SOURASHTRA COLLEGE, MADURAI– 625004

(An Autonomous Institution Re-accredited with 'B' grade by NAAC)

MASTER OF COMPUTER APPLICATIONS (M.C.A)

(Syllabus under CBCS w.e.f. 2017 – 2018 onwards)

SEMESTER –I

S.No	Sub.code	Sub.Title	Hours/ week	Exam Hours	C.A.	S.E	Total	Credits
1.	17MCAC11	Data Structure and Applications	5	3	25	75	100	4
2.	17MCAC12	Digital Principles and System Design	5	3	25	75	100	4
3.	17MCAC13	Design and Analysis of Algorithm	5	3	25	75	100	4
4.	17MCAC14	Programming in C	5	3	25	75	100	4
5.	17MCACP1	Programming using C lab	5	3	40	60	100	4
6.	17MCACP2	Data Structure Lab	5	3	40	60	100	4

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Part III : CORE	Title : DATA STRUCTURE AND APPLICATIONS	Subject Code : 17MCAC11
Semester : I	Hours : 5 Hours / Week	Credits : 4

Objectives: To give knowledge on the concepts and applications of (i) linear data structures viz., arrays, stacks, queues (ii) linked linear data structures viz., linked lists, linked stacks and linked queues and (iii) Non-linear data structures viz.,trees, binary trees

Unit I Introductions and Overview: Definitions – Concept of Data Structure – Overview of Data Structure – Implementation of Data Structures.
Arrays: Definition – Terminology – One Dimensional Array – Multidimensional Array – Pointer Array.
Linked List:Definition – Single Linked List – Circular Linked List – Double Linked List – Circular Double Linked List – Application of Linked List – Memory Representation – Boundary Tag System – De allocation Strategy – Buddy System – Compaction.

Unit II Stacks:Introduction – Definition – Representation of Stack – Operation of Stacks – Applications of Stack.
Queue: Introduction – Definition – Representation of Queue – Various Queue Structure – Applications of Queue.

Unit III Trees: Basic Terminology – Definition and Concepts – Representation of Binary Tree – Operation of Binary Tree – Types of Binary Tree.

Unit IV Graphs: Introduction – Graph Terminologies – Representation of Graphs – Operation on Graphs – Application of Graph Structures – BDD and its Application.

Unit V Tables:Rectangular Tables – Jagged Tables – Inverted Tables – Hash Tables.
Sets: Definition and Terminologies – Representation of Sets – Operation of Sets – Application of Sets.

Text Book:

Classic Data Structure – D Samantha, PHI, 2008

References:

Data Structure and Problem Solving Using C++, 2/E, Allen Weiss, Addison Wesley Longman Publishing company 2006

Sl.No	Unit	Chapter	Page No.
1	I	1 , 2 , 3	1 -6 ,13 – 30 , 37 -64
2	II	4 , 5	105 – 185
3	III	6	190 – 207
4	IV	7	214 – 362
5	V	8 , 9	416 – 490 , 497 - 525

Passed in the BOS Meeting
Held on 15-3-2017

Signature of chairman/ HOD

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Part III : CORE	Title : DIGITAL PRINCIPLES AND SYSTEM DESIGN	Subject Code : 17MCAC12
Semester : I	Hours : 5 Hours / Week	Credits : 4

OBJECTIVES:

- To give knowledge about Binary, Octal, Decimal, Hexadecimal number system
- To inculcate knowledge on logic gates and Boolean algebra
- To give knowledge on the physical components of computers like Registers, Multiplexers, Decoders, Flipflops, and counters
- To impart knowledge on System design

UNIT I:

Binary Systems: Digital Computers and Digital System – Binary Numbers – Number Base Conversion – Octal and Hexadecimal Numbers – Complements – binary Codes –Binary Storage and Registers – Binary Logic – Integrated Circuits.

Boolean Algebra and Logic Gates: Basic Definition – Axiomatic Definition of Boolean Algebra – Basic Theorems and properties of Boolean Algebra – Boolean Functions – Canonical and Standard Forms – other Logic Operations – Digital Logic gates – IC Digital Logic families.

UNIT II:

Simplification of Boolean Functions: Map Method – Two and Three variable maps – Four variable Maps – Five and six variable maps – Product of Sums simplification –NAND and NOR implementation – Other two level implementation – Don't care Conditions.**Combinational Logic:** Introduction – Design Procedure – Adders – Subtractors – Code Conversion – Analysis Procedure – Multilevel NAND Circuits – Multi-level NOR circuits – XOR and Equivalence function..

UNIT III:

Combinational Logic with MSI and LSI: Introduction – Binary Parallel adder –decimal adder – Magnitude Comparator – Decoders – Multiplexers – Read only Memory – Programmable Logic array – Concluding remarks.**Sequential Logic:** Introduction – Flip-Flop – Triggering of Flip Flop – Analysis of clocked Sequential circuits.

Registers, counters and Memory Unit: Introduction – Registers – Shift Registers – Ripple Counters – Synchronous Counters – Timing Sequence – memory unit.

UNIT IV:

Processor Logic Design: Introduction – Processor organization – arithmetic logic unit – Design of arithmetic circuit – design of logic circuit – design of arithmetic logic unit – status registers – design of shifters – processor unit – design of accumulator.

Control Logic Design: Introduction – control organizational hardwired control – Micro program control – Control of Processor unit – Hard wired Control – PLA control – Micro Program Sequences.

UNIT V:

Computer Design: Introduction – System of Configuration – Computer Instructions – Timing and Control – Execution of instructions – design of Computer Registers – design of control – Computer console.**Micro Computer System Design:** Introduction – Micro Computer Organization – Micro processor Organization.

Text Book:

Digital Logic and Computer Design.M.Morris Mano, Prentice Hall of India.

Reference:

1. Digital Principles and Applications- Donald .P.Leach, Albert Paul Malvino, TMH 2005
2. Digital Logic and Computer Organization, V.Rajaraman, T.RadhaKrishnan, PHI, 2006
3. Computer Organization and Architecture, William Stallings, PHI 2008

Sl.No	Unit	Chapter	Page No.
1	I	1 , 2 , 3	1 -6 ,13 – 30 , 37 -64
2	II	4 , 5	105 – 185
3	III	6	190 – 207
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Part III : CORE	Title : DESIGN AND ANALYSIS OF ALGORITHMS	Subject Code : 17MCAC13
Semester : I	Hours : 5 Hours / Week	Credits : 4

OBJECTIVES: 1. To give knowledge on various algorithmic techniques like Divide and Conquer, Dynamic Programming, etc., and to solve problems using these techniques
2. To study various sorting and searching algorithms and measure the time and space complexity of each algorithm.

Unit I: Introduction: Algorithm – scope of algorithm – steps of development of algorithm – types of problem – types of solution procedure/algorithm – components of algorithm.

Unit II : Graph: Introduction – Terminology of Graph – Network – Tree –Tree traversal Distance based Network Algorithm: Introduction – Dijkstra's Algorithm Floyd's Algorithm – Minimum Spanning Tree Problems.

Unit III: Searching Algorithm: Introduction – Variable Based Search Algorithm – Branch and Bound Algorithm.

Unit IV: Sorting Algorithm : Straight Insertion Sort – Bubble Sort – Heap Sort – Quick Sort – Merge Sort – Analysis of volume and time complexity.

Unit V: Heuristics : Introduction – Traveling sales problem – Simple Heuristic to minimize total tardiness in single machine scheduling problem .

Dynamic Programming: Introduction – Terminology – Dynamic Programming Algorithm – Application Area of Dynamic Programming.

TEXT BOOK:

1. Design an analysis of Algorithm, R.Paneerselvam, Eastern Economy Edition PHI, New Delhi 2007. Chapters 1, 2, 4,5,6,7 (7.1, 7.2, 7.3),11

REFERENCE:

1. Fundamentals of Computer algorithm, Ellis Horowitz, Sartajsahni.

Sl.No	Unit	Chapter	Page No.
1	I	1	1 – 19
2	II	2 , 4	23 – 49 , 78 – 108
3	III	5	118 – 171
4	IV	6	185 – 216
5	V	7	223 – 232 , 296 – 306

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Part III : CORE	Title : PROGRAMMING IN C	Subject Code : 17MCAC14
Semester : I	Hours : 5 Hours / Week	Credits : 4

Objectives:

- To make understand the concepts and features of C programming language
- To enrich the logical skills of the students by solving problems using C language

Unit-I:Overview of C:

History of C – Importance of C – Basic structure of C – Programming style – Constants, variables and Data types – declaring a variable as constant, volatile – overflow and underflow of data. Operators and expressions: arithmetic, relational, logical, assignment operators – increment and decrement operators, conditional operators, bitwise operators, special operators – arithmetic expression – evaluation of expressions – precedence of arithmetic operators – type conversion in expression – operator precedence and associativity – mathematical functions – managing I/O operations: reading and writing a character – formatted input, output. Decision making and

Branching: if statement, if….else statement – nesting of if …else statement – Else if Ladder – Switch statement – the ?:operator – goto statement.

Unit –II:

The While statement – do statement – The for statement – jumps in loops.

Unit-III: Arrays:

One – dimensional array – declaration, initialization – two dimensional array – multi – dimensional array – dynamic arrays – initializations.

Strings:

Declaration, initialization of string variables – reading and writing string – arithmetic operations on strings – putting strings together – comparison – string handling function – table of strings – feature of strings.

Unit-IV: **User defined functions:**eedmulti function program – elements of user defined function – definition – return values and their types – function calls, declaration, category arrays, strings to functions – scope visibility and life time of variables – multi file programs.

Structures and unions: Defining a structure – declaring structure variables – accessing structure members– initialization – copying and comparing – operations on individual members – arrays of structures – arrays within structures – structures within structures – structures and functions – Unions – size of structures – bit fields.

Unit V: **Pointers:**Accessing the address of a variable – declaring, initialization of pointer variables – accessing a variable through its pointer – chain of pointers – pointer expressions – pointer increment and scale factor pointers and arrays – pointers character strings – array of pointers – pointers and structures.

Files: Defining, opening, closing a file: I/O operations on files – error handling during I/O operations – random access file – command line argument.

Text Book:

Programming in ANSI C, E. Balagurusamy, Tata McGraw Hill Publisher Company, 2008.

Sl.No	Unit	Chapter	Page No.
1	I	1 , 2 , 3	1 – 14 , 22 – 45 , 52 – 73
2	II	4 , 5 , 6	83 – 96 , 112 – 135 , 151 – 176
3	III	7 , 8	192 – 216 , 227 – 261
4	IV	9 , 10 , 11	270 – 312 , 324 – 344 , 357 – 384
5	V	12	395 - 414

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Part III : CORE	Title : PROGRAMMING IN C LAB	Subject Code : 17MCACP1
Semester : I	Hours : 5 Hours / Week	Credits : 4

1. Program Using formulas
2. Program using if Statement
3. Program using Switch Statement
4. Program using if… Else Statement
5. Program using loop constructs
6. Program using functions
7. Program using Recursion
8. Program using arrays
9. Program using pointers
10. Program using Files
11. Program using structures
12. Program using Command Line arguments

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Part III : CORE	Title : DATA STRUCTURE LAB	Subject Code : 17MCACP2
Semester : I	Hours : 5 Hours / Week	Credits : 4

Write C Programs for the following:

1. To check the presence of an element in an array using binary search.
2. To find the transpose of a non-square matrix.
3. To find the row sum and column sum of a non-square matrix
4. To do any five string operations
5. To manipulate a stack using array data structure.
6. To balance the parenthesis in an expression
7. To manipulate a queue using array data structure
8. Using structures prepare an address book
9. To do inventory control using file
10. To prepare student mark list using file
11. To manipulate a linked list
12. To manipulate a circularly linked list
13. To traverse a binary tree
14. To search an identifier in a binary search tree.

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SEMESTER –II

S.No	Sub.code	Sub.Title	Hours/ week	Exam Hours	C.A.	S.E	Total	Credits
1.	17MCAC21	Management Accountancy	5	3	25	75	100	4
2.	17MCAC22	Discrete Mathematics	5	3	25	75	100	4
3.	17MCAC23	Modern Operating System	5	3	25	75	100	4
4.	17MCAC24	Object Oriented Programming using C++	5	3	25	75	100	4
5.	17MCACP3	Operating System Lab	5	3	40	60	100	4
6.	17MCACP4	Object Oriented Programming using C++ Lab	5	3	40	60	100	4

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Part III : CORE	Title : MANAGEMENT ACCOUNTANCY	Subject Code : 17MCAC21
Semester : II	Hours : 5 Hours / Week	Credits : 4

Objectives: 1. To give knowledge on solving problems in Management Accounting
2. To give knowledge on solving problems in Budgeting & Forecasting
3. To give knowledge on solving problems in Inventory control system

UNIT I:

Accounting and Accounting records – Journal – Ledger – Subsidiary books – Balance – Final Accounts.

UNIT II:

Objectives of carrying inventory – Inventory costs – EOQ – Safety stock order point – ABC analysis – Comparison of financial statements – Ratio analysis – Limitations.

UNIT III:

Standards for control – Variable / Fixed Costs – Contribution – Break Analysis Standard / Actual cost – Material Price / Usage Variance – Labour cost variance – Sales Price / quantity variance.

UNIT IV:

Budgeting and forecasting – Objectives – Sales, Production, Purchase List – Capital Expenditure and cash budgets.

UNIT V:

Working Capital cycle – Economic and Financial Capital investment through discounted Cash flow – Accounting rate of return – Internal rate of return – back period – sensitivity Analysis.

Text Books:

1. Advance Accountancy, R.L. Gupta, M. Radhasamy, Sultan chand& Sons, 1989
2. Financial Management, S.C. Kuchhal, Chaitanya Publishing House, 1989

Reference Books:

1. Management Accounting, Financial Management and holding company accounts S. Nagarathnam, S. Chand & Co., 1989.
2. Accounting for Managers, Dr. Jawaharlal, Himalaya Publishing

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Part III : CORE	Title : DISCRETE MATHEMATICS	Subject Code : 17MCAC22
Semester : II	Hours : 5 Hours / Week	Credits : 4

Objectives:

- To teach the basic concepts of Set theory, Relations and Functions
- To impart knowledge on solving problems using Recurrence relation, Generating functions and logic
- To teach the basic concepts of Lattices, Boolean Algebra and Graph theory

Unit I : Set Theory : Introduction– Sets-Subsets-Venn Diagram-Operations–Properties-Duality. Relations : Cartesian Product-Relations-Operations-Equivalence Relations-Closure and Warshall's Algorithm.

Unit II : Functions: Functions and Operators-One to One-Onto Functions-Special Type of Functions-Inversions-Composition of Functions.

Mathematical Inductions: Technical Proof-Mathematical Induction.

Unit III : Recurrence Relation and Generating Functions: Introduction-Polynomial and their Evaluations-Recurrence Relations-Solution of Finite order homogeneous relations-Solution of Non-homogeneous- Generating Functions-Some common Recurrence Relations-Primitive Recursive Functions.

Unit IV : Logic: Introduction-TF Statements-Connectives-Atomic and Compound Statements-Well-formed Formulae-Truth Tables-Tautology-Tautological Implications and Equivalence of Formulas-Replacement Processes-Normal Forms-Principal Normal Forms

Unit V : Lattices and Boolean Algebra: Lattices-Properties-New Lattices-Modular and Distributive Lattices-Boolean Algebra-Boolean Polynomials-K-map.

Graph Theory: Basic concepts-Matrix Representation-Trees-Spanning Trees-Shortest path Problem-Directed Trees.

Text Book:

1. Discrete Mathemetics by Dr. M.K. Venkatraman, Dr. N. Sridharan and N. Chandrasekaran, The National Publishging Company, July 2012

Reference:

1. Discrete Mathematical Structures by Kolman Busby Ross , PHI, 5TH Edition.

Sl.No	Unit	Chapter	Page No.
1	I	1 , 2	1.1 – 1.24 , 2.1 – 2.40
2	II	3 , 4	3.1 – 3.13 , 4.1 – 4.2
3	III	5	5.1 – 5.33
4	IV	9	9. 1 – 9.49
5	V	11	11.1 – 11.81

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Part III : CORE	Title : MODERN OPERATING SYSTEM	Subject Code : 17MCAC23
Semester : II	Hours : 5 Hours / Week	Credits : 4

Objectives:

- To give knowledge on the various concepts of Operating systems
- To impart knowledge on Deadlock, Processor scheduling, Memory management and disk scheduling

Unit-I:

What is an OS?- History – The operating system zoo- mainframe OS- server OS- multiprocessor OS- Real time OS- smart ward OS- operating system concepts- systems calls for process management- system calls for file management- system calls for directory management- OS structure- monolithic systems client- server model.

Unit-II:

Process- the process model- process creation- process termination- process hierarchies- process states- threads- usage- classical thread model- posix threads- implementing threads in user space and kernel- pop up threads- race conditions- critical region- mutual exclusion- sleep and wake up- semaphores- monitors- message passing- scheduling- classical IPC problems.

Unit- III:

Memory abstraction- a memory abstraction- virtual memory- page replacement algorithm- design uses- implementation issues- segmentation- pure segmentation- segmentation with paging- multics.

Unit- IV:

Files- warning- structure- types- access- attributes- file operation- a rectories- single level- hierarchical systems- directory operations- disk space management- life systems backups- consistency.

Unit-V:

I/O devices – device controllers- memory mapped I/O- DMA- goals of the I/O software- programmed I/O- interrupt driven I/O-I/O using DMA-Disk hardware- formatting, scheduling algorithms- condition for deadline- modeling- ostrich algorithm- detection and recovery- avoidance- prevention.

Textbook:

Modern OS, 3rd Edition, by Andrew S. Tanenbaum, Pearson, Prentice Hall.

Reference:

1. Operating System, Internals and Design Principles, William Stallings, PHI 2008
2. An Introduction to Operating Systems. Concepts and Practice, Pramod Chandra P.Bhatt, Prentice Hall of India, 2007
3. Operating System A Concept Based approach by D.M.Dhamdhere, Second Edition, Tata McGraw Hill Publishing Company, New Delhi 2006.

Sl.No	Unit	Chapter	Page No.
1	I	1	31 -46 , 61 – 90 , 95
2	II	2	111 -118 , 123 -140 , 145 – 168 , 191 – 195
3	III	3	207 – 212 , 216 – 226 , 229 – 237 , 244 – 261
4	IV	4	285 – 292 , 296 – 300 , 320 – 322
5	V	5	358 – 364 , 371 -375 , 404 , 466 – 484

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Part III : CORE	Title : OBJECT ORIENTED PROGRAMMING USING C++	Subject Code : 17MCAC24
Semester : II	Hours : 5 Hours / Week	Credits : 4

Objectives:

- To inculcate knowledge in object oriented programming concepts.
- To enrich the knowledge in inheritance and virtual functions
- To give knowledge on file handling

Unit I: Principles of object Oriented Programming (OOP): Software Evolution Paradigm – Basic concepts of OOP – Benefits of OOP – Object Oriented Language – Applications of OOP. Introduction to C++-Tokens,Keywords,Identifiers and constants – data types –symbolic constants – type compatibility – declaration, dynamic initialization of variables – reference variables – operators – scope resolution – member dereference – memory management operators – manipulators – type cast operators – expressions and their types – special assignment expressions – implicit conversion – operator overloading – precedence – control structures – Functions: main function – function prototyping – return by reference – inline functions – default,constarguments – function overloading – friend and virtual functions – math library functions

Unit II: Classes and Objects: specifying a class – defining member function –making an array with function inline – nesting of member function,private member function – arrays within a class – memory allocation for objects-static data members – static member functions – arrays of objects – objects as function arguments – friendly functions – returning objects – const member functions – pointers to members – local classes.

Unit III: Constructors and Destructors: constructors – parameterized constructors – multiple constructors in class – constructors with default arguments – dynamic initialization of objects – copy,dynamic constructors-constructing two dimensional arrays – destructors. Operator overloading and type conversions: defining operator overloading – overloading unary, binary operators – using friends – manipulation of strings using operators – rules for overloading operators – type conversions.

Unit IV: Inheritance extending classes: Defining derived classes – Single inheritance – making a private member inheritance – Multilevel inheritance – Multiple inheritance – Hierarchical inheritance – Hybrid inheritance – virtual base, abstract classes – constructors in derived classes – member classes: nesting of classes – pointers, Virtual functions and Polymorphism; pointers-pointers to objects-'This' pointer – pointers to derived classes –virtual functions – pure virtual functions – managing console i/o operations: streams – stream classes – unformatted I/O operations – formatted console I/O operations –managing input with manipulators.

Unit V: Working with files: Classes for file stream operations – opening and closing of a file – End – of – file deletion – more about open (); file modes, file pointers and manipulations – sequential input and output operations – Updating a file: random access – Error handling during file operations – Command line arguments. Templates: class templates, and with multiple parameters – function templates, and with multiple parameters –overloading of templates functions – member function templates – non type template arguments. **Exception handling:** Exceptions handling mechanisms – throwing and catching mechanism – rethrowing exception – specifying exception

Text book:

Object Oriented Programming with c++, Balagurusamy, 5th edition,Tata McGraw-Hill, New Delhi, 2008.

Reference:

C++, The Complete Reference, 4th edition,Herbert Schildt, TMH, 1999.

Sl.No	Unit	Chapter	Page No.
1	I	1 , 2 , 3	4 -11 , 16 – 24 , 30 -52
2	II	5	90 – 124
3	III	6 , 7	131 – 146 , 155 – 170
4	IV	8 , 9	182 – 209 , 226 – 246
5	V	13	344 – 359

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Part III : CORE	Title : OPERATING SYSTEM PROGRAMMING LAB	Subject Code : 17MCACP3
Semester : II	Hours : 5 Hours / Week	Credits : 4

I. Unix Programs Lab Cycle

1. Write a shell script for sorting, searching and insertion/deletion of elements in a list
2. Write a shell program to display the good morning, good afternoon, good evening and good night depending on the users log on time
3. Write a shell script which works similar to the wc command. This script can receive the option -l, -w, -c to indicate whether number of lines/ words/characters
4. Write a shell script which deletes all lines containing the word "UNIX" in the files supplied as arguments to this shell script
5. Write a shell script which displays a list of all files in the current directory to which you have read, write and execute permissions
6. Write a shell script which deletes all lines containing the word "xx"
7. Write a shell script containing a function mycd() using which, it is possible to shuttle between directories
8. Write a shell program for basic network commands
9. Write a shell script for renaming each file in the directory such that it will have the current shell's PID as an extension. The shell script should ensure that the directories do not get renamed
10. Write a program which demonstrates the shared memory functions .

II. System Calls Programs Lab Cycle

11. Program using system calls : create, open, read, write, close, stat, fstat, lseek
12. Copying files using system calls
13. Implement ls command using system calls
14. Implement cat command using system calls
15. Implemetps command using system calls.

III. Linux Programs Lab Cycle

16. Program to implement inter process communication using pipes
17. Program to perform inter process cots : sniffer
18. Create two processes to run a for loop, which adds numbers 1 to n, say one process adds odd numbers and the other even
19. Create a file that is shared among some users, write a program that finds whether a specific user has created read and write operations on the file
20. Write a program demonstrating semaphore operation on a shared file for reading but not writing
21. Write a program demonstrating mutual exclusion principle

22. Write a program which reads a source file name and destination file name using command line arguments and then converts into specified format (i.e. either from lower case to upper case or upper case to lower case or inverse of each)
23. Write a program which takes a set of filenames along with the command line and print them based on their size in bytes either ascending or descending order
24. Write a program which takes directory name along the command line and displays names of the files which are having more than one link
25. Write a program to demonstrate the use of exec family functions
26. Write a program to demonstrate the locking mechanism while accessing the shared files

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Part III : CORE	**Title : OBJECT ORIENTED PROGRAMMING USING C++ LAB**	**Subject Code : 17MCACP4**
Semester : II	**Hours : 5 Hours / Week**	**Credits : 4**

Write a program in C++

1. To fid sum of digits of a number , to reverse a given number and check if it is palindrome
2. To evaluate sine series and cosine series
3. To sort an array using bubble sort and insertion sort
4. To count the occurrences of a number in a set
5. To solve quadratic equation using switch case
6. To do string operation
7. To find Factorial vale Fibonacci, GCD using recursion
8. To add, subtract, and multiply two matrix
9. To find row wise sum of a matrix of order mXm
10. To perform binary search and linear search using function
11. To find NCR and NPR value using function
12. To calculate mean, variance, and standard deviation using function
13. To prepare Pay Bill- Structure.

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III SEMESTER

S.No	Sub.code	Sub.Title	Hours /week	Exam Hours	C.A.	S.E	Total	Credits
1.	17MCAC31	Operations Research	5	3	25	75	100	4
2.	17MCAC32	Database Management System	5	3	25	75	100	4
3.	17MCAC33	Java Programming	5	3	25	75	100	4
4.	17MCAN31	Information Technology and Management	5	3	25	75	100	4
5.	17MCACP5	DBMS Lab	5	3	40	60	100	4
6.	17MCACP6	Programming in J2EE	5	3	40	60	100	4

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Part III : CORE	Title : OPERATIONS RESEARCH	Subject Code : 17MCAC31
Semester : III	Hours : 5 Hours / Week	Credits : 4

Objectives:

- To solve Assignment problems and Transportation problems using OR techniques
- To solve LPP using Graphical, Simplex, methods
- To impart knowledge on solving problems in Game theory, queuing theory and PERT/CPM

UNIT I: Transportation problems – Vogel's Approximation Method – MODI method – Transhipment Problem. Assignment Problem – Travelling salesman Problem.

UNIT II: Game theory – Two Person Zero Sum game * Game with and without saddle Poiunt – Solution of 2 ✶2 game – Dominance – Graphical Method.

UNIT III: Network Scheduling – Critical path – CPM – PERT – PERT algorithm – Resource Allocation and scheduling.

UNIT IV: Queuing Theory: Poission and Exponential Distribution, Birth – Death process – queues with combined Arrivals and Departures – Steady State Measures – Special Passion Queues: Including Multiple Serves and / or finite waiting call.

UNIT V:
Linear Programming problems formation – Graphical Method – Simplex Method.

Text Books: Operations Research, KantiSwarup, R.K.Gupta and Manmohan, sultan Chand & Sons, Delhi, 1994.

Sl.No	Unit	Chapter	Page No.
1	I	10 , 11	171 – 207 , 209 – 230
2	II	17	313 – 339
3	III	21	459 – 480
4	IV	20	415 – 421
5	V	2 , 3	29 – 56 , 57 – 86

Passed in the BOS Meeting
Held on 15-3-2017

Signature of chairman/ HOD

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MASTER OF COMPUTER APPLICATIONS (M.C.A)
(Syllabus under CBCS w.e.f. 2017 – 2018 onwards)

Part III : CORE	Title : DATABASE MANAGEMENT SYSTEM	Subject Code : 17MCAC32
Semester : III	Hours : 5 Hours / Week	Credits : 4

Objectives:

- To give knowledge about the basic concepts of Database management systems
- To make understand the need of normalization using various normal forms
- To give knowledge about SQL and on-line Transaction processing

UNIT I:

Introduction: Database System Applications – Purpose of Database Systems – View of Data – Relational Database – Database Design – Object-Based and Structured Databases – Data Storage and Querying – Transaction Management – Database Architecture – Database Users and Administrators. Relational Model: Structure of Relational Database – Fundamental Relational Algebra Operations – Tuple Relational Calculus – Domain Relational Calculus.

UNIT II:

Database Design and E-R Model: Overview of the Design Process – The entity – Relationship Model – Constraints – Entity-Relationship Diagram – Entity – Relationship Design Issues – Weak Entity Sets – Extended E-R Features – Database Design for Banking Enterprise Relational Database Design: Features of Good Relational Designs – Atomic Domains and First Normal Form – Decomposition using Functional Dependencies – Functional Dependency Theory – Decomposition using Function Dependencies – Decomposition using Multi valued Dependencies.

UNIT III:

Object – Based Databases: Overview – Complex Data types – Structured Types and Inheritance in SQL – Table Inheritance – Array and Multi set Types in SQL – Object – Identity and Reference types in SQL – Implementing O-R Features – Persistence Programming Languages – Object-Oriented Versus Object – Relational Databases.

UNIT IV:

Storage and File Structure: Overview of Physical Storage Media – Magnetic Disk – 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 – Multiple – Key Access – Static Hashing – Dynamic Hashing.

UNIT V:

Transactions: Transaction Concept – Transaction State – Implementation of Atomicity and Durability – Concurrent Executions – Serializability – Recoverability – Implementation of Isolation – Testing for Serializability. Concurrency control: Lock – Based Protocols - Timestamp – Based Protocols – Validation-Based Protocols Recovery System: Failure Classification – Storage Structure- Recovery and Atomicity – Log – Based Recovery – Recovery with Concurrent Transactions.

Text Book:

Database System Concepts – Fifth Edition, Abraham Silberschats, Henry F.Korth, and S.Sudarshan, TMH, 2006.

Reference Book:

Essentials of Database Management Systems, Alexis Leon, Mathews Leon, Nicole Imprints Pvt. LTd., 2006.

Sl.No	Unit	Chapter	Page No.
1	I	1.1 – 1.3 , 3.1 -3.4	1-11 , 63 – 93
2	II	2.5 – 2.9 , 6.5 , 7.3 – 7.6	36 – 58 , 202 – 210 , 221 – 244
3	III	9.2 – 9.4 ,8.2	278 – 288 , 253 – 262
4	IV	10.1 – 10.8 , 11.1 – 11.3 , 11.5 – 11.6 , 11.9	339 – 356 , 358 – 369 , 372 – 376
5	V	13.1 – 13. 9 , 14.1 – 14.3 , 15.1 – 15.6	439 – 465 , 471 – 487 , 511 – 531

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Part III : CORE	Title : JAVA PROGRAMMING	Subject Code : 17MCAC33
Semester : III	Hours : 5 Hours / Week	Credits : 4

Objectives:

- To give knowledge about OOP concepts using JAVA language
- To make understand the features of JAVA as a Platform independent Language
- To train the students by solving various problems using JAVA

UNIT-I : The genesis of java Java's lineage, The creation of java, Why java is important to the internet, Java's magic:
The Bytecode, The java Buzzwords, The continuing Revolution.An Overview of Java-Object-oriented Programming, A first simple program, A second Short Program, Two control statements, Using blocks of code, Lexical issues, The java class libraries.
Data Types, Variables and Arrays
Java is a strongly typed language, The simple types, Integers, Floating-point types,Characters,Booleans,A closer look at literals,Variables,Type conversion and casting, Automatic type promotion in expressions,Arrays,A few words about strings,A note to c/c++ programmers about pointers.

UNIT-II
Operators-Arithmetic Operators, The bitwise operators, Relational operators, Boolean logical operators, The assignment operators, The operators, Operator precedence, Using parentheses.
Control Statements- Java's selection statements, Iteration statements, Jump statements.
Introducing Classes-Class fundamentals, Declaring objects, Assigning object reference variables, Introducing methods, Constructors, The this keyword, Garbage collection, The finalize() method, A stack class.

UNIT-III
Inheritance-Inheritance basics, Using super, Method overloading, Dynamic method dispatch, Using abstract classes, Using final with inheritance, The object class.
Packages and Interfaces-Packages, Access protection, Importing packages, Interfaces.
Exception Handling-Exception-Handling fundamentals, Exception types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, Nested try statements, Throw, Throws, Finally, Java's built-in exception, Creating your own exception subclasses, Chained exceptions, Using Exceptions.

UNIT-IV
Multithreaded Programming-The java thread model, The main thread, Creating a thread, Creating multiple threads, Using isAlive() and join(), Thread priorities, Synchronization, Interthread communication, suspending, Resuming, And stopping threads, Using multithreading.

I/O, Applets and other topics- I/O basics, Reading console input, Writing console output, The printwriter class, Reading and Writing files, Applet fundamentals, The transient and volatile modifiers, Using instanceof, Strictfp, Native methods, Using assert.

UNIT-V

Networking-Networking basics, Java and the net, Inet address, Tcp/Ip client sockets, URL , URLconnection, Tcp/Ip Server sockets , A caching proxy HTTP server, Datagrams, Inet4address and Inet6address, The URL class.

The Applet class-Applet basics, Applet architecture, An Applet skeleton, Simple applet display methods, Requesting Repainting, Using the status window, The HTML APPLET tags, Passing parameters to applets, The audioclip interface, The appletstub interface, Outputting to the console.

TEXT BOOKS:

Patrick Naughton, "COMPLETE REFERENCE: JAVA 2,"Tata McGraw-Hill,2003.

REFERENCE BOOK: Complete Reference J2EE, Tata McGraw Hill "Jim Keogh"

Sl.No	Unit	Chapter	Page No.
1	I	1,2,3	3-15,17-39,41-71
2	II	4,5,6	73-96,99-126,129-151
3	III	8,9,10	189-220,223-246,249-271
4	IV	11,12	273-311,313-343
5	V	18,19	587-626,627-652

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Part IV : NME	Title : INFORMATION TECHNOLOGY AND MANAGEMENT	Subject Code : 17MCAN31
Semester : III	Hours : 5 Hours / Week	Credits : 4

Objectives:

1. To impart knowledge about the various aspects of MIS and System Design
2. To give knowledge in the following Packages:
   MS Word, MS Powerpoint, Financial Accounting Package, and SPSS

Unit I: Introductory - Overview of MIS - Structure of MIS - Components of data processing - Inter relationships. Concepts - Information, Systems, Communication Decision Making Process.

Unit II: Information support for managerial process.

1. Transaction support
2. Decision support
3. Planning and control support
4. Data Base Management Systems.

System Design: 1. Analysis 2. Design 3. Implementation, Philosophies, methodologies.

Unit III: MS Word – The Ribbons – creating, editing – layouts - Formatting Text, paragraphs – Styles – Tables – Graphics– Table of Contents –Track changes – mail merge. MS Excel - – The Ribbons – workbook creating, editing, saving documents - modifying a worksheet – Calculations - Sort and Filter – Graphics – Charts – Format worksheets – Developing a workbook – page properties and printing – Layouts.

MS Power point – presentations – Working with content – Adding Content – Graphics – Tables – Charts – Designing of background and Animations – printing. E-Mail – Video Conferencing.

Unit IV: Financial And Accounting Management:Introduction to accounting packages – exercises on creating, altering and displaying –Ledgers and Vouchers – Inventory management – Payroll – Reports using any one financial accounting package.

Unit V: Exercises to use research data and analyze using various statistical methods (learned in statistics management course) using SPSS. Introduction and hands on experience.

Text/ Reference Books.

1. Gordon B Davis - Management Information System
2. Margerethe H Olson, Scott - Principles of Management Information System
3. C Kenneth - MIS Org & Tech

Sl.No	Unit	Chapter	Page No.
1	I	1 , 2 , 3	4 -11 , 16 – 24 , 30 -52
2	II	5	90 – 124
3	III	6 , 7	131 – 146 , 155 – 170
4	IV	8 , 9	182 – 209 , 226 – 246
5	V	13	344 – 359

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Part III : CORE	Title : DBMS LAB	Subject Code : 17MCACP5
Semester : III	Hours : 5 Hours / Week	Credits : 4

1. Creating database tables and using data types.

   Create table, • Modify table, • Drop table
2. Practical Based on Data Manipulation.

   Adding data with Insert, • Modify data with Update,• Deleting records with Delete
3. Practical Based on Implementing the Constraints.

   NULL and NOT NULL, • Primary Key and Foreign Key Constraint • Unique, Check and Default Constraint
4. Practical for Retrieving Data Using following clauses.

   Simple select clause, • Accessing specific data with Where, Ordered By, Distinct and Group By
5. Practical Based on Aggregate Functions.

   AVG, • COUNT, • MAX, • MIN, • SUM, • CUBE
6. Practical Based on implementing all String functions.
7. Practical Based on implementing Date and Time Functions.
8. Practical Based on implementing use of union, intersection, set difference.
9. Implement Nested Queries & JOIN operation.
10. Practical Based on performing different operations on a view.
11. Practical Based on implementing use of triggers, cursors & procedures.
12. Make a Database connectivity with front end tools like – VB, VC++,D2K
13. Design and implementation of Payroll processing System.
14. Design and implementation of Banking system.
15. Design and implementation of Library Information System.

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Part III : CORE	Title : PROGRAMMING IN J2EE	Subject Code : 17MCACP6
Semester : III	Hours : 5 Hours / Week	Credits : 4

1. Java program using swing components Containers, Layout Managers.
2. Java Swing Applications using the GUI Components with a Look and Feel
3. Performing Java Database Connectivity.
4. HTML to Servlet Applications.
5. Applet to Servlet Communication.
6. Developing application using Servlet.
7. Creating JSP program using JavaBeans.
8. Developing aEnterprise Java Bean Application.
9. Designing online application with JSP.
10. Building web applications.

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IV SEMESTER

S.No	Sub.code	Sub.Title	Hours/ week	Exam Hours	C.A.	S.E	Total	Credits
1.	17MCAC41	Computer Graphics and Multimedia	5	3	25	75	100	4
2.	17MCAC42	Data Communications & Networking	5	3	25	75	100	4
3.	17MCAC43	Software Engineering	5	3	25	75	100	4
4.	17MCAE41*	Mobile Computing and Wireless Technology	5	3	25	75	100	5
	17MCAE42*	Distributed Systems	5	3	25	75	100	5
	17MCAE43*	Image Processing	5	3	25	75	100	5
5.	17MCACP7	Computer Graphics and Multimedia Lab	5	3	40	60	100	4
6.	17MCACP8	Network Programming	5	3	40	60	100	4

***One paper has to be chosen out of three elective papers**

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Part III : CORE	Title : COMPUTER GRAPHICS AND MULTIMEDIA	Subject Code : 17MCAC41
Semester : IV	Hours : 5 Hours / Week	Credits : 4

Objectives:

- To give knowledge about various display devices, input devices on Graphic systems
- To impart knowledge on various algorithms for line drawing, circle generating, ellipse generating, polygon filling, and clipping
- To make understand two-dimensional transformations like scaling, rotation, translation, etc., and Window-to-Viewport coordinate transformation.
- To give knowledge on multimedia concepts viz., Text, Audio, Video, Images and Graphics
- To impart knowledge on Digital Audio and Digital Video systems

Unit I

Computer Graphics Applications: Introduction – Application – Graphical User Devices ; Introduction – Display System – Hardware Components – Graphical user Interface; Introduction – Types of GUI – Designing of GUI – Principles for good GUI Design – User Interface Engineering – GUI Examples – Creating Graphical Interfaces – Scan conversion; Line Drawing algorithms – DDA Algorithm – Bresenham's Line Drawing Algorithm – General Bresenham's Algorithm – Bresenham's Circle generation Algorithm – Poly Filling.

Unit II

Windows and Clipping : Windows and view – port – Window to view – port Mapping – Clipping – Sutherland Cohen subdivision Line clipping Algorithm – Midpoint subdivision Algorithm ; 2D Transformation : Introduction – Representation of a points – Transformation – Transformation between coordinate system – Translation and Homogenous coordinates – Translation – 2D Rotation – Reflection – Scaling – Shearing.

Unit III

3D Transformation: Introduction – Representation of points – Representation of 3D object in Matrix form – 3D Translation – 3D Rotation – 3D Reflection – 3D Scaling – 3d Shearing. 3D Perspective Geometry ; 3D Viewing An Introduction – Terms related to Hidden surfaces; Hidden Surface and lines – Back face Detection – Back face Removal – Z Buffer Algorithm – A Buffer Algorithm

Unit IV

Multimedia An Overview – Introduction – Presentation and Production – Characteristics of Multimedia Presentation – Hardware and Software Requirements – Uses of Multimedia – Visual display System : Introduction – Cathode Ray Tube – Video Adapter Card – Video Adapter Cable – Liquid Crystal Display – Plasma Display Panel. Text: Introduction – Types – Standards – Font – Insertion of Text – Text Compression – File formats. Image: Introduction – Image type – Seeing Color – Color Models – Basic Steps for Image Processing – Interface Standards – Color Management System – File formats

Unit V

Audio: Introduction – Nature – Fundamentals Characteristics of Sound – Elements of audio system – MIDI – Sound card – Audio file formats and CODECs. Video : Introduction – analog Video Camera – Transmission of Video signals – Video signa formats – Television broadcasting standards – Digital Video –Digital Video Standards – Video File Formats & CODECs, Compression Techniques – JEPG Image Coding standards – MPEG Standards Overview.

Text Book:

1. Computer Graphics, ISRD Group, The McGraw Hill, 2006(UNIT I,II,III)
2. Principles of Multimedia, Ranjan Parekh The McGraw Hill, 2006(UNIT IV,V)

References:

1. Computer Graphics, Multimedia and Animation, Malay K. Pakhira, PHI 2007
2. Computer Graphics,DonaldHearrBanline Barker,PHI,2007
3. Multimedia Making it Work, Tay Vaughan, Tata McGraw Hill 2007

Sl.No	Unit	Chapter	Page No.
1	I	1,2,3,4	1-68
2	II	5,6	69-106
3	III	7,8,9	107-175
4	IV	1,3,4,5	1-21,54-90,91-114,130
5	V	7,8,10	178-193,207-222,289-328,383-417.

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Part III : CORE	Title : DATA COMMUNICATIONS AND NETWORKING	Subject Code : 17MCAC42
Semester : IV	Hours : 5 Hours / Week	Credits : 4

Objectives:

- To teach various types of networking technology and Network topologies
- To impart knowledge on various issues of the different layers of OSI
- To learn about ISDN, TCP, ATM, FDP, UDP
- To introduce the basic concepts of Web page design using HTML

UNIT-I:

Introduction – fundamental concepts – data communications – protocol standards – Standards organization – signal propagation – analog and digital signals – bandwidth of a signal and medium – Fourier analysis – data transmission rate and bandwidth. Analog and digital transmission methods: Introduction – Analog and digital transmission – badu rate and bit per second – analog signal storage and transmission – Nyquist theorem. Modes of date transmission. Multiplexing: Introduction – parallel and serial communication – synchronous, asynchronous and isochronous communication – simplex, Half duplex and full duplex communication – types of multiplexing – FDM versus TDM.

Transmission errors: Detectiona and Correction – classification – types.

Transmission Media: Introduction – guided media – unguided media – storage capacity.

UNIT II:

Network topologies, switching and routing algorithm: Introduction – different topologies – switching and types – router and routing algorithms. Networking protocols and OSI model: Introduction – protocols in computer communications – OSI model. LAN, MAN, WAN architectures – addressing and transmission mechanism – Packet forwarding – next hop table and routing.

UNIT III:

ISDN – background, architecture, interfaces – Functional grouping – reference points – protocols architecture – B-ISDN.X.25 Protocol – working and characteristics – operations. Frame Relay: need, working – frame format – congesting control – traffic control – FRAD. ATM: overview- packet size – Virtual Circuits in ATM-ATM cells – switching – ATM layers.

UNIT IV:

TCP Basics – Features, Connections, Packet Format.UDP – UDP Packet format.Differences between TCP and UDP. DNS – Email – FTP – TFTP.

UNIT V:

WWW – history and browsing – HTML – Web Browser Architecture – Web Pages and Multimedia – Remote Login (Telnet) – static and Dynamic Active Web Pages.

Text Book:

1. Data Communciation and Networks – Achyuts.Godbole, Tata McGraw Hill, 2005

Reference:

1. Computer Networks, Andrew S.Tanenbum, 4th Ed, Prentice Hall of India, 2006.
2. Data Communication and Networking, William Stallings, PHI, 2007.

Sl.No	Unit	Chapter	Page No.
1	I	1.0 -1.10 , 2.0 - 2.6	1-21,24-37
2	II	3.0-3.6,4.0-4.3,6.0-6.3	40-59,62-76,106-122.
3	III	7.0-7.9,8.0-8.4,9.0-9.17	124-139,153-174,176-209
4	IV	10.5-10.11,11.0-11.5,12.0-12.8	212-232,235-246,248-262
5	V	19.0-19.4,20.0-20.7	421-454,457-482

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MASTER OF COMPUTER APPLICATIONS (M.C.A)

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Part III : CORE	Title : SOFTWARE ENGINEERING	Subject Code : 17MCAC43
Semester : IV	Hours : 5 Hours / Week	Credits : 4

Objectives:

- To impart knowledge on systematic way of software development and Maintenance
- To give knowledge about the important activities of the Software Risk Management and SQA
- To introduce the SE Tools

UNIT I: Introduction to Software Engineering – Introduction: Software – what is a good Software? – Software Engineering – Components of Software Engineering – Software Development models – Comparative Analysis of process models. Software Estimation size, Effort and Cost: Software Metrics: Metrics database FPA and MARk II FPA tool for Estimation – Case Illustration – Estimation of Effort and Schedule – COCOMO – Software Cost Estimation.

UNIT II : Software Risk Management: Introduction to Software Risk – Software Risk Management – Risk Mitigation through RMMM plan – Analysis of SEI Software Risk taxonomy. Quality Engineering for software quality Assurance: Quality – ISO 9001 standard software quality and assurance – Testing techniques for SQA – Test Case design – software testing strategies.

UNIT III: System Analysis: System – System Modeling – Structured system Analysis – Software Requirement Specification – Information Systems. System Design – The Design Development process – Data Structure and Database Design – System Design Architecture – System behavior Design – Architecture and choices – Architecture and Non functional requirements – Design Specification and documentation.

UNIT IV: SE Tools: Analysis tools – Modeling representation – Requirements Engineering – Work Breakdown structure – Prototyping – CASE, I-CASE tools. User Interface Design: User Interface – Analysis and Design – Improving effectiveness of UI – Guidelines for Designing UI Components.

UNIT V : Procedural Design and Use of Reusable Components: Design and Structural Programming – Reusable Code – Component based software Engineering – program verification. Testing for software quality: Function Testing System Testing – User satisfaction testing – Test cases and test plans.

TEXT BOOK:

Software Engineering concepts by Roger Pressman. Software Engineering Principles and Practice by Waman.S.Jawedekar, Tata publishing company Private Ltd, New Delhi 2005.

REFERENCE:

Software Engineering Principles and Practice by Waman.S.Jawedekar, TMH, New Delhi 2005.

Sl.No	Unit	Chapter	Page No.
1	I	1.1 – 1.6 , 2.1 – 2.7	3 – 33 , 36 – 86
2	II	3.1 – 3.5 , 4.1 – 4.6	88 – 113 , 116 – 144
3	III	7.1 - 7.5 , 8.1 – 8.8	199 – 232 , 237 – 266
4	IV	5.1 – 5.7 , 10.1 – 10.4	155 – 188 , 308 – 338
5	V	11.1 – 11.5 , 22.1 – 22.5	339 – 361 , 636 – 668

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Part III ELECTIVE	**Title : MOBILE COMPUTING AND WIRELESS TECHNOLOGY**	**Subject Code : 17MCAE41**
Semester : IV	**Hours : 5 Hours / Week**	**Credits : 5**

Objectives: 1. To give knowledge on Wireless technology and Mobile Computing
2. To give knowledge on GSM, WAP and Wireless LAN technologies

UNIT I : Introduction – Mobility of Bits and Bytes – Wireless The beginning – Mobile Computing – Dialogue Control – Networks – Middleware and Gateways – Applications and Services – Developing Mobile Computing Applications – Security in Mobile wireless space. Mobile Computing Architecture: History of Computers – History of Internet – Internet – The Ubiquitous Network – Architecture for Mobile Computing – Three-tier architecture – Design consideration for Mobile Computing – Mobile Computing through Internet – Making existing applications mobile enabled.

UNIT II : Mobile Computing through Telephony – Evolution of Telephony – Multiple Access Procedures – Mobile Computing through Telephone – Developing an IVR application – Voice XML – Telephony Application Programming Interface. Emerging Technologies: Introduction – Bluetooth – Radio Frequency Identification Wireless Broadband – Mobile IP – Internet Protocol Version 6 – Java Card.

UNIT III : Global System for Mobile Communication – Global System for Mobile Communications GSM Architecture – GSM Entities – Call routing in GSM – PLMN Interfaces – GSM Address and Identifiers – Network aspects in GSM – GSM Frequency GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in Application for GPRS – Limitations of GPRS – Billing and Charging in GPRS.

UNIT IV: Wireless Application Protocol – Introduction – WAP – MMS Application CDMA and 3G:Introduction – Spread spectrum technology – IS95 versus GSM – Wireless Data Third Generation Networks – Application on 3G

UNIT V: Wireless LAN: Introduction – Wireless LAN advantages – IEEE 802.11 Standards – Wireless LAN architecture – Mobility in Wireless LAN – Deploying Wireless LAN – Mobile Adhoc Networks and Sensor Networks – Wireless LAN Security – WiFi versus 3GInternet networks and Internetworking: Introduction – Fundamentals of call processing – Intelligence in the networks – SS#7 Signaling – IN Conceptual Model – Soft switch – Programmable Networks – Technologies and Interfaces for IN 360.

TEXT BOOK: Mobile Computing, Technology application and Service creation, AsokeK.Talukder, RoopaR.Yavagal., TMH Publishing Company, New Delhi, 2005.

REFERENCE BOOK: Mobile Communication – ochen Schiller 2nd Edition Pearson 2003

Sl.No	Unit	Chapter	Page No.
1	I	1.1 -1.9 , 1.12 , 2.1 – 2.8	1 – 18 , 24 , 25 , 28 -55
2	II	3.1 , 3.2 , 3.4 – 3.7 , 4.1 – 4.7	58 – 63 , 66 – 81 , 84 – 115
3	III	5.1 – 5.7 , 5.9 , 7.1 – 7.8	116 – 131 , 138 , 139 , 174 – 190
4	IV	8.1 – 8.4 , 9.1 – 9.7	194 – 215 , 218 – 248
5	V	10 .1 – 10.8 , 10.12 , 11.1 – 11.8	251 – 279 , 283 , 284 , 287 – 307

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Part III : ELECTIVE	**Title : DISTRIBUTED SYSTEMS**	**Subject Code : 17MCAE42**
Semester : IV	**Hours : 5 Hours / Week**	**Credits : 5**

Objectives:

1. To give knowledge on various aspects of Distributed Computing system
2. To give knowledge on Distributed Shared memory, Distributed file system and Distributed databases

UNIT I: Fundamentals

What is Distributed Computing Systems? – Evolution of Distributed Computing Systems - Distributed Computing system models – Why are Distributed Computing Systems gaining popularity? – What is Distributed operating system? – Issues in designing a Distributed operating Systems Introduction to Distributed Computing Environment (DCE).

UNIT II: Distributed shared memory

Introduction – general architecture of DSM systems – Design and Implementation Issues of DSM - Granularity – Structure of Shared Memory Space – Consistency Models – Replacement Strategy – Thrashing – Other Approaches to DSM – Heterogeneous DSM- Advantages of DSM.

UNIT III: Distributed File Systems

Introduction – Desirable features of good Distributed File Systems – File models – File accessing models – File sharing Semantics – File Caching schemes – File Replication – Fault Tolerance – Atomic Transactions – Design Principles – Case Study: DCE Distributed File Systems.

UNIT IV: Distributed Databases

Features of Distributed versus Centralized databases – Why Distributed Databases – Distributed Databases Management Systems – Reference Architecture for Distributed Databases – Types of Data fragmentation – Distributed Database design: A framework for Distributed Database design – The Design of Database fragmentation – The allocation of fragments.

UNIT V: Computer Networks

Introduction – Networks types – LAN Technologies – WAN Technologies – Communication Protocols – Internetworking – ATM Technology.

TEXT BOOK:

1. Distributed operating systems : Concepts and Design by Pradeep K. Sinha , PHI Learning Private Ltd., 2007 edition
   Chapters: 1 (1.1 – 1.7), 2(2.1 – 2.7), 5 (5.1 – 5.11), 9 (9.1 – 9.11)

2. Distributed Databases Principles and Systems by Stefano Ceri and GiuseppuPelagatti, McGraw – Hill Book Company, International Edition 1985.
   Chapters : 1 (1.1 – 1.3) , 3 (3.1- 3.2), 4 (4.1 – 4.3) .

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Part III : ELECTIVE	**Title : IMAGE PROCESSING**	**Subject Code : 17MCAE43**
Semester : IV	**Hours : 5 Hours / Week**	**Credits : 5**

Objectives: To give knowledge on various techniques on digital Image processing like, Image enhancement, Image restoration, Image segmentation and image compression

UNIT I DIGITAL IMAGE FUNDAMENTALS

Elements of digital image processing systems, Vidicon and Digital Camera working principles, Elements of visual perception, brightness, contrast, hue, saturation, mach band effect, Color image fundamentals – RGB, HSI models, Image sampling, Quantization, dither, Two – dimensional mathematical preliminaries, 2D transforms – DFT, DCT, KLT, SVD.

UNIT II IMAGE ENHANCEMENT

Histogram equalization and specification techniques, Noise distributions, Spatial averaging, Directional Smoothing, Median, Geometric mean, Harmonic mean, Contraharmonic mean filters, Homomorphic filtering, Color image enhancement.

UNIT III IMAGE RESTORATION

Image Restoration – degradation model, Unconstrained restoration – Lagrange multiplier and Constrained restoration, Inverse filtering – removal of blur caused by uniform linear motion, Wiener filtering, Geometric transformations – spatial transformations.

UNIT IV IMAGE SEGMENTATION

Edge detection, Edge linking via Hough transform – Thresholding – Region based segmentation – Region growing – Region splitting and Merging – Segmentation by morphological watersheds – basic concepts – Dam construction – Watershed segmentation algorithm.

UNIT V IMAGE COMPRESSION

Need for data compression, Huffman, Run Length Encoding, Shift codes, Arithmetic coding, Vector Quantization, Transform coding, JPEG standard, MPEG.

TEXTBOOKS:

1. Rafael C. Gonzalez, Richard E. Woods, Digital Image Processing', Pearson , Second Edition, 2004.

2. Anil K. Jain, , Fundamentals of Digital Image Processing', Pearson 2002.

REFERENCES:

1. Kenneth R. Castleman, Digital Image Processing, Pearson, 2006.

2. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.

3. D,E. Dudgeon and RM. Mersereau, , Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference, 1990.

4. William K. Pratt, Digital Image Processing' , John Wiley, New York, 2002

5. MilanSonka et aI, 'IMAGE PROCESSING, ANALYSIS AND MACHINE VISION', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999,

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MASTER OF COMPUTER APPLICATIONS (M.C.A)

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Part III : CORE	Title : COMPUTER GRAPHICS AND MULTIMEDIA LAB	Subject Code : 17MCACP7
Semester : IV	Hours : 5 Hours / Week	Credits : 4

C-Graphics Lab

1. To implement Bresenham's algorithms for line, circle and ellipse drawing.
2. To perform 2D Transformations such as translation, rotation, scaling, reflection and sharing.
3. To implement Cohen-Sutherland 2D clipping and window-viewport mapping.
4. To perform 3D Transformations such as translation, rotation and scaling. Application
5. Bouncing ball
6. Flood fill
7. Car moving
8. Traffic controlling vehicle
9. Moving wheel
10. Draw a hut using a simple graphics function.

Multi Media Lab

11. Creating a sample Image
12. Editing Existing Image brightness, mode color, and add edit layer style.
13. Stitch and edit two images into single image use selection tools Lasso tool, clone stamp .
14. Study masking concept use audio in the movie.
15. Add buttons , menus and action to the movie.
16. Add effects to the text (Predefined and user defined)
17. Insert text, image, sprites to the movie

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Part III : CORE	Title : NETWORK PROGRAMMING LAB	Subject Code : 17MCACP8
Semester : IV	Hours : 5 Hours / Week	Credits : 4

1. Write a program using Java to display the Details of local host-inetaddress
2. Write a program using Java to get details of any URL.
3. Write a program using Java to establish One way communication between client & server.
4. Write a program using Java to establish One way communication between client & server with end
5. Write a program using Java to establish Two way communication between client & server.
6. Write a program using Java to establish Two way communication between client & server with end.
7. Write a program using Java with the Conversion of uppercase to lowercase between client & server.
8. Write a program using Java with the Conversion of lowercase to uppercasebetween client & server.
9. Write a program using Java to Check whether the file exist or not
10. Write a program using Java to Copy the file contents to another directory
11. Write a program using Java to establish One way communication Between client & server using UDP.
12. Write a program using Java with the Conversion of uppercase to lowercase between client & server using UDP.
13. Write a program using Java with the Conversion of lowercase to uppercase between client & server using UDP.
14. Write a RMI program to do Mathematical operations.
15. Write a RMI program for Banking application.
16. Write a RMI program for Electricity bill processing.
17. Write a RMI program for Pay roll processing.

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V SEMESTER

S.No	Sub.code	Sub.Title	Hours /week	Exam Hours	C.A.	S.E	Total	Credits
1.	17MCAC51	Structured System Analysis and Design	5	3	25	75	100	4
2.	17MCAC52	Software Project Management	5	3	25	75	100	4
3.	17MCAC53	Internet Computing with ASP .Net	5	3	25	75	100	4
4.	17MCAE51*	Data Mining and Data Warehousing	5	3	25	75	100	5
	17MCAE52*	Soft Computing	5	3	25	75	100	5
	17MCAE53*	Embedded Systems	5	3	25	75	100	5
5.	17MCACP9	Web Designing Lab	5	3	40	60	100	4
6.	17MCACV1	Mini Project	5	3	40	60	100	4

***One paper has to be chosen out of three elective papers**

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Part III : CORE	Title : STRUCTURED SYSTEM ANALYSIS AND DESIGN	Subject Code : 17MCAC51
Semester : V	Hours : 5 Hours / Week	Credits : 4

Objectives:

1. To give knowledge on System Development Life Cycle
2. To give knowledge on System Analysis and Design
3. To give knowledge on System testing and Software Quality Assurance

Unit I: Basic system concepts

Systems concepts and theory: The system and basic concepts-Elements of a system-Real life business system-system models-types of systems-Basic system principles-systems approach-Characteristics of system.

System Development Life Cycle: System development process-Capability Maturity Model-System Development Life Cycle(SDLC).

System Development Process Models: Project and process management-Linear sequential model-Prototyping Model-Rapid application development – Spiral Model-Project definition-Software Project Management.

Systems Analysis and Systems Analyst: Scope of Systems analysis and design (SAD)-Responsibilities of a System Analyst-Skillset required to perform systems analysis-Responsibilities of an Information Systems Analyst-Change in system analyst's work patterns.

Unit II: Information systems planning

Project initiation: Preliminary investigation-project identification and selection-project commencement

Feasibility Study: Objectives-types-cost/benefit analysis-steps in feasibility study

Unit III: Information systems analysis

Systems analysis and design methods – Introduction-System analysis methods-business process reengineering-systems design methods.

Information gathering techniques-need-determination of requirements-need for documenting the existing system- fact finding techniques-modern methods for determining system requirements Information Systems Modeling – documenting the existing system –process modeling-logic modeling-data modeling.

Unit IV: Detailed Information Systems Design
System design-Introduction-characteristics-logical and physical design-application architecture - using physical and logical DFDs in preparing design for existing system
Output design-introduction-objectives-types-key output questions- formats of outputs-designing-turn around documents-layout-gidelines.

Unit V: Software Quality assurance and testing-procedure –testing strategies and validations-System implementation and operations-system implementation-System security and audit-system operation and maintenance.

TEXTBOOK: STRUCTURED SYSTEM ANALYSIS AND DESIGN ,ISRD Group,TMH

Sl.No	Unit	Chapter	Page No.
1	I	1,2,3	3-15,17-39,41-71
2	II	4,5,6	73-96,99-126,129-151
3	III	8,9,10	189-220,223-246,249-271
4	IV	11,12	273-311,313-343
5	V	18,19	587-626,627-652

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Part III : CORE	Title : SOFTWARE PROJECT MANAGEMENT	Subject Code : 17MCAC52
Semester : V	Hours : 5 Hours / Week	Credits : 4

Objectives:

To inculcate knowledge on Software Project Management, Managing People, Organizing Team, Activity planning, Risk Management, Resource Allocation, Monitoring and Control

UNITI: Introduction – Importance of Software Project Management – Project – Software Projects Vs other types of Project – Contract and Technical Project Management – Activities covered by SPM – Plants, methods and Methodologies – Categorizing Software Projects – Setting Objectives – Stake holders. Requirements specification – Management control. Step Wise: An overview of Project Planning: Ten Steps – Programme Management and Project evaluation: Programme Management – Managing the allocation of resources within programs – Strategic PM – Creating a Programme – Aids to PM – Benefit Management – Evaluation Techniques – Cash flow forecasting – Risk Evaluation.

UNIT II: Selection of an appropriate project approach: Introduction – Choosing Technologies – Technical plan contents list – Choices of process models – StructsVs Speed of delivery – The waterfall Model – V-Process model – Spiral Model – Software prototyping – Incremental Delivery – Dynamic Systems Development method – Extreme programming – Managing iterative processes – Selecting the most appropriate process model. Software Cost Estimation: Introduction – Where are estimates done? – Problems with over and under estimates – basis for software Estimating – Software effort estimation – Software effort estimation techniques – Albrecht function point analysis Function Points – COCOMO: a parametric model.

UNIT III: **Activity planning:** Objectives – plan – project schedules – Scheduling and Sequencing Activities – Network Planning models – Adding te time dimension – Identifying Critical path – Shortening the project duration – Identifying the critical activities.

Risk Management: Risk – Categories of Risk – A framework for dealing risk – Risk Identification – Risk assessment – Risk Planning – Risk Management – Evaluating risks to the schedule – Applying the PERT technique – Mote Carlo simulation.

Resource Allocation: The nature of Resources – Identifying resource requirements – Scheduling resources – Creating Critical paths – Counting the cost publishing the Resource schedule – Cost Schedule – Scheduling Sequence.

UNIT IV: Monitoring and Control: Creating the framework – Collecting the date – Cost Monitoring – Earned Value Analysis – Getting the project back to target.

Managing Contracts:ISO 12207 approach to acquisition and supply of software – The supply process – Type of Contract – Stages in Contract placement – Contract Management Acceptance.

UNIT-V: Managing people and Organizing teams:

Understanding behavior – Organizational behavior: Selecting the right person for the job – Motivation – the Oldham – Hackman job characteristics model – Working in groups – team – Decision making – Leadership – Organizational Structes – Dispersed and Virtual team – The influence of culture – stress and safety.

Software Quality: Place of Software quality in project planning – importance and defining software quality – ISO 9126 – quality measures – External Standards Techniques to enhance quality – quality plans.

Text Book:

1. Software Project Management: Bob Hughes and mike Cotterell, TMH fourth edition 2006.

Reference:

Software Project Management: A concise study, S.A.Kelkar, PHI, 2007.

Sl.No	Unit	Chapter	Page No.
1	I	1 , 2	1.1 – 1.24 , 2.1 – 2.40
2	II	3 , 4	3.1 – 3.13 , 4.1 – 4.2
3	III	5	5.1 – 5.33
4	IV	9	9. 1 – 9.49
5	V	11	11.1 – 11.81

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(Syllabus under CBCS w.e.f. 2017 – 2018 onwards)

Part III : CORE	Title : INTERNET COMPUTING WITH ASP .NET	Subject Code : 17MCAC53
Semester : V	Hours : 5 Hours / Week	Credits : 4

Objectives:

To give knowledge on Web design using HTML, ASP .NET Controls, ADO .NET, XML in .NET, Web Services

Unit – I : HTML Basics : Introduction to Internet, Applications, Web Designing, Web Browser, Web Pages, Home Page, Web Site, Web Servers, WWW, Concepts of Hypertext, Hypermedia, Versions of HTML, Elements of HTML, Syntax, Sections of HTML, Building & Executing HTML Documents

Various tags of HTML : Headings & Title, Text-level elements, Changing Colors, Font, Size using <FONT> tag, Text Alignment & Paragraph Creating links with <A HREF> tag, Inserting image using <IMG> tag, Creating Table with <TABLE> tag, rowspan, colspan attributes, <FRAMESET>&<FRAME> tag, <FORM> tag, Creating Text Boxes, Buttons, Checkboxes, Radio Buttons, Hidden Control, Password, Lists & Dropdown list, TextArea. Submitting a Form, Get & Post method. ASP & HTML forms. Working with Cascading Style Sheet (CSS).

Unit – II : ASP .NET Controls : Overview of Dynamic Web Page, Introduction & Features of ASP .NET, Understanding ASP .NET Controls, Applications, Web Servers. Web Forms, Web Form Controls, Server Controls, Client Controls, Adding Controls to Web Form, Buttons, Text Box, Labels, Checkbox, Radio Buttons, List Box. Adding controls a runtime, Running a Web Application, Creating a Multiform Web Project.

Form Validation : Client side and Server side Validation, Validation Controls – Required Field Comparison range, Calendar Control, Ad Rotator Control, Internet Explorer Control.

Unit – III : ADO .NET : Overview of ADO .NET, From ADO To ADO .NET, ADO .NET architecture, Accessing data using Data Adapters and Datasets, using command and data reader, Binding data to data bind controls, displaying data in data grid.

Unit – IV : XML in .NET : XML Basics, Attributes, Fundamentals of XML Classes, Document, Text Writer, Text Reader, XML Validations, XML in ADO .NET, Data Document.

Unit – V : Web Services : Introduction, State Management, View State, Session State, Application State, Service Description Language, Building & Consuming a Web Service. Web Application Development, Caching, Threading Concepts, Creating Threads in .NET, Managing

Threads, Thread Synchronization, Features of .NET, Role Based Security & Code Access Security, Permissions.

Text Books :

1. The Complete Reference ASP .NET – Mathew Macdonald (TMH)
2. Professional ASP .NET – Wrox Publication(UNIT I)
3. Learn HTML in a Weekend – Steven E. Callihan (TMH)

References :

1. VB .NET Programming Black Book – Steven Holzner (Dreamtech Pub.)
2. Introduction to .NET Framework – Wrox Publication
3. ASP .NET Unleashed – BPB Publication.
4. Learn HTML in a Weekend – Steven E. Callihan (TMH)
5. Using HTML – Lee Anne Philips (PHI)

Sl.No	Unit	Chapter	Page No.
1	I	17	684-708
2	II	5,6,7,9	103-133,139-170,171-207,239-272
3	III	12,13,14	353-369,373-394,421-443,466-491
4	IV	17	525-561
5	V	18,19,20,23,24	565-575,581-601,611-636,717-747,753-786

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Part III : ELECTIVE	Title : DATA MINING AND DATA WAREHOUSING	Subject Code : 17MCAE51
Semester : V	Hours : 5 Hours / Week	Credits : 5

Objectives:

- To give knowledge in Data Mining and Data Warehousing
- To inculcate knowledge on Association Rule mining, Clustering and Classification techniques
- To learn various applications of data mining techniques

UNIT-I Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, Data Warehouse and OLAP Technology for Data Mining Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

UNIT-II Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept of Hierarchy Generation, Online Data Storage.

UNIT-III Mining Association Rules in Large Databases: Association Rule Mining, Mining Single – Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint – Based Association Mining.

UNIT-IV Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

UNIT-V Cluster Analysis Introduction :Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density – Based Methods, Grid – Based Methods, Model – Based Clustering Methods, Outlier Analysis. Mining Complex Types of Data: Multidimensional Analysis and Descriptive Mining of Complex, Data Objects, Mining

Spatial Databases, Mining Multimedia Databases, Mining Time – Series and Sequence Data, Mining Text Databases, Mining the World Wide Web.

TEXT BOOKS:

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.
2. Data Mining Techniques – ARUN K PUJARI, University Press
3. Building the DataWarehouse- W. H. Inmon, Wiley Dreamtech India Pvt. Ltd..

REFERENCE BOOKS:

1. Data Warehousing in the Real World – SAM ANAHORY & DENNIS MURRAY. Pearson Edn Asia.
2. Data Warehousing Fundamentals – PAULRAJ PONNAIAH WILEY STUDENT EDITION.
3. The Data Warehouse Life cycle Tool kit – RALPH KIMBALL WILEY STUDENT EDITION.
4. Data Mining Introductory and advanced topics –MARGARET H DUNHAM, PEARSON EDUCATION.

Sl.No	Unit	Chapter	Page No.
1	I	1.1 – 1.4 , 1.6 , 1.9 , 3.1 – 3.5 , 4.2	1 – 15 , 21 – 27 , 29 – 31 , 36 – 39 , 105 – 150 , 189 – 197
2	II	2.1 , 2.3 – 2.6	48 – 50 , 61 – 97
3	III	5.1 – 5.5	227 – 272
4	IV	6.1 – 6.6 , 6.8 , 6.10 – 6.12	285 – 336 , 344 -346 351 – 360
5	V	7.1 – 7.4 , 7.6 – 7.8 , 7.11 , 10.1 – 10.5	383 -407 , 418 – 433 , 451 – 460 , 591 – 641

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Part III : ELECTIVE	Title : SOFT COMPUTING	Subject Code : 17MCAE52
Semester : V	Hours : 5 Hours / Week	Credits : 5

Objectives:

To Impart Knowledge on Fuzzy Set Theory, Optimization, Neural Networks, Neuro Fuzzy Modeling and Applications of Computational Intelligence

UNIT I FUZZY SET THEORY

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II OPTIMIZATION

Derivative – based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III NEURAL NETWORKS

Supervised Learning Neural Networks – Perceptrons – Adaline – BackpropagationMutilayerPerceptrons – Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks – Learning Vector Quantization – Hebbian Learning.

UNIT IV NEURO FUZZY MODELING

Adaptive Neuro – Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross – fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TEXT BOOK

1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.

REFERENCES

1. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.

2. DavisE.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
3. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
4. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.

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Part III : ELECTIVE	Title : EMBEDDED SYSTEM	Subject Code : 17MCAE53
Semester : V	Hours : 5 Hours / Week	Credits : 5

Objectives:

To give knowledge on various aspects of Embedded systems and do embedded programming in C and C++

UNIT I: Introduction to Embedded Systems:

Definition and Classification – Overview of processor and hardware units in an embedded system – Software embedded into the system – Exemplary Embedded Systems – Embedded Systems on a Chip (SoC) and the use of VLSI designed circuits.

UNIT II: Real Time Operating Systems:

Definictions of process, tasks and threads – Clear cut distinction between functions – ISRs and tasks by their characteristics – Operating System Services – Goals – Structures – Kernel process Management – Memory Management – Device Management – File System Organization and Implementation – I/O Subsystems – Interrupt Routines Handling in RTOS.

UNIT III: Real Time Operating Systems:

RTOS Task scheduling models – Handling of task scheduling and latency and deadlines as performance.

Inter Process Communication and Synchronization:

Shared data problem – Use of Semaphore(s) – Priority Inversion problem and Deadlock Situations – Inter Process Communications using Signals – Semaphore Flag or mutex as Resource key – Message Queues – Mailboxes – Pipes – Virtual (Logical) Sockets – Remote procedure Calls (RPCs).

UNIT IV: Programming Cocepts and Embedded Programming in C:

Programming in assembly language (ALP) vs. High Level Language – C Program Elements, Macros and functions – Use of Pointers – NULL Pointers – Use of Function Calls – Multiple function calls in a Cyclic Order in the Main Function Pointers – Function Queues and Interrupt Service Routines Queues Pointers.

UNIT V: Embedded Programming in C++:

Objected Oriented Programming – Embedded Programming in C++, "C" Program compilers – Cross compiler – Optimization of memory codes. Related Programs.

TEXT BOOKS:

1.Rajkamal, Embedded Systems Architecture, Programming and Design, TATA McGraw-Hill, First reprint Oct.2003.

References:

1. Steve Heath, Embedded Systems Design, Second Edition-2003, Newnes.
2. David E.Simon, An Embedded Software Printer, Pearson Education Asia, First Indian Reprint 2000.
3. Wayne Wolf, Computers as Components: Principles of Embedded Computing System Design – Harcourt India, Morgan Kaufman Publishers, First Indian Reprint 2001.
4. Frank Vahid and Tony Givargis, Embedded Systems Design – A unified Hardware/Software Introduction, John Eilry, 2002.

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Part III : CORE	Title : WEB DESIGNING LAB	Subject Code : 17MCACP9
Semester : V	Hours : 5 Hours / Week	Credits : 4

I. HTML Programs :

1. **Develop and demonstrate** basic HTML document that illustrate the use of HTML heading, paragraph.
2. **Develop and demonstrate** basic HTML document that illustrate the use of HTML ordered list.
3. **Develop and demonstrate** a HTML document that illustrates the use of HTML Tables.
4. **Develop and demonstrate** a HTML document that illustrates the use of HTML Frames.
5. **Develop and demonstrate** a HTML document that illustrates the use of HTML Forms.

II. DHTML Programs :

1. **Develop and demonstrate** a DHTML document that displays college information using various style sheets.
2. **Develop and demonstrate** a DHTML document that create menus in HTML
3. **Change Background Color at runtime**
4. **That implement 3 types styles (inline, header style and external style file) in a page.**
5. **Show or hide a form at runtime**

III. Javascript Programs :

1. **Design a HTML page** with Javascript to find the area of a rectangle.
2. **Design a HTML page** display clock.
3. **Design a HTML page** with Javascript to count the number of vowels in a text typed in a text area.
4. **Design a HTML page** with Javascript to find the age of a person in completed years.
5. **Design a HTML page** with Javascript to demonstrate prompt and alert box.

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Part III : CORE	**Title : MINI PROJECT**	**Subject Code : 17MCACV1**
Semester : V	**Hours : 5 Hours / Week**	**Credits : 4**

MINI PROJECT

1) Sleeping Barber Problem
2) Cigarette Smokers Problem
3) Password Retriever Problem
4) Leave Management Problem
5) Notepad Application
6) Loan Management Application
7) Chatting Application
8) Voice Chatting Application
9) Video Chatting Application
10) Development of an Online Course Portal for a campus.
11) Image Processing-Comparison
12) Multithreading Programming Applications

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VI SEMESTER

S. No	Sub. Code	Subject Title	Hours / Week	Duration of exams	CA	SE	Tot	Credits
1	17MCACV2	Project work & Viva Voce			40	60	100	18