automata, Finite Automata with ϵ -moves, Conversion of NFA and DFA, Minimization of Finite Automata, Applications of Finite Automata, Implementation of Lexical Analyzer.. .															
UNIT – II	Regular Sets and Context Free Grammars							Hours: 09							
Chomsky hierarchy, Properties of regular sets, Pumping Lemma for regular languages, Context-Free Grammars – Derivation trees, Ambiguous and unambiguous grammars, Normalization of Context Free Grammar, Context-Free Grammars for Programming Languages.															
UNIT – III	Pushdown Automata							Hours: 09							
Introduction on pushdown automata, Deterministic and Nondeterministic pushdown automata, Acceptance by PDA, Equivalence between pushdown automata and context-free grammars, Applications of pushdown automata.															
UNIT – IV	Parser							Hours: 09							
Introduction on Parser, Top-down parsing and Bottom-up parsing, Operator Precedence Parser, Automatic Construction of Efficient Parser – Predictive Parser, LL(1) Parser, LR Parser, SLR Parser.															
UNIT – V	Turing machines							Hours: 09							
Turing machines (TM) – computable languages and functions –Turing Machine constructions –Programming techniques for TM, Variations of TMs – Time and Space complexity of TMs –Complexity classes – Introduction to NP-Hardness and NP-Completeness.															
Total contact Hours: 45	Total Tutorials: 15	Total Practical Classes: -			Total Hours: 60										
Text Books:															
1. John E. Hopcroft and Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation, Narosa Publishers, Third Edition, 2002.															
Reference Books:															
1. Michael Sipser, Introduction to the Theory of Computations, Brooks/Cole, Thomson Learning, First Edition, 1997. 2. John C. Martin, Introduction to Languages and the Theory of Computation, Tata McGraw-Hill, Third Edition, 2003.															
Websites :															
1. http://nptel.ac.in/courses/106106049/ 2. http://nptel.ac.in/courses/106103070/															

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : Four		Category : TY													
Subject Code	Subject			Hours / Week		Credit	Maximum Marks								
		L	T	P	C	CA	SE	TM							
CA171	Software Engineering	3	1	-	4	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> To provide information about wider engineering issues that form the background to develop complex, evolving (software-intensive) systems. To plan a software engineering process to account for functional and non-functional requirements. To impart knowledge to translate requirement specifications into a design, and then realize that design practically, all using an appropriate software engineering methodology. 														
Outcomes	<p>On successful completion of the module students will be able to:</p> <ul style="list-style-type: none"> Choose an appropriate process model for designing a project. Analyze the stakeholders' requirements and develops suitable models. Demonstrate the knowledge of technologies and standards for designing a suitable project Test the functional and nonfunctional aspects of the project. 														
UNIT – I															
Introduction: The Software Engineering Discipline—Its Evolution and Impact Software Development Projects – Limitation of Exploratory Style of Software Development - Emergence of Software Engineering. Software Life Cycle Models Use a Life Cycle Model- Classical Waterfall Model - Iterative Waterfall Model - Prototyping Model-Evolutionary Model - Spiral Model - Comparison of Different Life Cycle Models															
UNIT – II															
Software Project Management: Project Planning-Metrics for Project, Size Estimation, Project Estimation Techniques Empirical Estimation Techniques COCOMO A Heuristic Estimation Technique Staffing Level Estimation: Putnam's Work Effect of Schedule Change on Cost Scheduling. Requirements Analysis And Specification: Requirements Gathering and Analysis Software Requirements Specification (SRS) - Executable Specification and 4GL															
UNIT – III															
Software Design: Outcome of a Design Process – Characterization of a Good Software Design.- Cohesion and Coupling - Layered Arrangement of Modules - Approaches to Software Design – Object Oriented versus Function Oriented Design Approaches. Function-Oriented Software Design:Overview of SA/SD Methodology-Structured Analysis- Data Flow Diagrams (DFDs)-Structured Design-Detailed Design- Design Review.															
UNIT – IV															
Object Modeling Using UML: Unified Modeling Language (UML) UML Diagrams - Class Diagrams - Interaction Diagrams - Activity Diagrams - State Chart Diagram- Postscript: Package and Deployment Diagrams. User Interface Design - Characteristics of a Good User Interface - Basic Concepts - Types of User Interfaces- Fundamentals of Component-based GUID - Development A User Interface Design Methodology															
UNIT – V															
Coding And Testing Coding - Code Review - Software Documentation Testing- Testing in the Large versus Testing in the Small - Unit Testing - Black-Box Testing - White-Box Testing - Debugging - Program Analysis Tools - Integration Testing - Testing Object-Oriented Programs - System Testing - Some General Issues Associated with Testing.															
Total contact Hours: 45	Total Tutorials: 15	Total Practical Classes: -		Total Hours: 60											
Text Books:															
1. 1. Rajib Mall, Fundamentals of Software Engineering, PHI, Third Edition, 2009.															
Reference Books:															
1. Roger S Pressman, Software Engineering - A Practitioner's approach, McGraw Hill, Seventh Edition,2010. 2. PankajJalote, An Integrated Approach to Software Engineering, Narosa Publishing House, Third Edition, 2011.															
Websites :															
1. http://nptel.ac.in/courses/106101061/ 2. http://nptel.ac.in/courses/Webcoursecontents/IIT%20Kharagpur/Soft%20Engg/New_index1.html															

Department : Computer Science and Engineering		Programme : Master of Computer Application								
Semester : Four		Category : LB								
Subject Code	Subject	Hours / Week			Credit	Maximum Marks				
		L	T	P	C	CA	SE	TM		
CA172	Web Technologies Laboratory	-	-	3	2	60	40	100		
Prerequisite	-									
Objectives	<ul style="list-style-type: none"> • To learn the evolution of web and its associated technologies. • To get familiarity on Client side and server side scripting. • To provide hands on experience on building web application. 									
Outcomes	On successful completion of the course, students will be able to: <ul style="list-style-type: none"> • Design and develop web applications. • Incorporate recent technologies such as Ajax and web services for developing e-commerce applications. 									
Cycle - I	HTML, CSS Client Side Scripting						Hours: 21			
	1. Creation of HTML Files 2. Working with Cascading Style Sheets and DOM 3. Working with Client Side Scripting <ul style="list-style-type: none"> a. VBScript b. JavaScript 4. Experiments in Java Servlets <ul style="list-style-type: none"> a. Establishing Data Base Access Programming b. Session and Application objects 									
Cycle - II	Servlets and JSP						Hours: 24			
	1. Working with other Server Side Scripting. <ul style="list-style-type: none"> a. Java Server Pages b. PHP 2. Developing Web Applications using XML. 3. Developing Web Services. 4. Experiments in Ajax Programming. 5. Developing any E-commerce application using JSP (Mini Project)									
Total contact Hours: -	Total Tutorials: -	Total Practical Classes: 45			Total Hours: 45					

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : Four		Category : LB													
Subject Code	Subject			Hours / Week		Credit	Maximum Marks								
		L	T	P	C	CA	SE	TM							
CA173	CASE Tools Laboratory	-	-	3	2	60	40	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> • To understand the software engineering methodologies for project development. • To gain knowledge about open source tools for Computer Aided Software Engineering. • To develop an efficient software using case tools 														
Outcomes	<p>Upon Completion of the course, the students should be able to:</p> <ul style="list-style-type: none"> • Prepare an SRS for the Sample project. • Draw following model diagrams : Use Case and Activity Diagrams Sequence, Collaboration and Class Diagram using CASE Tools • Perform Code coverage testing, memory leaks and other tests using CASEtools 							Hours: 45							
SOFTWARE REQUIRED: Open source Tools:StarUML / UMLGraph / Topcased Prepare the following documents for each experiment and develop the software using software engineering methodology.															
1. Problem Analysis and Project Planning -Thorough study of the problem – Identify Project scope - Objectives and Infrastructure 2. Modeling - Use work products – data dictionary - use case diagrams and activity diagrams - build and test class diagrams - sequence diagrams and add interface to class diagrams. 3. Software Development and Debugging – implement the design by coding 4. Software Testing - Prepare test plan - perform validation testing - coverage analysis - memory leaks - develop test case hierarchy - Site check and site monitor.															
Sample Experiments															
Academic Domain															
1. Online objective type test examination system 2. Course Registration System under Autonomous System															
Transport domain															
3. Online ticket reservation system for PTDC Buses 4. GPS based bus monitoring system															
Finance domain															
5. ATM system 6. Share buying and Selling software															
Human Resource Management															
7. E-mail Client system 8. Staff scheduling System in a project															
Total contact Hours: -	Total Tutorials: -	Total Practical Classes: 45				Total Hours: 45									

Department : Computer Science and Engineering		Programme : Master of Computer Application															
Semester : Five		Category : TY															
Subject Code	Subject	Hours / Week			Credit	Maximum Marks											
		L	T	P	C	CA	SE	TM									
CA174	Mobile Computing	3	1	-	4	40	60	100									
Prerequisite	Computer Networks																
Objectives	<ul style="list-style-type: none"> To introduce the basic concepts of mobile communications. To understand the wireless protocols, network layer and transport layer functionalities. Understand concepts of ad hoc and sensor networks. To impart the knowledge about mobile application development using android. 																
Outcomes	<ul style="list-style-type: none"> Develop a clear understanding of mobile network standards. Understand clearly challenges and solutions of wireless communications. Able to develop android based applications. 																
UNIT – I	Wireless Communications overview						Hours: 09										
Frequencies Spectrum – Multiplexing-Spread spectrum-GSM vs CDMA-2G Mobile Wireless Services-Comparison of 2G and 3 G-GSM Architecture – Entities-Call Routing – PLMN-Address and identifiers-Network Aspects-Mobility Management – Frequency Allocation-Authentication and Security – SMS Architecture-Value Added Service through SMS – GPRS-GPRS and Packet Data Network – Architecture-Network Operations – Data Service – Application.																	
UNIT – II	Mobile Short Range Networks						Hours: 09										
Introduction- WLAN Equipment -WLAN Topologies-WLAN Technologies-IEEE 802.11Architecture-WLAN MAC-Security of WLAN, Power Management – Standards – WAPArchitecture-WAP 2.0 – Bluetooth enabled Devices Network-Layers in Bluetooth Protocol-Security in Bluetooth – IrDA – ZigBee.																	
UNIT – III	Mobile Network and Transport Layer						Hours: 09										
IP and Mobile IP Network Layer-Packet delivery and Handover Management – Location Management – Registration-Tunneling and Encapsulation-Route Optimization – Dynamic Host Configuration Protocol–VoIP – Ipsec-Mobile Transport Layer – Conventional TCP/IP Transport Layer Protocol Indirect, Snooping, Mobile TCP.																	
UNIT – IV	Mobile Ad Hoc and Sensor Networks						Hours: 09										
Introduction to Mobile Ad hoc Network – MANET-Routing and Routing Algorithm – Security–Wireless Sensor Networks – Applications-Distributed Network and Characteristics-Communication Coverage-Sensing Coverage – Localization – Routing – Function Computation – Scheduling.																	
UNIT – V	Mobile Application Development						Hours: 09										
Mobile Applications Development-Application Development Overflow-Techniques forComposing Applications-Understanding the Android Software Stack–Android Application Architecture–Developing for Android –The Android Application Life Cycle–The Activity Life Cycle–Creating Your First Android Activity–Creating Applications and Activities–Creating User Interfaces–Intents–Broadcast Receivers–Adapters–Data Storage, Retrieval, and Sharing.-Geo services – creating mobile applications like game, Clock, calendar, Convertor, phone book, Text Editor.																	
Total contact Hours: 45		Total Tutorials:15		Total Practical Classes: -		Total Hours: 45											
Text Books:																	
1. Asoke K Talukder, HasanAhmed,Roopa R Yavagal, Mobile Computing, 2 nd edition, TataMcGraw Hill,2010.																	
Reference Books:																	
1. Raj Kamal, Mobile Computing, Oxford Higher Education, 2 nd edition 2012. 2. DonnFelker, Android Application Development For Dummies,Wiley,2 nd edition, 2010 3. Ed Burnette, Hello, Android: Introducing Google's Mobile Development Platform, 2 nd edition, Pragmatic Programmers,2012. 4. Jerome J.F. DiMarzio, Android A programmer's Guide, 2 st edition, Tata McGraw–Hill, 2010.																	
Websites :																	
1. http://www.vogella.com/tutorials/android.html																	

Department : Computer Science and Engineering		Programme : Master of Computer Application												
Semester : Five		Category : TY												
Subject Code	Subject	Hours / Week			Credit	Maximum Marks								
		L	T	P	C	CA	SE	TM						
CA175	Management Concepts and Strategies	4	-	-	4	40	60	100						
Prerequisite	-													
Objectives	<ul style="list-style-type: none"> • To understand the different aspects of management • To have the knowledge of general management principles • To understand the challenges in managing organization and people • To understand the need to control and monitor operations with suitable methods 													
Outcomes	<p>On successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> • Realize the need for management • Plan strategies and policies for organizations • Perform of the role human resource manager • Monitor and Implement changes in operations for improving efficiency 													
UNIT – I	Planning							Hours: 09						
Management: Science Theory and Practice - Management and Society: Social responsibility and Ethics. The nature and purpose of planning - objectives - Strategies Policies and planning premises.														
UNIT – II	Organizing							Hours: 09						
Decision making - The Nature and purpose of organizing - Basic departmentation - Line / staff Authority and decentralization - Effective Organizing and organizational culture.														
UNIT – III	Staffing							Hours: 09						
Human Resource Management and selection - Performance appraisal and career strategy - Manager and organizational development.														
UNIT – IV	Leading							Hours: 09						
Managing and the Human factor - Motivation - Leadership - communication.														
UNIT – V	Controlling							Hours: 09						
Total contact Hours: 45		Total Tutorials: 15	Total Practical Classes:			Total Hours: 60								
Text Books:														
<ol style="list-style-type: none"> 1. Herald Knootz and Heinz Weihrich, Essentials of Management, McGraw-Hill Publishing Company, Singapore International Edition, 2000. 2. Ties AF, Stoner and R.Edward Freeman, Management, PrenticeHall of India Pvt., Ltd., 2003. 3. Joseph I, Massie, Essentials of Management, Prentice Hall of India Pvt., Ltd., 2002. 														
Reference Books:														
<ol style="list-style-type: none"> 1. Stephen P. Robbins, David A. De Cenzo, Mary Coulter, Fundamentals of Management: Essential Concepts and Applications, Pearson Education, 2014. 2. Andrew J. DuBrin, Principles of Management, South Western, Ninth Edition, 2012. 3. Stephen P. Robbins, Essentials of Management, Pearson Education; Sixth edition, 2010. 														
Websites:														
<ol style="list-style-type: none"> 1. http://wps.pearsoned.ca/ca_ph_robbins_fom_5/65/16653/4263415.cw/-/t/index.html 2. http://college.cengage.com/business/griffin/fundamentals/3e/students/readynotes/ 3. https://www.studyblue.com/notes/b/fundamentals-of-management/10852/0 4. http://www.saylor.org/site/textbooks/Principles%20of%20Management.pdf 														

Department : Computer Science and Engineering		Programme : Master of Computer Application						
Semester : Five		Category : LB						
Subject Code	Subject	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CA176	Mobile Application Development Laboratory	-	-	3	2	60	40	100
Prerequisite	-							
Objectives	<p>The student should be made to:</p> <ul style="list-style-type: none"> • Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles. • Understand how to work with various mobile application development frameworks. • Learn the basic and important design concepts and issues of development of mobile applications. 							
Outcome	<p>On successful completion of this course</p> <ul style="list-style-type: none"> • The student should be able to: Design and Implement various mobile applications using emulators. • Deploy applications to hand-held devices 							
Cycle -I								Hours: 18
	<ol style="list-style-type: none"> 1. Develop an application that uses GUI components, Font and Colours 2. Develop an application that uses Layout Managers and event listeners. 3. Develop a native calculator application. 4. Write an application that draws basic graphical primitives on the screen. 5. Develop an application that makes use of database. 6. Develop an application that makes use of RSS Feed. 							
Cycle - II								Hours: 27
	<ol style="list-style-type: none"> 1. Implement an application that implements Multi threading 2. Develop a native application that uses GPS location information. 3. Implement an application that writes data to the SD card. 4. Implement an application that creates an alert upon receiving a message. 5. Write a mobile application that creates alarm clock 							
Total contact Hours: -	Total Tutorials: -	Total Practical Classes: 45				Total Hours: 45		

Department : Computer Science and Engineering		Programme : Master of Computer Application						
Semester : Five		Category : LB						
Subject Code	Subject	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CA	SE	TM
CA177	Mini Project	-	-	3	2	60	40	100
Prerequisite	-							
Objectives	<ul style="list-style-type: none"> • The objective of the mini project is to make the students to apply theoretical and practical tools/techniques to solve real life problems related to industry and academic institutions. 							
Outcomes	<p>After the completion of this project work the student should be able to:</p> <ul style="list-style-type: none"> • Describe the Systems Development Life Cycle (SDLC). • Determine how to collect information to determine requirements and to design SRS • Generate reports • To decide the future scope and further enhancement of the system 							
The students are expected to develop application oriented small scale projects, through which students explore their technical skills. The students shall carry out the project assigned to them and submit a report at the end of the semester for continuous assessment.								
Total Contact Hours: -	Total Tutorials: -	Total Practical Classes: 45				Total Hours: 45		

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester : Five		Category : PR													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CA178	Comprehensive Test and Viva - Voce	-	-	3	1	60	40	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> ● To refresh the subjects studied. ● To face the placement tests conducted for the campus recruitment with a sound fundamental knowledge. 														
Outcomes	<ul style="list-style-type: none"> ● Take up competitive exams for higher studies. ● Able to confidently appear placement interviews. 														
The students are provided with tutorial sessions to update and refresh their knowledge in all courses they have studied from the 1 rd to 5 th semester. Two comprehensive tests, preferably with objective type questions from above courses will be conducted. A comprehensive viva voce examination (external) will be conducted.															
Total Contact Hours: -	Total Tutorials: -	Total Practical Classes: 45			Total Hours: 45										
Text Books:															
1. Test Books prescribed for the courses in the respective syllabus from I to V semester.															

Department : Computer Science and Engineering		Programme : Master of Computer Application						
Semester : Six		Category : PR						
Subject Code	Subject	Hours / Week		Credit	Maximum Marks			
		L	T	P	C	CA	SE	TM
CA179	Project Work	-	-	-	10	150	150	100
Prerequisite	-							
Objectives	<ul style="list-style-type: none"> • To expose the students with project-product development cycle using state-of-art technologies. • To understand the Product Development Cycle • To plan for various activities of the project. • To acquire in depth working knowledge in the chosen area of problem 							
Outcomes	<ul style="list-style-type: none"> • Acquire knowledge and skills needed for the construction of software project namely, design, development, testing and documentation phases • Enhance the technical presentation skills. 							
Project Work	<ol style="list-style-type: none"> 1. Select a Real time Application/ Industrial problem. 2. Perform a feasibility study. 3. Study the limitations of the Existing System. 4. Define the Problem Statement and Objectives. 5. Detailed Design of the Proposed Solution. 6. Finalize the Experimental Environment. 7. Implementation of the Proposed Solution. 8. Document the results in the Project Report. 							
Total contact Hours: -	Total Tutorials: -	Total Practical Classes: -				Total Hours: -		

SYLLABUS (Elective Subjects)

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester :-		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CAE51	Object Oriented Analysis and Design	3	-	-	3	40	60	100							
Prerequisite															
Objectives	<ul style="list-style-type: none"> • To understand the object oriented life cycle. • To know how to identify objects, relationships, services and attributes through UML. • To understand the use-case diagrams. • To know the Object Oriented Design process. • To know about software quality and usability. 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Differentiate object oriented analysis design from structured design. • Design a software development process up to industry standard. 														
UNIT – I	Introduction							Hours: 09							
The Rational Unified Process (RUP) – The Unified Modeling Language (UML) – UML models – Introduction to the case study – Requirements for the wheels case study system – Requirement engineering – Requirements elicitation – List of requirements for the Wheels system use case – Use case diagram – Use case descriptions – Actor and actor descriptions – Use case relationship: Communication association, include and extend boundary using the use case model in system development.															
UNIT – II	Objects and Classes							Hours:09							
Basics Object classes Relationships between classes - The class diagram Stages in building a class diagram - Packages -Using the class diagram in system development.															
UNIT – III	Identifying functionality							Hours: 09							
Introduction CRC cards and interaction diagrams - Identifying operations using the CRC card technique - Interaction diagrams Specifying operations - Using the CRC cards and interaction diagrams in system development - State Diagrams - States and events Constructing a state diagram - Using state diagrams in system development.															
UNIT – IV	Activity Diagrams							Hours: 09							
Introduction - Modeling a sequence of activities - Modeling alternative courses of action - modeling iteration of activities- Modeling activities that are carried out in parallel -Swim lanes Design Architecture Implementation diagrams -The user interface Dealing with persistent data.															
UNIT – V	Designing Objects and Classes							Hours: 09							
Introduction - class diagram - Interaction diagrams.Implementation of class diagram - Sequence diagram. Case Study Library Information System, Student Information System.															
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes: -			Total Hours: 45										
Text Books:															
<ol style="list-style-type: none"> 1. Ivar Jacobson, Grady Booch, James Rumbaugh, The Unified Software Development Process, Second Edition, Pearson Education, 2005. 2. Micheal Blaha, James Rumbaugh, Object-Oriented Modeling and Design with UML, Second Edition, Prentice Hall of India Private Limited, 2007 															
Reference Books:															
<ol style="list-style-type: none"> 1. Martin Fowler, UML Distilled, Second Edition, PHI/Pearson Education, 2002. 2. Mahesh P. Matha, Object Oriented Analysis and Design using UML, Second Edition, Prentice- Hall of India,2008. 															
Websites:															
<ol style="list-style-type: none"> 1. http://www.uml-diagrams.org/uml-object-oriented-concepts.html 2. http://www.modelingstyle.info/activityDiagram.html 															

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Semester :-		Category : TY															
Subject Code	Subject	Hours / Week			Credit	Maximum Marks											
		L	T	P	C	CA	SE	TM									
CAE52	System Software	3	-	-	3	40	60	100									
Prerequisite																	
Objectives	<ul style="list-style-type: none"> To design assemblers, loaders, linkers To understand system software support program execution To understand the data structures required to implement assemblers, loaders and linkers 																
Outcomes	<ul style="list-style-type: none"> To realize how assembling and linking of programs are carried out To compare and appreciate how translation could be improved by efficiently through good programming style 																
UNIT – I	Machine Architecture and Introduction to Assembler						Hours: 09										
Introduction, System Software and Machine Architecture, Simplified Instructional Computer (SIC) - SIC Machine Architecture, SIC/XE Machine Architecture. Basic Assembler Function - A Simple SIC Assembler, Assembler Algorithm and Data Structures, Machine Dependent Assembler Features - Instruction Formats & Addressing Modes, Program Relocation.																	
UNIT – II	Assembler and Macroprocessor						Hours: 09										
Machine Independent Assembler Features – Literals, Symbol-Definition Statements, Expression, Program Blocks, Control Sections and Programming Linking. Basic Macro Processor Functions - Macro Definitions and Expansion, Macroprocessor Algorithm and Data Structures, Machine-Independent Macro Processor Features - Concatenation of Macro Parameters, Generation of Unique Labels, Conditional Macro Expansion																	
UNIT – III	Loaders and Linkers						Hours: 09										
Basic Loader Functions - Design of an Absolute Loader, A Simple Bootstrap Loader, Machine-Dependent Loader Features – Relocation, Program Linking, Algorithm and Data Structures for a Linking Loader; Machine-Independent Loader Features - Automatic Library Search Loader Options, Loader Design Options - Linkage Editor, Dynamic Linkage, Bootstrap Loaders																	
UNIT – IV	Compilers						Hours: 09										
Basic compiler functions – Grammar, Lexical Analysis, Syntactic analysis, Code generation – Machine dependent compiler features – Intermediate form of the programs, Machine dependent code optimization – Machine independent features – structured variables, code optimization, storage allocation, block structured languages																	
UNIT – V	Editors and Debugging Systems						Hours: 09										
Text Editors - Overview of Editing Process, User Interface, Editor Structure, Interactive Debugging Systems - Debugging Functions and Capabilities, Relationship With Other Parts Of The System, User-Interface Criteria																	
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes: -			Total Hours: 45												
Text Books:																	
1. Leland.L.Beck, System Software, Third Edition, Pearson Education, 2012																	
Reference Books:																	
1. D. M. Dhamdhere, Operating Systems: A Concept-based Approach, Second Edition, Tata McGraw-Hill, 2006.																	
Websites :																	
1. http://www.tldp.org/LDP/LGNET/issue53/boldyshev.html for Unix assembly language programming																	
2. http://www.oopweb.com/Assembly/Documents/Win32ASM/Volume/win32asm.htm for Win32 Programming for x86 Assembly Language Programmers																	

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Semester :-		Category : TY													
Subject Code	Subject	Hours / Week				Credit	Maximum Marks								
		L	T	P	C	CA	SE	TM							
CAE53	Information Security	3	-	-	3	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> • To introduce the need for information security in the computer-driven world. • To introduce the security techniques for the protection of information system • To familiarize the concepts of security planning, Laws and Risk management strategies. 														
Outcomes	<p>On successful completion of the course, the students will be able to:</p> <ul style="list-style-type: none"> • Identify the need for information security and the various threats and attacks against the CIA triad of information security. • Identify the various types of security controls available to protect the information infrastructure. • Perform effective information security risk management. 														
UNIT – I	Introduction							Hours: 09							
Key Information Security concepts, Components of an Information System, The Three Pillars of Information Security, Threats, Attacks, Approaches to Information Security Implementation.															
UNIT – II	Planning for Security							Hours: 09							
Information Security Planning and Governance, Information Security Policy Standards, and Practices, The Information Security Blueprint, Security Education, Training, and Awareness program, Continuity Strategies.															
UNIT – III	Security Technology							Hours: 09							
Cryptography, Access Controls, Scanning and Analysis Tools, Firewalls and VPNs, Intrusion Detection and Prevention Systems, Honey pots, Physical Security.															
UNIT – IV	Risk Management							Hours: 09							
Overview, Risk identification, Risk Assessment, Risk Control Strategies, Quantitative vs. Qualitative Risk Control Practices.															
UNIT – V	Implementing Information Security							Hours: 09							
Information Security Project Management, Security and Personnel, Information Security Maintenance, Legal, Ethical and Privacy Issues.															
Total contact Hours: 45	Total Tutorials:	Total Practical Classes:				Total Hours: 45									
Text Books:															
<ol style="list-style-type: none"> 1. Michael E. Whitman, Herbert J. Mattord, Principles of Information Security, Fourth Edition, Cengage Learning, 2011. 2. Mark Stamp, Information Security: Principles and Practice, 2nd Edition, Wiley-Blackwell, 2011. 															
Reference Books:															
<ol style="list-style-type: none"> 1. Mark S. Merkow and Jim Breithaupt ,Information Security: Principles and Practices, SecondEdition, Pearson 2014. 															
Websites:															
<ol style="list-style-type: none"> 1. http://freecomputerbooks.com/compsc specialSecurityBooks.html 2. http://iiscs.wssu.edu/drupal/node/2991 															

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Semester :-		Category : TY															
Subject Code	Subject			Hours / Week		Credit		Maximum Marks									
		L	T	P	C	CA	SE	TM									
CAE54	Cloud Computing	3	-	-	3	40	60	100									
Prerequisite	-																
Objectives	<ul style="list-style-type: none"> To understand the concept of virtualization, set up a private cloud To learn and apply different cloud programming model as per need To learn the design and implementation of cloud services. 																
Outcomes	<ul style="list-style-type: none"> Understand the cloud computing architectures and models Apply suitable virtualization concept, choose the appropriate cloud service provider, programming models and setup a private cloud 																
UNIT – I	Cloud Computing Architecture and Model						Hours: 09										
Technologies for Network-Based System – System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture. Cloud Models:- Characteristics – Cloud Services – Cloud models (IaaS, PaaS, SaaS) – Public vs Private Cloud –Cloud Solutions - Cloud ecosystem – Service management – Computing on demand																	
UNIT – II	Virtual Machine						Hours: 09										
Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource management – Virtualization for Data-center Automation																	
UNIT – III	Cloud Infrastructure						Hours: 09										
Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources																	
UNIT – IV	Programming Model and SLA Management						Hours: 09										
Hadoop and MapReduce – Cloud Application Design – SLA Management in Cloud Computing : A Service provider's Perspective - Big data Analytics																	
UNIT – V	Cloud Security						Hours: 09										
Security Overview – Cloud Security Challenges and Risks – Software-as-a-Service Security – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Data Security – Application Security – Virtual Machine Security - Identity Management and Access Control – Autonomic Security																	
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes: -			Total Hours: 45												
Text Books:																	
<ol style="list-style-type: none"> Kai Hwang, Geoffrey C Fox, Jack G Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann Publishers, 2012. RajkumarBuyya, James Broberg, AndrzejGoscinski, Cloud Computing Principles and Paradigms, Wiley Publications, 2014 																	
Reference Books:																	
<ol style="list-style-type: none"> ArshdeepBahga, Vijay Madisetti, Cloud Computing, University Press, 2014. Anthony T.Velte , Toby J. Velte Robert Elsenpeter, Cloud computing a Practical Approach, TMH, 2010. 																	
Websites :																	
<ol style="list-style-type: none"> http://nptel.ac.in http://india.emc.com 																	

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Semester :-		Category : TY													
Subject Code	Subject	Hours / Week		Credit	Maximum Marks										
		L	T	P	C	CA	SE	TM							
CAE55	Hardware and Troubleshooting	3	-	-	3	40	60	100							
Prerequisite															
Objectives	<ul style="list-style-type: none"> To study the fundamentals of PC hardware and Peripherals. To understand the working principles of hardware devices and components. To understand the system resources and their uses. To bridge the gap between the theoretical study of Computer Organization and the practical study of the hardware components in use. To practice the troubleshooting of hardware and network bugs in real life. 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> Map the theoretical concepts of Computer Organization and Microprocessors to the real-life Personal Computer organization. Interface the PC to the real-time application entities of their own engineering discipline. Troubleshoot any kind of systems and fix networking bugs in practice. 														
UNIT – I															
Personal Computer: Introduction – System Components - Data flow inside the PC – Mother board components– Processor types– Supporting Chip sets –SMPS – Power specifications - Connectors – Switches – RTC/NVRAM batteries -CMOS setup –I/O slots – Assembling a complete system.								Hours: 09							
UNIT – II															
Bus standards: ISA – PCI - Signals and Timing – AGP –MCA – System Resources: – Interrupts – DMA channels – I/O Port addresses. RAM types and performance –DRAM – EDO RAM – SDRAM – DDRx RAM – RDRAM –Identifying Memory modules – System memory map.								Hours: 09							
UNIT – III															
Secondary Storage: Magnetic Storage: Data Encoding Schemes –RLL and MFM - Hard disk drive – SATA.RAMdisk, USB Flash disks. Optical Storage - CD, DVD, BD – Disk formats - Optical Drive Performance specifications - Troubleshooting memory problems.Input and Output Devices: Keyboard – Signals and Interface standards – Pointing devices: Mouse - mechanical and optical – Joystick.								Hours: 09							
UNIT – IV															
Video hardware:Video Display Adaptors – Interface standards – 3D graphics accelerators – LCD and LED monitors - Printers: dot matrix – laser jet - ink jet – Pen plotters – BIOS and DOS Interrupt services for I/O devices – Troubleshooting I/O related problems. External I/O Interfaces: Serial versus Parallel - USB - Low speed connections: RS232C and Parallel port: SPP, EPP, ECP. Interfacing switches, LEDs, relays using parallel and USB ports.Network:Network Interface Cards – Configuring Switches/Access Points – Wireless Ethernet hardware – Bluetooth connectivity.								Hours: 09							
UNIT – V															
PC Diagnostics, Testing & Maintenance: POST – Boot process – Maintenance tools – Preventive Maintenance.Network Troubleshooting: Protocol analyzers, Cable testers, Network management applications, Flow control testers.								Hours: 09							
Total contact Hours: 45	Total Tutorials:- -	Total Practical Classes: -			Total Hours: 45										
Text Books:															
<ol style="list-style-type: none"> Scott Mueller, Upgrading and Repairing PCs, Pearson Education, Twenty First Edition, 2013. Hans Peter Messmer, The Indispensable PC Hardware Book, Addison-Wesley, Fourth Edition, 2001. Neal Allen, Network Maintenance and Troubleshooting Guide: Field Tested Solutions for Everyday Problems, Pearson Education, 2010. 															
Reference Books:															
<ol style="list-style-type: none"> Scott Mueller, Upgrading and Repairing Laptops, Pearson Education, Third Edition, 2012. Frank van Gilluve, The undocumented PC: A Programmer's Guide to I/O, CPUs, and Fixed Memory Areas Pearson Education, Second Edition, 2002. Jan Alexon, USB complete: A Developers' Guide, Penram International Publishing (India), Fourth Edition, 2011. 															

Websites:

1. <http://forum.scottmueller.com>
2. <http://pcsupport.about.com>
3. <http://www.bioscentral.com>

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Semester :-		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CAE56	Accounting and Financial Management	3	-	-	3	40	60	100							
Prerequisite															
Objectives	<ul style="list-style-type: none"> To introduce the basics terminologies and concepts of economics. To educate more analysis methods related economics. To impart the role of managers and various management concepts in organizations. 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> Understand the basics of concepts, principles and practical applications of Economics, which govern the functioning of a firm/organization under different market conditions Have the ability to understand the fundamental concepts and principles of management; the basic roles, skills, functions of management and various organizational structures 														
UNIT – I															
Introduction to Management: Definition, Principles, Nature and Scope – Role and function of Managers – Levels of Management – Manager vs Leader – Functions of Management (Planning, Organizing, Staffing, Directing and Controlling) – Types of Management (Finance, Marketing, Human Resource, Production)								Hours: 09							
UNIT – II															
Introduction to Economics:Nature and Scope of Economics – Micro and Macro Economics – Theory of Demand and Supply: Definitions – Determinants - Laws – Elasticity – Equilibrium. Elements of costs: Fixed cost, variable cost, Average cost, marginal cost, opportunity cost; standard cost; Break Even Analysis, Nature and Functions of Money, National Income (GNP, GDP, NNP, NDP),Inflation and Deflation.								Hours: 09							
UNIT – III															
Financial Management: Scope and Functions - Sources of Finance – Types of accounting (Double Entry system, Journal, Ledger, Trial Balance, Balance Sheet, Profit-Loss Statement). Depreciation: Meaning – Methods of Depreciation (Straight line method, Declining Balance Method, Sum of the Years Digits Method, Sinking Fund Method).								Hours: 09							
UNIT – VI															
Cost Management: Objectives – Determinants of cost – Methods of costing. Marginal Costing: Nature, scope and Importance, Break Even - Analysis, Uses and its Limitations.								Hours: 09							
UNIT – V															
Financial statement: Ratio Analysis – Introduction, Purpose, Types of Ratio (solvency ratio, profitability ratio, activity ratio, liquidity ratio). Budgeting: Budgets – Definition, Nature and Scope, Importance, Types of Budgets - budgetary control, preparation of budgets, master budget, fixed and flexible budgeting.								Hours: 09							
Total contact Hours: 45	Total Tutorials:-	Total Practical Classes: -				Total Hours: 45									
Text Books:															
<ol style="list-style-type: none"> R. Pannerselvam, Engineering Economic, Prentice Hall of India Pvt. Ltd, 2012. Sp. Jain and kl. Narang, Financial Accounting, Sultan and Chand Co, 2002. P.C. Tripathi and P.N. Reddy, Principles of Management - Tata McGraw-Hill, 2008. 															
Reference Books:															
<ol style="list-style-type: none"> Mote Paul, Gupta, Managerial Economics, Tata McGraw Hill, 1987. Joseph Massie L, Essentials of Management,Third Edition PHI 1995. Paul A Samuelson, Economics, Tata McGraw Hill, 1987. 															
Websites: -															

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Semester :-		Category : TY												
Subject Code	Subject	Hours / Week			Credit	Maximum Marks								
		L	T	P	C	CA	SE	TM						
CAE57	Resource Management Techniques	3	-	-	3	40	60	100						
Prerequisite	-													
Objectives	<ul style="list-style-type: none"> • To understand the basics of operations research • To have the knowledge of mathematical aspects of resource management • To understand the challenges indecision making • To understand the issues in scheduling 													
Outcomes	<p>On successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> • Implement strategies for resource management and scheduling • Understand risks and uncertainty in decision making • Adopt job scheduling principles in production • Manage Inventory 													
UNIT – I	Transportation Problem							Hours: 09						
Introduction - Mathematical model – types – methods - transshipment model - modeling of quantity discounts.														
UNIT – II	Inventory Control							Hours: 09						
Introduction-models of inventory – operations – discount-purchase inventory model-shortest limitation-purchase model-EOQ model-determination of stock level.														
UNIT – III	Production Scheduling							Hours: 09						
Introduction- single machine scheduling - flow shop scheduling - job shop scheduling.														
UNIT – IV	Decision Theory							Hours: 09						
Introduction - certainty – risk – uncertainty - Decision tree Project management: introduction – phases – CPM – CRM - Gantt Chart – PERT - crashing of project work - constrained resources.														
UNIT – V	Queuing Theory							Hours: 09						
Introduction – terminologies-empirical queuing models-simulation.														
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes: -	Total Hours: 45											
Text Books:														
<ol style="list-style-type: none"> 1. R.Paneerselvam, Operation Research, Prentice-Hall of India Pvt. Ltd., Second edition, 2006. 2. J K Sharma, Operations Research: Theory and Application, MACIN, Fifth Edition, 2012. 														
Reference Books:														
<ol style="list-style-type: none"> 1. H.A. Taha, Operation Research: An Introduction, Prentice-Hall of India Pvt. Ltd., Eighth edition, 2007. 2. Frederick K. Hiller, Bodhibrata Nag, PreetamBasu, Introduction to Operations Research, McGraw Hill Education (India) Private Limited, Ninth Edition, 2011. 														
Websites:														
<ol style="list-style-type: none"> 1. http://people.brunel.ac.uk/~mastjjb/jeb/or/contents.html 2. http://www.slideshare.net/hemanthcrpatna/operations-research-6215649 3. http://www.cs.toronto.edu/~stacho/public/IEOR4004-notes1.pdf 														

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Semester :-		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CAE58	Agent Technologies	3	-	-	3	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> To understand the concept of agents and multi-agent systems and the main applications for which they are appropriate To know the typical applications for agent technology To understand deductive reasoning agents, practical reasoning agents, reactive and hybrid agents 														
Outcomes	<p>On successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> Have knowledge on an intelligent software agent and its characteristics Describe multi-agent learning, and mobile agent characteristics and applications Design multi-agent system by using knowledge representation technique, and agent communication and coordination mechanisms 														
UNIT – I															
Introduction- Intelligent Agents:Agents and Objects – Agents and Expert Systems – Agents as Intentional Systems – Architectures for Intelligent Agents – How to Tell an Agent What to Do – Deductive Reasoning Agents: Agents as Theorem Provers–Agent-Oriented Programming – Concurrent MetateM.								Hours: 09							
UNIT – II															
Practical Reasoning Agents: Practical Reasoning Equals Deliberation Plus Means-Ends Reasoning – Means-Ends Reasoning – Implementing a Practical Reasoning Agent -Homer – Procedural Reasoning System – Reactive and Hybrid Agents: Reactive Agents – Subsumption Architecture – Limitations – Hybrid Agents.								Hours: 09							
UNIT – III															
Multiagent Interactions: Utilities and Preferences – Dominant Strategies and Nash Equilibria – Competitive and Zero-Sum Interactions – The Prisoner’s Dilemma –Dependence Relations in Multiagent Systems – Agent coordination– Agent cooperation – Agent organization – Auctions:Classifying Auctions – Auctions for Single Items – Combinatorial Auctions – Auctions in Practice – Negotiation: – Negotiation Parameters– Resource Division – Task Allocation – Resource Allocation – Argumentation: Types of Argument – Deductive Argumentation Systems – Dialogue Systems.								Hours: 09							
UNIT – IV															
Communication: Speech Acts – Agent Communication Languages – Cooperative Distributed Problem Solving: Task Sharing and Result Sharing-Combining – Handling Inconsistency – Coordination – Multiagent planning and Synchronization.								Hours: 09							
UNIT – V															
Methodologies: Agent-Oriented Analysis and Design Techniques – Pitfalls of Agent Development – Mobile Agents. Applications of Agents.								Hours: 09							
Total contact Hours: 45	Total Tutorials:	Total Practical Classes:			Total Hours: 45										
Text Books:															
<ol style="list-style-type: none"> Michael Wooldridge, An Introduction to Multiagent Systems, Second Edition, John Wiley & Sons Ltd. 2009. Jeffrey M. Bradshaw, Software Agents, Second edition, MIT Press, 2000. 															
Reference Books:															
<ol style="list-style-type: none"> Gerhard Weiss, Multi-agent Systems A Modern Approach to Distributed Artificial Intelligence,First edition, MIT Press, 2000. WeimingShen, Douglas H. Norrieand J-P. Barthes,Multi-Agent Systems for Concurrent Intelligent Design and Manufacturing, First edition, CRC Press, 2000. Nicholas R. Jennings, Michael Wooldridge, Agent Technology: Foundations, Applications and markets, Springer Verlag Publishing, 1998. 															
Websites:															
<ol style="list-style-type: none"> http://www.masfoundations.org/multiagent.com/p/fundamentals-of-multiagent-systems.html http://www.agentbuilder.com/AgentTechnology/index.html 															

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Semester :-		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CAE59	UNIX Internals	3	-	-	3	40	60	100							
Prerequisite															
Objectives	<ul style="list-style-type: none"> To learn UNIX environment, UNIX shells and Important utilities in UNIX To gain knowledge about Networking Utilities, System programming system calls, files, processes, sockets and pipes and memory management. 														
Outcomes	<p>On successful completion of the module students will be able to:</p> <ul style="list-style-type: none"> Design the necessary file system based on the requirement Write system level programs such as file recover, process interaction etc. Design a proper communication among the various processes in a multi process system. 														
UNIT – I	Introduction to the Kernel and File sub-system							Hours: 09							
Architecture of the UNIX operating system – Introduction to the system concepts – Kernel Data Structures; The Buffer Cache: Buffer Headers – Structure – Retrieval of a buffer – Reading and writing disk blocks – Advantages and Disadvantages; Internal Representation of Files: Inode – Structure of a regular file – Directories – Conversion of a pathname to an Inode – Super Block – Inode Assignment															
UNIT – II	System Calls for the file system							Hours: 09							
Open – Read – Write – lseek – Close – file creation – creation of special files – change directory and change root – change owner and change mode – Pipes – Dup – Mounting and unmounting file systems; The Structure of Processes: Process states and transitions – Layout of system memory – The context – saving the context															
UNIT – III	Process Control							Hours: 09							
Process creation – Signals – Process Termination – Awaiting Process Termination – Invoking other programs – The user ID of a process – The shell – System Boot and the INIT Process; Process Scheduling and Time: Process scheduling – System calls for Time – Clock															
UNIT – IV	Memory Management Policies							Hours: 09							
Swapping – Demand Paging – A Hybrid System with swapping and demand paging; The I/O Subsystem: Drier Interfaces, Disk Drivers, Terminal Drivers, Streams.															
UNIT – V	Inter Process Communication							Hours: 09							
Process Tracing – System V IPC – Messages, Shared memory, Semaphores- Network Communications –Sockets – Messages – Ports – Message Passing –Port Operations															
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes: -			Total Hours: 45										
Text Books:															
<ol style="list-style-type: none"> Maurice J. Bach, The Design of the UNIX Operating System, Prentice-Hall of India, 2004. UreshVahalia, UNIX Internals: The New Frontiers, Pearson Education Asia, 2002. 															
Reference Books:															
<ol style="list-style-type: none"> William Stallings, Operating Systems – Internals and Design Principles, Pearson Education, Sixth Edition, 2009. Silberschatz, Galvin and Gagne, Operating System Concepts, Wiley, Sixth edition, 2003. Graham Glass and King Ables, The New Frontiers, Pearson Education, 2001. Daniel P. Bovet and Marco Cesati, Understanding the LINUX kernel, O'Reilly Publication, Third edition, 2005 															
Websites :															
<ol style="list-style-type: none"> http://www.ee.surrey.ac.uk/Teaching/Unix/ http://www.ccse.kfupm.edu.sa/~akbar/ICS431_031/IndexPages/MainIndex.htm 															

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Semester :-		Category : TY													
Subject Code	Course Name	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CAE60	Software Architecture	3	-	-	3	40	60	100							
Prerequisite															
Objectives	<ul style="list-style-type: none"> • To learn how to develop quality software products • To introduce fundamentals of software design • To understand the software architecture evaluation process 														
Outcomes	<ul style="list-style-type: none"> • Have acquired traits of a good software architect • Able to design software products that ensures quality • Able to choose from a set of alternative designs 														
UNIT – I								Hours: 09							
Characteristics of design activities – Elements of design – Software quality models and their effects – Quality Attributes – Basic rules of software design – Design process.															
UNIT – II								Hours: 09							
Architecture – Software Architecture – Architectural styles – Visual Notation- Active and passive elements – Data, control and relationships – composition and decompositions – Data Flow Style – Call and Return – Independent components – Data centered and virtual machine.															
UNIT – III								Hours: 09							
Choices of styles and their combination – Hierarchical styles – Simultaneously heterogeneous style – Locationally heterogeneous style															
UNIT – IV								Hours: 09							
Case Study - Key word frequency vector - Theory of design spaces – Design Space of architectural elements – Design Space of architectural styles.															
UNIT – V								Hours: 09							
Concept of Scenario – Evaluating modifiability – Evaluating Performance – SAAM Method – The process: Analysis and Evaluation of modifiability - ATAM – Analysis Process – Analysis Activities – Quality Models															
Total contact Hours: 45	Total Tutorials:-	Total Practical Classes: -			Total Hours: 45										
Text Books:															
1. Hong Zhu, Software Design Methodology: From Principles to Architectural Styles, 1 st edition, Butterworth-Heinemann Elsevier Publishers, 2013.															
Reference Books:															
1. Ian Gorton, Essential Software Architecture, Springer – Verlag, Berlin Heidelberg, 2008. 2. Paul Clements, Rick Kazman and Mark Klein, Evaluating Software Architectures – Methods and Case Studies, Tenth edition, Pearson Low Price Edition, India, 2008. 3. Mary Shaw and David Garlan, Software Architecture – Perspectives of an Emerging Discipline, Second edition, Prentice-Hall of India, 2008. 4. Mahesh P. Matha, Object Oriented Analysis and Design using UML, Second edition, Prentice-Hall of India, 2008. 5. Bernd Bruegge, Allen H. Dutoit, Object-Oriented Software Engineering Using UML, Patterns, and Java, Second edition, Pearson Low Price Edition, India, 2008.															
Websites:															
1. http://www.bredemeyer.com/ 2. http://www.ibm.com/developerworks/rational/library/feb06/eeles/ 3. http://www.sei.cmu.edu/architecture/															

Department : Computer Science and Engineering		Programme : Master of Computer Application												
Semester : -		Category : TY												
Subject Code	Subject	Hours / Week		Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM						
CAE61	Social Network Analysis	3	-	-	3	40	60	100						
Prerequisite	-													
Objectives	The students are to		<ul style="list-style-type: none"> • Be exposed to the overview of social networks and its importance. • Understand the social network concepts and various methods of analysis. • Understand the underlying mathematical structures of Social Networks. • Get an overview of the structural properties of Social Networks. 											
	On successful completion of the course, students will be able to:		<ul style="list-style-type: none"> • Understand the theories and concepts of social networks. • Understand the data in the Social Network way. • Identify, formulate and analyze Social network problems. • Interpret the results obtained. 											
UNIT – I	Network, Relations and Structure		Hours: 09											
The Social Networks Perspective- Network Data- Boundary Specification and Sampling- Types of Networks- Network Data, Measurement and Collection														
UNIT – II	Mathematical Representations of Social Networks		Hours: 09											
Graph Theoretic Notation- Sociometric Notation- Algebraic Notation- Graphs- Directed Graphs- Signed Graphs- Signed Directed Graphs- Valued Graphs- Valued Directed Graphs- Multi Graphs- Hyper Graphs- Relations- Matrices- Properties														
UNIT – III	Structural and Locational Properties		Hours: 09											
Actor Centrality- Degree Centrality- Closeness Centrality- Betweenness Centrality- Information Centrality- Structural Balance- Clusterability- Generalizations of Clusterability- Transitivity														
UNIT – IV	Roles and Positions		Hours: 09											
Background- Structural Equivalence- Automorphic and Isomorphic Equivalence- Regular Equivalence- Types of Ties- Local Role Equivalence- Ego Algebras														
UNIT – V	DYADIC and TRIADIC Methods		Hours: 09											
The Dyad Census- Examples - An Index for Mutuality- Simple Distributions on Digraphs- Conditional Uniform Distributions- The Triad Census- Examples - Mean and Variance of a Triad Census														
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes: -	Total Hours: 45											
Text Books:														
<ol style="list-style-type: none"> 1. Social Network Analysis, David Knoke and Song Yang, SAGE Publications, 2007. 2. Social Network Analysis – A Handbook, John Scott, SAGE Publications, 2000. 														
Reference Books:														
<ol style="list-style-type: none"> 1. Stanley Wasserman and Katherine Faust, Social Network Analysis – Methods and Applications, Cambridge University Press, 1994 . 2. Robert A. Hanneman and Mark Riddle, Introduction to Social Networks, University of California, Riverside, edition, 2005. 														
Websites:														
<ol style="list-style-type: none"> 1. http://reference.wolfram.com/language/guide/SocialNetworks.html 2. http://train.ed.psu.edu/WFED-543/SocNet_TheoryApp.pdf 														

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester :-		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CAE62	Advanced Java Programming	3	-	-	3	40	60	100							
Prerequisite															
Objectives	<ul style="list-style-type: none"> • To learn advanced Java programming concepts like Swings, Networking, Beans, etc. • To develop network and distributed applications in Java • To understand issues in enterprise applications development • To learn Java messaging and J2ME 														
Outcomes	<ul style="list-style-type: none"> • Develop Swing-based GUI • Develop client/server applications and socket programming concepts • Design, Update and retrieve the data from the databases using SQL • Develop distributed applications using RMI and component-based Java software using JavaBeans • Develop server side programs in the form of Servlets and enterprise applications. 														
UNIT – I															
Advanced Swing graphical interface components – Model view controller - Java I/O streaming – filter and pipe streams – Threading.															
UNIT – II															
Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application – Remote method Invocation															
UNIT – III															
Server side programming – servlets – Java Server Pages – JSTL - Applet to Applet communication – applet to Servlet communication - JDBC – Applications on databases															
UNIT – IV															
Multimedia streaming applications – Java Media Framework –Enterprise Java beans component model –Session EJB & distributed transactions – Entity EJB															
UNIT – V															
Messaging with JMS – Wireless application development and J2ME – Enterprise Java Case Study – Architecture – presentation and Controller logic – Business logic															
Total contact Hours: 45	Total Tutorials:	Total Practical Classes:			Total Hours: 45										
Text Books:															
<ol style="list-style-type: none"> 1. Hortsmann and Cornell, Core Java 2 Advanced features, Vol II, Pearson Education, 2002. 2. H. M. Deitel, P. J. Deitel and S. E. Santry, Advanced Java 2 Platform – How to Program, Prentice Hall, 2001. 															
Reference Books:															
<ol style="list-style-type: none"> 1. Herbert Schildt , Java The Complete Reference, Ninth Edition, McGraw-Hill, 2014. 2. Jim Keogh, J2EE: The complete Reference, Fourht edition, TMH, 2002. 															
Websites:															
<ol style="list-style-type: none"> 1. http://sites.google.com/site/advancedjavabooksandppts 2. http://docs.oracle.com/javase/7/docs/api/ 															

Department : Computer Science and Engineering		Programme : Master of Computer Application															
Semester :-		Category : TY															
Subject Code	Subject	Hours / Week			Credit	Maximum Marks											
		L	T	P	C	CA	SE	TM									
CAE63	Data Mining and Warehousing	3	-	-	3	40	60	100									
Prerequisite																	
Objectives	<ul style="list-style-type: none"> To introduce Data Preprocessing, Architecture and basic concepts of data mining To understand the Association rule mining techniques To describe and demonstrating basic data mining algorithms, methods, and tools To familiarize with clustering and classification algorithms To understand the overall architecture of a data warehouse techniques and Hardware and Operational design methods 																
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> Design applications related to Association rule mining algorithm Analyze uses of different classification algorithms for better classification Design various clustering techniques and solve outlier problems Design the architecture of Data warehousing methods Implement the data mining, data warehousing techniques and methods in integrating and interpreting datasets 																
UNIT – I	Introduction						Hours: 09										
Preprocessing, Cleaning, Integration, Transformation, Reduction, Discretization, Concept Hierarchy Generation, Data Mining Primitives, Query Language, Graphical User Interfaces, Architectures, Concept Description, Data Generalization, Characterizations, Class Comparisons, Descriptive Statistical Measures.																	
UNIT – II	Association Rule Mining						Hours: 09										
Association Rule Mining, Single-Dimensional Boolean Association Rules from Transactional Databases, Multi-Level Association Rules from Transaction Databases-mining multidimensional Association rules –association mining to correlation analysis-constraint based association mining.																	
UNIT – III	Classification and Prediction						Hours: 09										
Classification and Prediction, Issues, Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy.																	
UNIT – IV	Cluster Analysis						Hours: 09										
Cluster Analysis, Types of data, Categorization of methods, Partitioning methods, hierarchical methods, density based methods, grid based methods - Outlier Analysis. Recent trends - Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Databases, Multimedia Databases, Time Series and Sequence Data, Text Databases, World Wide Web, Applications and Trends in Data Mining.																	
UNIT – V	Data Warehousing						Hours: 09										
Data warehouse architecture and design, Hardware and Operational design, Tuning and testing.																	
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes: -			Total Hours: 45												
Text Books:																	
<ol style="list-style-type: none"> 1. J. Han and M. Kamber, Data Mining: Concepts and Techniques, Harcourt India /Morgan Kauffman, 2001. 2. Sam Anahory and Dennis Murray, Data Warehousing in the real world ,SeventhEdition, AddisonWesley, 2003. 																	
Reference Books:																	
<ol style="list-style-type: none"> 1. Margaret H. Dunham, Data Mining: Introductory and Advanced Topics, 1st edition, Pearson Education, 2004. 2. Alex Berson and Stephen J. Smith, Data Warehousing, Data mining and OLAP, 1st edition, Tata McGraw-Hill, 2004 																	
Websites:																	
<ol style="list-style-type: none"> 1. http://web.engr.illinois.edu/~hanj/bk2/datamining/concepts 2. http://www.cs.waikato.ac.nz/ml/weka/data mining software in java 3. http://datawarehouse4u.info/ 4. http://data-warehouses.net/architecture/ 																	

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Semester : -		Category : TY													
Subject Code	Subject	Hours / Week		Credit	Maximum Marks										
		L	T	P	C	CA	SE	TM							
CAE64	Artificial Intelligence	3	-	-	3	40	60	100							
Prerequisite															
Objectives	<ul style="list-style-type: none"> • To search and discover intelligent characteristics of existing AI projects, intelligent agents map a new problem – as search. • To understand different search strategies for a problem. • To understand different Knowledge Representation schemes for typical AI problems. • To design and implement a typical AI problem to be solved Using Machine Learning Techniques. 														
Outcomes	<p>On successful completion of this course students will be able to:</p> <ul style="list-style-type: none"> • Develop intelligent systems • Design applications related to Natural Language Processing and Web applications. 														
UNIT – I	Introduction	Hours: 09													
History of AI - - problem spaces and search- Production System-Heuristic Search techniques –Best-first search- Problem reduction-Constraint satisfaction-Means Ends Analysis.															
Intelligent agents: Agents and environment – structure of agents and its functions- simple reflex agent- goal based agent – utility based agent – learning agents.															
UNIT – II	Knowledge Representation	Hours: 09													
Approaches and issues in knowledge representation- Propositional Logic –Predicate logic-Forward and backward reasoning - Unification- Resolution- Weak slot-filler structure – Strong slot-filler structure- Knowledge- Based Agent															
UNIT – III	Reasoning under uncertainty	Hours: 09													
Logics of non-monotonic reasoning-Implementation- Basic probability notation - Bayes rule – Certainty factors and rule based systems-Bayesian networks – Dempster - Shafer Theory - Fuzzy Logic.															
UNIT – IV	Planning and Learning	Hours: 09													
Planning with state space search-partial order planning-planning graphs-conditional planning-continuous planning- Multi-Agent planning. Forms of learning- Learning from observation - Inductive learning – Decision trees – Explanation based learning – Statistical Learning methods - Reinforcement Learning -Neural Net learning and Genetic learning															
UNIT – V	Advanced Topics	Hours: 09													
Game Playing: Minmax search procedure-Adding alpha-beta cutoff Expert System: Representation-Expert System shells-Knowledge Acquisition. Robotics: Hardware-Robotic Perception-Planning-Application domains															
Total Contact Hours: 45	Total Tutorials: -	Total Practical Classes: -			Total Hours: 45										
Text Books:															
<ol style="list-style-type: none"> 1. Elaine Rich and Kevin Knight and ShivashankarB.Nair, Artificial Intelligence, Third edition, Tata McGraw Hill, 2009. 2. Ben Coppin, Artificial Intelligence Illuminated, Jones and Bartlett Publishers, First edition, 2004. 															
Reference Books:															
<ol style="list-style-type: none"> 1. RajendraAkerkar, Introduction to Artificial Intelligence, First Edition, Prentice hall of India, 2005. 2. Patrick Henry Winston, Artificial Intelligence, Third Edition Pearson Education, Inc., 2001. 3. Stuart J.Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson Education, Second Edition, 2003. 3. N.P.Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press, Second Edition, 2005. 															
Websites:															
<ol style="list-style-type: none"> 1. http://aima.cs.berkeley.edu/ai.html 2. www.stanford.edu/class/cs221/ 															

Department : Computer Science and Engineering		Programme : Master of Computer Application															
Semester :-		Category : TY															
Subject Code	Subject	Hours / Week			Credit	Maximum Marks											
		L	T	P	C	CA	SE	TM									
CAE65	Principles of Distributed Systems	3	-	-	3	40	60	100									
Prerequisite	-																
Objectives	<ul style="list-style-type: none"> • To introduce the Architecture, and types of Distributed Systems • To Learn the Fundamental Principles Distributed Systems • To Learn the Design Issues of the distributed Systems • To Learn the Design of Fault Tolerant Systems 																
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Design Middleware Components for Distributed Systems • Create a Distributed System through the integration of Heterogeneous Applications and Web services • Demonstrate the understanding of need for distributed systems and their applications • Design of Fault Tolerant Systems 																
UNIT – I	Distributed Systems Architecture and Operating Systems						Hours: 09										
Introduction – Goals - Types of Distributed Systems - Architectural Styles – Distributed Operating Systems – Issues in Distributed Operating System – Introduction to Distributed Computing Environment – Message Passing - Desirable features message passing system- Issues in message passing –Synchronization – Buffering – Multidatagram Messages – Encoding and Decoding message Data – Process Addressing – Failure Handling – group Communication																	
UNIT – II	Remote Procedure Call						Hours: 09										
Introduction – RPC model – Transparency of RPC- Implementing RPC mechanism- Stub generation- Marshaling arguments and results- Server management- Parameter passing semantics – Call semantics- Communication protocols for RPCs – Complicated RPC client server binding- Exception handling- Security- Special types of RPCs- RPCs in heterogeneous environments- Lightweight RPC																	
UNIT – III	Distributed Shared Memory and Synchronization						Hours: 09										
Introduction – General architecture of DSM systems- Design and implementation of DSM- Granularity- Structure of shared memory space- Consistency models- Replacement strategy- Thrashing- Advantages of DSM – Synchronization- Clock synchronization- Event ordering- Mutual exclusion- Deadlock- Election Algorithm																	
UNIT – IV	Resource and Process Management						Hours: 09										
Introduction – Features of Good Scheduling Algorithms – Task Assignment Approach – Load Balancing Approach – Load Sharing Approach – Process Management – Introduction – Process Migration – Threads																	
UNIT – V	Distributed File Systems						Hours: 09										
Introduction – Features of Good Distributed File System – File Models – File-Accessing Models – File-Sharing Models – File-Caching Schemes – File Replication – Fault Tolerance – Atomic transactions – Design Principles																	
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes:-			Total Hours: 45												
Text Books:																	
<ol style="list-style-type: none"> 1. Andrew S. Tanenbaum, Maarten Van Steen, Distributed Systems Principles And Paradigms, Pearson Prentice Hall, Second Edition, 2007. 2. Pradeep K Sinha, Distributed Operating Systems: Concepts and design, IEEE Computer Society Press, 2007. 																	
Reference Books:																	
<ol style="list-style-type: none"> 1. George Coulouris, Jean Dollimore and Tim Kindberg, Distributed Systems Concepts and Design,5th edition, Pearson Education, 2009. 2. SunitaMahajan and Seema Shah, Distributed Computing, Oxford University Press, Second Edition, 2011. 																	
Websites :																	
<ol style="list-style-type: none"> 1. http://nptel.ac.in 																	

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester :-		Category : TY													
Subject Code	Subject	Hours / Week		Credit	Maximum Marks										
		L	T	P	C	CA	SE	TM							
CAE66	Distributed Database System	3	-	-	3	40	60	100							
Prerequisite															
Objectives	<ul style="list-style-type: none"> • To introduce the basics of distributed database. • To educate various database management techniques. • To allow computer system resources to be used in an efficient manner by using database model. • Makes the computer more convenient to access the various data 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> • Understand the basics concepts of distributed database and its related techniques. • Provide a pleasant and effective user interface 														
UNIT – I	Distributed Data Processing							Hours: 09							
:Introduction-Distributed data processing, distributed database design, distributed query processing, distributed directory management, distributed concurrency control, distributed deadlock management, reliability of distributed DBMS, operating system support, heterogeneous databases. Overview of Relational DBMS.															
UNIT – II	Distributed DBMS Architecture							Hours: 09							
Review of computer networks : Data communication concepts, types of networks, protocol standards, broadband networks, wireless networks, Internet. Distributed DBMS Architecture: DBMS standardization, architectural model for distributed DBMS, Distributed DBMS Architecture: client/server systems, peer-to-peer distributed systems.															
UNIT – III	Query Processing in Distributed Databases							Hours: 09							
Overview- of Query Processing – Query Decomposition and Data Localization – Optimization of Distributed Queries, Multi-database Query Processing.															
UNIT – IV	Deadlock management							Hours: 09							
Deadlock prevention, deadlock avoidance, deadlock detection and resolution. Distributed DBMS Reliability : System, state and failure, reliability and availability, mean time between failures/mean time to report, failure and fault tolerance in distributed systems : reasons for failures, basic fault tolerance approaches and techniques															
UNIT – V	Transaction Management And other Advanced Systems							Hours: 09							
Introduction – Concurrency Control : Locking-based concurrency control algorithm, timestamp-based concurrency control algorithms : basic TO algorithm, conservative TO algorithm, optimistic concurrency control algorithms - Distributed DBMS Reliability – Data Replication – DDB Applications, Distributed Object Database Management – Peer -to-Peer Data Management – Web Data Management.															
Total contact Hours: 45	Total Tutorials:-	Total Practical Classes: -			Total Hours:45										
Text Books:															
<ol style="list-style-type: none"> 1. M.TamerOzs-PatricValduriez, Principles of Distributed Database System, Second Edition, Pearson Education, 2011. 2. David Taniar, Clement H.C.Leung, WennyRahayu, SushantGoel , High performance parallel Database processing and Grid Databases , John Wiley & Sons, 2013. 															
Reference Books:															
<ol style="list-style-type: none"> 1. Ceri and Pelagatti, Distributed Database Principles and Systems, McGraw Hill, 2008. 2. Bernstein, Hadzilacos and Goodman, A.W, Concurrency Control and Recovery in Database Systems, Addison Wesley Publishing Company, 1987. 															
Websites:															
<ol style="list-style-type: none"> 1. http://docs.oracle.com/cd/B10501_01/server.920/a96521/ds_concepts.htm 2. http://databasemanagement.wikia.com/wiki/Distributed_Database_Management_System_%28DDBMS%29 															

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester :-		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CAE67	Software Testing and Quality Assurance	3	-	-	3	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> • To understand the theoretical aspects of software testing • To have the knowledge of the existing testing methods • To understand the challenges in applying testing and analysis methods in software development and maintenance • To emphasize on software quality measurement, and quality standards 														
Outcomes	<p>On successful completion of the course students will be able to:</p> <ul style="list-style-type: none"> • Detect, classify, prevent and remove defects • Conduct formal inspections, record and evaluate results of inspections • Choose and design appropriate testing strategies and develop test cases • Analyze the software quality with software quality standards. 														
UNIT – I	Software Testing Fundamentals							Hours: 09							
Need for Testing - SDLC and Testing – Functional and Non-Functional Testing – Verification and Validation - Testing levels - Unit, Integration, System and Acceptance Testing – Testing and Debugging – Test Case Design – Test Management – Weyuker's Adequacy Axioms – Metrics and SDLC.															
UNIT – II	Testing Types							Hours: 09							
White Box, Black Box and Grey Box – White box testing techniques - Statement coverage, Branch Coverage, Condition coverage, Decision/Condition coverage, Multiple condition coverage, Dataflow coverage, Mutation testing – Black box testing techniques – Boundary value analysis, Equivalence partitioning, Syntax testing, Finite state testing.															
UNIT – III	Testing Object Oriented Software							Hours: 09							
Challenges – Differences from Testing non-OO Software – Testing and SDLC – Testing Strategies – Test Case Design – Testing Methods – Class testing strategies - Class Modality - State-based Testing – Message Sequence Specification.															
UNIT – IV	Software Quality							Hours: 09							
Introduction – Quality and SDLC – Software Quality Assurance (SQA) – SQA Plan, Team, Characteristics, Documentation, Review and Audits – Software Quality Models (McCall, FURBS and GQM) – Software Quality Measurement Metrics – Product quality, Process quality and Maintenance metrics – Quality Cost – Quality Control.															
UNIT – V	Software Quality Standards							Hours: 09							
CMM Model, ISO 9000 Series, Introduction to PCMM, CMMI and Six Sigma concept. Testing Specialized Environment – Testing Client-Server applications, Testing GUI, Testing compilers and language processors, Testing Realtime Systems. Testing Tools – Automated Tools for Testing – WinRunner, LoadRunner.															
Total contact Hours: 45	Total Tutorials:	Total Practical Classes:			Total Hours: 45										
Text Books:															
<ol style="list-style-type: none"> 1. William E.Perry, Effective Methods for Software Testing, Second Edition, John Wiley & Sons, 2006. 2. Glenford J. Myers, Tom Badgett, Corey Sandler, and Todd M. Thomas, The Art of Software Testing, John Wiley & Sons, Second edition, 2004. 3. Allan C. Gillies, Software Quality: Theory and Management, 2nd edition, Thomson Learning, 2003. 															
Reference Books:															
<ol style="list-style-type: none"> 1. Roger S. Pressman, Software Engineering. A Practitioners Approach, McGraw- Hill International Edition, Seventh edition, 2009. 2. Boris Beizer, Software Testing Techniques, Van Nostrand Reinhold, Second Edition, 1990. 3. Stephen H. Kan, Metrics and Models in Software Quality Engineering, 1st edition, Pearson Education (Singapore) Pvt. Ltd., 2002. 4. Robert V.Binder, Testing Object-Oriented Systems: Models Patterns and Tools, 1st edition, Addison Wesley, 2000. 															
Websites:															
<ol style="list-style-type: none"> 1. www.softwaretestinghelp.com/ 															

- 2. www.softwaretestingfundamentals.com/
- 3. www.apitest.com/resources.html
- 4. http://www.inf.ed.ac.uk/teaching/courses/seoc2/2004_2005/slides/quality.pdf

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester :-		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CAE68	Software Project Management	3	-	-	3	40	60	100							
Prerequisite															
Objectives	<ul style="list-style-type: none"> • To develop an awareness of the need for project planning and management • To explain the procedures needed to monitor, control and report upon an IT development project • To explain the ways in which appropriate quality attributes of the products of an IT development project can be assessed and assured 														
Outcomes	<p>On completion of this course the student will able to</p> <ul style="list-style-type: none"> • Apply the fundamentals of software project process framework • Do project planning, scheduling, tracking , organizing and controlling • Utilize the Quality management and tools used • Estimate cost and evaluate the project 														
UNIT – I															
Introduction To Software Project Management-Introduction-Software Project vs other types of Project-Contract and Technical Project Management-Activities-Plans, Methods And Methodologies-Categorizing-Stake Holders – Setting Objective -Business Cases-Management Control- Project Evaluation And Programme Management – Introduction-Business Case-Portfolio-Evaluation-Cost-Risk-Program Management-Resource Allocation-Strategic-Program Creation-Aids-Reservation –Benefits-An Overview Of Project Planning-Introduction-step wise project planning-10 steps.															
UNIT – II															
Selection Of An Appropriate Project Approach-Introduction-Build Or Buy-Choosing Methodologies and Technologies- Process Model-Structure vs Speed Of Delivery-Waterfall and Spiral Model-Prototyping-Categories-Incremental Delivery-Agile-Extreme Programming-Managing Iterative Process-Process Model Selection-Software Effort Estimation –Estimates-Over And Under Estimates-Software Estimating Basis-Effort Estimation Technique-Bottom Up-Top Down Approach-Expert Judgment-Analogy-Albrecht Function Point-Mark II-COSMIC-Cocomo-Activity Planning-Objective-Plan-Project Schedule-Activities-Sequencing And Scheduling-Network Planning Models-Formulating-Time Dimension-Forward And Backward Pass- Activity Float- Identifying Critical Path And Activities-Shortening Project Duration-Activity On Arrow Network.															
UNIT – III															
Risk Management –Introduction-Risk Categories-Framework-Identification-Assessment-Planning-Management-Evaluation-Pert Technique-Monte Carlo-Critical Chain-Resource Allocation-Nature-Identifying Requirements-Scheduling- Creating Critical Path-Counting the Cost-Resource Schedule-Cost Schedule-Scheduling Sequence-Monitoring and Control-Framework-Data Collection-Visualizing-Cost Monitoring-Earned Value Analysis-Prioritizing Monitoring-Change Control															
UNIT – IV															
Managing contracts-Types-stages-Contract management-Acceptance-Managing people in software environments-understanding Behaviour-organisation behavior-selection-instruction-Motivation-Oldham-hackmann-Ethical and professional concern-Working in teams –Becoming team-decision making-organizational structure-coordination dependencies-Dispersed and virtual teams-Communication genres and plans-Leadership															
UNIT – V															
Software reliability- statistical testing- software quality- software quality management system- ISO 9000-SEI Capability Maturity Model- Personal Software Process- Six Sigma															
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes:-			Total Hours: 45										
Text Books:															
<ol style="list-style-type: none"> 1. Bob Hughes, Mike Cotterell, Software Project Management, Fifth edition, Tata McGraw Hill, 2009. 2. Rajib Mall, Fundamentals of Software Engineering, PHI, Third Edition, 2009. 															
Reference Books:															
<ol style="list-style-type: none"> 1. Ramesh Gopalaswamy, Managing Global Software Projects, Tata McGraw Hill, Third edition, 2001. 2. Humphrey Watts, Managing the software process, Second edition, Addison Wesley, 1989. 															
Websites :															

1. <http://nptel.ac.in/courses/106101061/>
2. <http://freevideolectures.com/Course/2318/Software-Engineering/29>

Department : Computer Science and Engineering		Programme : Master of Computer Application															
Semester :-		Category : TY															
Subject Code	Subject	Hours / Week			Credit	Maximum Marks											
		L	T	P	C	CA	SE	TM									
CAE69	Parallel Computing	3	-	-	3	40	60	100									
Prerequisite																	
Objectives	<ul style="list-style-type: none"> To introduce parallel computing models, communication models, Parallel programming platforms and algorithms 																
Outcomes	<ul style="list-style-type: none"> Students acquire the skills to implement software effectively and efficiently on parallel hardware platforms such as multi-core processors and processors that use multithreading techniques. 																
UNIT – I	Introduction to Parallel Computing						Hours: 09										
Motivating Parallelism-Scope of parallel computing-Parallel programming platforms-Implicit Parallelism Limitations of Memory System Performance-Dichotomy of Parallel computing platforms-Physical organization of parallel platforms-Communication costs in parallel machines-Routing mechanisms for inter connection networks.																	
UNIT – II	Principles of Parallel Algorithm Design						Hours: 09										
Preliminaries-Decomposition techniques-characteristics of tasks and interactions-mapping techniques for load balancing-methods for containing interaction overheads-parallel algorithm models.																	
UNIT – III	Basic Communication Operations						Hours: 09										
One to all broadcast and all to one reduction-all to all broadcast and reduction -scatter and gather –sources of overhead in parallel programs-performance metrics for parallel systems-the effect of granularity on performance.																	
PROGRAMMING USING																	
UNIT – IV	Message Passing Paradigm						Hours: 09										
Principles of message passing programming-Building blocks-Message passing interface-Topologies and embedding-Overlapping computation with communication-Collective communication and computation operation.																	
UNIT – V	Programming Shared Address Space Platforms						Hours:09										
Thread basics-Why threads-POSIX thread-Thread basics-Synchronization primitives in Pthreads-controlling thread and synchronization attributes-Composite synchronization constructs-Case study:Implementation of Chat Server.																	
Total contact Hours: 45	Total Tutorials:-	Total Practical Classes: -			Total Hours: 45												
Text Books:																	
<ol style="list-style-type: none"> AnanthGrama ,Vipin Kumar, Introduction to Parallel Computing,Second edition,2007 Cameron Hughes,Tracey Hughes, Parallel and Distributed Programming using C++, Second edition, Pearson education,2005. 																	
Reference Books:																	
<ol style="list-style-type: none"> Rajaraman and C. Siva Ram Murthy, Parallel Computers – Architecture and Programming, Fourth edition, Prentice-Hall of India, 2003 Albert Y.Zomaya, Parallel and Distributed Computing Hand book, Second edition, McGrawl Publications, 2005. Selim G. Akl, The Design and Analysis of Parallel Algorithms, First edition, Prentice-Hall of India, 1999. M.J. Quinn, Parallel Computing – Theory and Practice, McGraw-Hill, 1994. 																	
Websites:																	
<ol style="list-style-type: none"> http:// www.nptel.ac.in http:// www.openmp.org 																	

Department : Compute Science and Engineering		Programme :M.C.A													
Semester :-		Category :TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CAE70	Big Data Analytics	3	-	-	3	40	60	100							
Prerequisite	-														
Objectives	<ul style="list-style-type: none"> • To learn to analyze the big data using intelligent techniques. • To understand the various search methods and visualization techniques. • To learn to use various techniques for mining data stream. • To understand the applications using Map Reduce Concepts 														
Outcomes	<p>On completion of this course the student will able to</p> <ul style="list-style-type: none"> • Analyze the big data analytic techniques for useful business applications. • Design efficient algorithms for mining the data from large volumes. • Analyze the HADOOP and Map Reduce technologies associated with big data analytics • Explore on Big Data applications Using Pig and Hive 														
UNIT – I	Introduction to Big Data							Hours: 09							
Introduction to BigData Platform – Challenges of Conventional Systems - Intelligent data analysis –Nature of Data - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools -Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error															
UNIT – II	Mining Data Streams							Hours: 09							
Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.															
UNIT – III	Hadoop							Hours: 09							
History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features															
UNIT – IV	Hadoop Environment							Hours: 09							
Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation - Hadoop Configuration-Security in Hadoop - Administering Hadoop – HDFS - Monitoring-Maintenance-Hadoop benchmarks- Hadoop in the cloud															
UNIT – V	Frameworks							Hours: 09							
Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphereBigInsights and Streams. Visualizations - Visual data analysis techniques, interaction techniques; Systems and applications															
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes: -			Total Hours: 45										
Text Books:															
<ol style="list-style-type: none"> 1. Michael Berthold, David J. Hand, Intelligent Data Analysis, Springer, 2007. 2. Tom White, Hadoop: The Definitive Guide Third Edition, O'reilly Media, 2012. 3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, McGrawHill Publishing, 2012 4. AnandRajaraman and Jeffrey David Ullman, Mining of Massive Datasets, Cambridge University Press, 2012. 															
Reference Books:															
<ol style="list-style-type: none"> 1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics, John Wiley & sons, 2012. 2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007PeteWarden, Big Data Glossary, O'Reilly, 2011. 3. Jiawei Han, MichelineKamber, Data Mining Concepts and Techniques, Second Edition, 4. Elsevier, Reprinted 2008. Da Ruan,Guoqing Chen, Etienne E.Kerre, GeertWets, Intelligent Data Mining, Springer,2007 5. Paul Zikopoulos ,Dirk deRoos , Krishnan Parasuraman , Thomas Deutsch , James Giles ,David Corrigan , Harness the Power of Big Data The IBM Big Data Platform, Tata McGraw Hill Publications, 2012 6. Michael Minelli (Author), Michele Chambers (Author), AmbigaDhiraj (Author) , Big Data, BigAnalytics: 															

Emerging Business Intelligence and Analytic Trends for Today's Businesses,Wiley Publications,2013
7. Zikopoulos, Paul, Chris Eaton, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, Tata McGraw Hill Publications, 2011
Websites:
1. nptel.ac.in/syllabus/110105060

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester :		Category: TY													
Subject Code	Subject	Hours / Week		Credit	Maximum Marks										
		L	T	P	C	CA	SE	TM							
CAE71	User Interface Design	3	-	-	3	40	60	100							
Prerequisite	-														
Objective	<ul style="list-style-type: none"> To develop specific skills, competencies, and points of view needed by professionals in user interface design and implementation 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> Identify and define key terms related to user interfaces and user interface design and implementation Identify and describe various types of computer users and computer use contexts Describe and explain the user interface design process 														
UNIT – I								Hours: 09							
Introduction – A Taxonomy Of Software Design – Goal-Directed Design – The Three Models–Visual Interface Design – Forms – Idioms And Affordances – History of Rectangles on the Screen– Windows-with-a-Small-w – Lord of the Files – Storage and Retrieval Systems – ChoosingPlatforms															
UNIT – II								Hours: 09							
Behavior of Presentation – Orchestration and Flow – Techniques for Inducing and MaintainingFlow – Characteristics of Good User Interface – Postures and State – Idiocy –The Secret Weaponof Interface Design.															
UNIT – III								Hours:09							
The Interaction – Mouse Operations – Selection – Direct Manipulation – Manipulating gizmos –Repositioning – Resizing and reshaping – Arrowing – Direct-Manipulation visual feedback –Drag-and-Drop.															
UNIT – VI								Hours: 09							
The Cast – The Meaning of Menus – Menu – Dialog Boxes – Dialog Box Etiquette –Toolbars – The Gizmos – Imperative and Selection Gizmos – Entry and Display Gizmos – New Gizmos.															
UNIT – V								Hours: 09							
Eliminating the Error Messages – Managing Exceptions – Undo – Troubles – Redo – Special UndoFunctions – Installation – Configuration – Personalization.															
Total contact Hours: 45	Total Tutorials: -	Total Practical Classes: -			Total Hours: 45										
Text Books:															
<ol style="list-style-type: none"> Alan Cooper, Robert Reimann, David Cronin andChristopherNoessel, The Essential Of User Interface Design, John Wiley & Sons, Fourth Edition edition, 2014. Ben Sheiderman,CatherinePlaisan, Maxine Cohen andSteven Jacobs, Designing the User Interface: Strategies for Effective Human-Computer Interaction, Prentice Hall, Fifth edition, 2009. Alan Cooper, The Essentials of User Interface Design, Wiley Dreamtech India (P)Ltd., 2002. 															
Reference Books:															
<ol style="list-style-type: none"> Wilbert. O. Galitz ,The Essential Guide to User Interface Design: An Introduction To GUI Design Principles and Techniques, John Wiley& Sons, 2007. Alan Dix, Janet E Finlay, Gregory D. Abowd and Russell Beale, Human- Computer Interaction, Prentice Hall, 3rd Edition, 2003. 2. Jacob Nielson, Usability Engineering, Academic Press, 1993. 															
Websites:-															
<ol style="list-style-type: none"> nptel.ac.in/courses/106105087/pdf/m09L20.pdf https://www.iam.unibe.ch/scg/svn_repos/Lectures/ESE/08UIDesign.ppt 															

Department : Computer Science and Engineering		Programme : Master of Computer Application														
Semester :-		Category : TY														
Subject Code	Subject	Hours / Week			Credit	Maximum Marks										
		L	T	P	C	CA	SE	TM								
CAE72	Multimedia Systems and Applications	3	-	-	3	40	60	100								
Prerequisite	-															
Objectives	<ul style="list-style-type: none"> To introduce the principles and current technologies of multimedia systems, Issues in effectively representing, processing, and retrieving multimedia data such as sound and music, graphics, image and video. To discuss latest Web technologies and some advanced topics in current multimedia research 															
Outcomes	On successful completion of the course, the students will be able to: <ul style="list-style-type: none"> Understand the characteristics of different media Gain knowledge about different compression principles Program multimedia data and design and implement media applications 															
UNIT – I	Introduction to Multimedia Systems						Hours: 09									
Multimedia: Media And Data Streams -Medium -Main Properties of a Multimedia System - Multimedia - Traditional Data Streams Characteristics -Data Stream Characteristics for continuous Media - Information Units Sound/Audio : Basic Sound Concepts- Music - MIDI :Basic Concepts , Devices, Messages ,MIDI and SMPTE Timing Standards -Software Speech : Generation, Analysis, Transmission Images and Graphics : Basic Concepts, Computer Image Processing Video and Animation : Basic Concepts - Television -Computer-Based Animation.																
UNIT – II	Data Compression						Hours: 09									
Storage Space -Coding Requirements Source, Entropy and Hybrid Coding, Some Basic Compression Techniques - JPEG - H.261 (px64) - MPEG - DVI. Optical Storage Media: Basic Technology- Video Disks and Other Worms- Compact Disk Digital Audio - Compact Disk Read only Memory -CD-ROM Extended Architecture - Further CD-ROM-based Developments - Compact Disk Write Once - Compact Disk Magneto Optical -Computer Technology																
UNIT – III	Multimedia Operating Systems						Hours: 09									
Introduction -Real Time - Resource Management -Process Management - File Systems - Interprocess Communication and Synchronization -Memory Management -Device Management- System ArchitectureNetworking Systems : Layers, Protocols and ServicesNetworks - Local Area Networks (LANs) - Metropolitan Area Networks (MAN's) -Wide Area Networks - ISDN: ATM. Multimedia Communication Systems : Application Subsystem - Transport Subsystem - Quality of Service and Resource Management																
UNIT – IV	Multimedia Database Management Systems						Hours: 09									
Multimedia Database Management Systems - Characteristic of an MDBMS -Data Analysis-Data Structure - Operations on Data -Integration in a Database Model- Documents, Hypertext and MHEG : Documents - Documents Architecture -Manipulation of Multimedia Data-Hypertext and Hypermedia - Documents Architecture SGML - Document Architecture ODA -MHEG-User Interfaces - General Design Issues - Video at the User Interface - Audio at the User Interface - User-friendliness as the Primary Goal																
UNIT – V	Synchronization and Multimedia Applications						Hours:09									
Introduction - Notion of Synchronization - A Reference Model for Multimedia Synchronization-Synchronization Specification - Case StudiesAbstractions for Programming: Abstraction Levels -Libraries -System Software - Toolkits-Higher Programming Languages- Object-oriented Approaches. Multimedia Applications :Introduction - Media Preparation- Media Composition - Media Integration - Media Communication - Media Consumption - Media Entertainment																
Total contact Hours: 45	Total Tutorials: -			Total Practical Classes: -			Total Hours: 45									
Text Books:																
1. R. Steinmetz and K. Nahrstedt, Multimedia: Computing, Communications and Applications, Fourth edition, Prentice Hall, 2014. 2. Z-N. Li, M.S. Drew, Fundamentals of Multimedia, Pearson Prentice Hall Upper Saddle River, Second edition, NJ, 2004.																
Reference Books:																
1. Ze-Nian Li, and Mark S. Drew, Fundamental of Multimedia, Pearson Prentice Hall, October 2003. 2. M K. Rammohanarao, Z. S. Bolzkovic, D. A. Milanovic, Multimedia Communication Systems, Prentice Hall, May 2002. 3. Yao Wang, JoernOstermann, and Ya-Qin Zhang, Video Processing and Communications, Prentice Hall,																

- 2002.
4. Michael Rabinovich and Oliver Spatscheck, Web Caching and Replication, Addison-Wesley, 2002.
 5. Fred Halsall, Multimedia Communications: Applications, Networks, Protocols and Standards, Addison-Wesley, 2001.
 6. Ralf Steinmetz, KlaraNahrstedt, Multimedia Applications Springer Science & Business Media,X.media, 11-Mar-2004

Websites:-

1. http://hsc.csu.edu.au/ipt/mm_systems/7-1/what_is_multimedia.htm
2. <http://www.tutorialspoint.com/listtutorials/multimedia/1>

Department : Computer Science and Engineering		Programme : Master of Computer Application													
Semester :-		Category : TY													
Subject Code	Subject	Hours / Week			Credit	Maximum Marks									
		L	T	P	C	CA	SE	TM							
CAE73	Microprocessors and Assembly Language Programming	3	-	-	3	40	60	100							
Prerequisite															
Objectives	<ul style="list-style-type: none"> To introduce the Architecture, Instruction Set and Programming of 8086 microprocessor To Learn the Peripheral Interfacing of Microprocessors To Learn the Architecture, Instruction Set, Programming and Interfacing of 8051 Microcontroller To impart through case studies, the system design principles using 8086 and 8051 														
Outcomes	<p>On successful completion of the course, students will be able to:</p> <ul style="list-style-type: none"> Design and Implement Assembly Language Programs Using 8086 Microprocessor Interface Microprocessor and Microcontroller with different kinds of Peripherals Design and Implement Assembly Language Programs Using 8051 Microprocessor Design and Implement the Microprocessor and Microcontroller based Systems 														
UNIT – I	16-bit Microprocessor Architecture and Programming							Hours: 09							
Introduction - Evolution of Microprocessors - Intel 8086 Pins – Signals – Architecture – Instruction Set of 8086 – Instruction Formats – Addressing Modes – Data Transfer Instructions - Arithmetic Instructions – Logical Instructions – String Manipulation Instructions – Control Transfer Instructions															
UNIT – II	Memory and I/O Interfacing							Hours: 09							
Memory and I/O interfacing – Interrupts – Assembly Language Programming - string manipulation, array operations.															
UNIT – III	Peripheral Devices and Interfacing							Hours: 09							
Peripheral Devices and Interfacing – Parallel Data Communication Interface – Serial Data Communication Interface – Keyboard Display Interface – ADC and DAC Interface – Programmable Timer Interface															
UNIT – IV	8086 Microprocessor-based System Design							Hours: 09							
Clock Generator- Intel 8484 – Bus Controller – Intel 8288 - Coprocessor Intel 8087 – Minimum Mode 8086 Based System – Maximum Mode 8086 Based System - Multiprocessor Configuration - Temperature Control System – Motor Speed Control System - Traffic Light Control System – Stepper Motor Control System															
UNIT – V	8-bit Microcontroller							Hours: 09							
Introduction – Architecture of 8051 Microcontroller – Memory Organization – Pin Diagram – Timer/Counters – Serial Communication – Interrupts – Addressing Modes – 8051 Instruction – Assembly language Programming using 8051 Microcontroller – System Design using 8051: Traffic Light Control - Introduction to Intel Galileo Processor															
Total contact Hours: 45		Total Tutorials: -			Total Practical Classes: -		Total Hours: 45								
Text Books:															
<ol style="list-style-type: none"> Nagoorkani, 8086 Microprocessor & Its Applications, Tata McGraw Hill Education, Second Edition, 2013. Soumitra Kumar Mandal, Microprocessors and Microcontrollers: Architecture, Programming and Interfacing Using 8085, 8086 and 8051, Tata McGraw Hill, Sixth Reprint, 2012. 															
Reference Books:															
<ol style="list-style-type: none"> Krishna Kant, Microprocessors and Microcontrollers – Architectures, Programming and System Design 8085, 8086, 8051, 8096, PHI, Sixth Edition, 2010. Senthil Kumar. N, Saravanan. M, and Jeevananthan. S, Microprocessors and Microcontrollers, Oxford University Press, 2011 Ajit Pal, Microcontrollers: Principles and Applications, PHI Learning Private limited, Eastern Economy Edition, 2011. 															
Websites:															
<ol style="list-style-type: none"> http://nptel.ac.in http://www.intel.in 															