THE AMERICAN COLLEGE, MADURAI.

DEPARTMENT OF MASTER OF COMPUTER APPLICATION

ELIGIBILITY:

1. A pass with minimum percentage of marks in Part III as per the Government norms in

   a) B.Sc degree in Computer Science / IT / IT and Management/Software/Mathematics/Statistics/Physics/Chemistry/Applied Science/Electronics

   b) BCA, B.Com / B.Com with CA, B.Com with IT, BBA with Mathematics, BA with Mathematics at the HSS / Degree Level.

   c) BE / BTech

2. Entrance Test : As per the Government norms

3. Reservation : As per the Government norms

4. Minimum marks : As per the Government norms

SCHEME OF EXAMINATION FOR THEORY CUM LAB COURSES:

For courses having both theory and practical's there will be two tests, one on theory and the other on practical's which will be taken as Test 1 and Test 2. Assignment and Quiz will be only on theory. The final examination will be only on Theory and will be of 3 hours duration with a course maximum of 100 marks.

DEPARTMENT OF MASTER OF COMPUTER APPLICATIONS

SEMESTER 1				
Sno	**Course Code**	**Course Title**	**Hrs / Crs**	**Marks**
1	MCA 4655	Mathematical Foundation for Computer Application -I	6	120
2	MCA 4457	Advanced Programming in C	4	80
3	MCA 4459	Digital Principles and Computer Organization	4	80
4	MCA 4661	Operating System (TL)	4 + 2	120
5	MCA 4663	Web Programming (TL)	4 + 2	120
6	MCA 4465	LAB 1 – C Programming	4	80
SEMESTER 2				
Sno	**Course Code**	**Course Title**	**Hrs / Crs**	**Marks**
7	MCA 4656	Mathematical Foundation for Computer Application -II	6	120
8	MCA 4458	Design and Analysis of Algorithm using C++	4	120
9	MCA 4660	Advanced DBMS (TL)	4 + 2	120
10	MCA 4462	Embedded System (TL)	2 + 2	80
11	MCA 4664	OOAD & UML (TL)	4 + 2	120
12	MCA 4466	LAB 2 –Computer Algorithms using C++	4	80
SEMESTER 3				
Sno	**Course Code**	**Course Title**	**Hrs / Crs**	**Marks**
13	MCA 5655	Data Science using Python (TL)	4 + 2	120
14	MCA 5557	Advanced Software Engineering	5	100
15	MCA 5559	Advanced Java Programming	5	100
16	MCA 5661	Computer Networks (TL)	4 + 2	100
17		Elective I	4	80
18	MCA 5463	LAB 3 – Java Programming	4	100

SEMESTER 4				
Sno	**Course Code**	**Course Title**	**Hrs / Crs**	**Marks**
19	MCA 5456	Dot Net Programming	4	120
20	MCA 5558	Data Mining and Warehousing	5	100
21	MCA 5460	Soft Computing	4	100
22		Elective II	4	80
23	MCA 5462	LAB 4 – Dot net Programming	4	80
24	MCA 5964	Project – Viva Voce	9	180

ELECTIVE COURSES

Sno	Course Code	Course Title	Hrs / Crs	Marks
1	MCA 0440	Android Programming (TL)	2+2	80
2	MCA 0441	Artificial Intelligence	4	80
3	MCA 0442	Computer Graphics (TL)	2+2	80
4	MCA 0443	Big Data Analytics	4	80
5	MCA 0444	Biometrics	4	80
6	MCA 0445	Compiler Design	4	80
7	MCA 0446	Multimedia and Applications (TL)	2+2	80
8	MCA 0447	Parallel Computing	4	80

VALUE ADDED COURSES

Sno	Course Code	Course Title	Hrs / Crs	Marks
1	MCA 421V	Essentials of Management	2	

PROGRAMME SPECIFIED OUTCOMES (PSOs):

MCA programme has been designed to prepare graduates for attaining the following program outcomes:

1. An ability to apply knowledge of mathematics, computer science and management in practice
2. An ability to identify, critically analyse, formulate and develop computer applications
3. An ability to select modern computing tools and techniques and use them with dexterity
4. An ability to design a computing system to meet desired needs
5. An ability to make realistic constraints such as safety, security and applicability
6. An ability to devise and conduct experiments, interpret data and provide well informed conclusions
7. An ability to understand the impact of system solutions in a contemporary, global, economical, environmental, and societal context for sustainable development
8. An ability to function professionally with ethical responsibility as an individual as well as in multidisciplinary teams with positive attitude
9. An ability to communicate effectively
10. An ability to appreciate the importance of goal setting and to recognize the need for life-long learning.

Mapping of Course Outcomes (COs) with Programme Specific Outcomes (PSOs)

Courses	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
MCA 4655	✓	✓	✓	✓		✓	✓			
MCA 4457	✓	✓	✓	✓	✓	✓				
MCA 4459	✓	✓	✓	✓	✓			✓		
MCA 4661	✓	✓		✓	✓		✓		✓	
MCA 4663	✓	✓	✓	✓	✓				✓	
MCA 4465	✓	✓	✓	✓	✓	✓		✓		
MCA 4656	✓	✓	✓	✓		✓	✓			
MCA 4658	✓	✓	✓	✓		✓	✓			
MCA 4660	✓	✓	✓	✓	✓	✓				
MCA 4462	✓	✓	✓	✓	✓	✓				
MCA 4464	✓	✓	✓	✓		✓	✓			
MCA 4466	✓	✓	✓	✓	✓			✓		
MCA 5655	✓	✓	✓	✓	✓			✓		
MCA 5557	✓	✓	✓	✓		✓	✓	✓		
MCA 5559	✓	✓	✓	✓	✓			✓	✓	✓
MCA 5561	✓	✓		✓	✓		✓			
MCA 5563	✓	✓	✓	✓	✓	✓		✓		
MCA 5456	✓	✓	✓	✓	✓	✓				
MCA 5458	✓	✓	✓	✓	✓	✓				
MCA 5460	✓	✓	✓	✓	✓		✓	✓	✓	
MCA 5462	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MCA 5464	✓	✓	✓	✓	✓	✓				
MCA 0440	✓	✓	✓	✓		✓	✓			
MCA 0441	✓	✓	✓		✓	✓	✓			
MCA 0442	✓	✓	✓	✓	✓	✓			✓	
MCA 0443	✓	✓	✓	✓		✓	✓			
MCA 0444	✓	✓		✓	✓		✓		✓	
MCA 0445	✓	✓	✓	✓	✓	✓				
MCA 0446	✓	✓	✓	✓	✓	✓			✓	
MCA 0447	✓	✓	✓	✓	✓	✓			✓	

Mapping Programme Outcome (POs) for Post graduation with MCA (PSOs)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10
PSO 1		✓								
PSO 2		✓								
PSO 3					✓					
PSO 4									✓	
PSO 5					✓					
PSO 6	✓		✓							
PSO 7	✓							✓		
PSO 8	✓						✓		✓	✓
PSO 9						✓				
PSO 10				✓						

MCA 4655 Mathematical Foundation for Computer Applications - 1 6Hrs / 6 Cr

Objective

This course will enable the students to know the logic and relation, graph theory and automata. Theorems are discussed with examples. This course explores various techniques in numerical methods for solving different mathematical models such as linear and non-linear equations.

Upon completing the course students will be able to

i. Natural language encoded to proposition calculus and model design by relation.
ii. Real world problem describe by diagram by means of vertex and edges and analyze the properties
iii. Analyze abstract machines and automata, as well as the computational problems that can be solved using them.
iv. Find the solution for algebraic and transcendental and system of equations
v. Find the unknown values from known values

Unit 1: Logic 10hrs

LOGIC-Connectives –Normal Form - Rules of Inference Theory in Statement Calculus - Relation – Equivalence Relation- Partial Order Relation - Relational Matrix - Relational Graph

Unit 2: Graph 14hrs

GRAPH – Walk – Path – Tree - Binary Tree - Kruskal Algorithm - Prims Algorithm – Connectivity- Planner Graph –Colouring.

Unit 3: Automata 12hrs

Finite Automata – Deterministic Finite Automata – Non-deterministic Finite Automata - Languages – Grammars - Push Down Automata.

Unit 4: Linear Equations 12hrs

Methods for finding roots of linear and non-Linear equations - Bisection Method- False Position Method Newton - Raphson Method – System of linear equations - Gauss-Elimination Method, Gauss - seidel.

Unit 5: Interpolation 12hrs

Interpolation – Newton Forward and Backward differences interpolation methods – Lagrange Interpolation – – Numerical Differentiation – Integration - Solving first order ordinary differential equations using R-K method.

Textbook

1. Tremblay JP, Manohar R, “Discrete Mathematical Structures with application to Computer Science”, McGraw HillPublication, 2018.

References

1. Narsingh Deo, “Graph Theory with applications to Engineering and Computer Science”, Prentice Hall India, 2012.
2. HopcroftJEullman, JD, “Introduction to Automata Theory, Languages and Computation”, Narosa Publishing House, 2013
3. M.K.Jain, S.R.K. Iyengar, R.K. Jain, “Numerical Methods Problems and Solutions”, New Age International, 2008.
4. EBalagurasamy, “Numerical Methods”, Tata McGraw Hill, 2012.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3			3			
CO4				4		
CO5					5	

MCA 4457 **Advanced Programming in C** **4 Hrs/4cr**

Objective

This course introduces programming concepts and helps them to write programs in an advanced level. It introduces control structures, arrays, functions, pointers, file handling. Also, gives Introduction to TSRs programs and interfaces programming using C.

Upon completing the course students will be able to

i. Classify data types, operators and Functions.
ii. Build code using Pointers and Arrays.
iii. Discover the role of pointers in DMA and examine its usage in OOP.
iv. Implements Structure and Data Files.
v. Categorize BIOS functions and examines network and low level programming.

Unit 1: C Introduction **12hrs**

C introduction – Operators and expressions – Data types – Arithmetic expressions - I/O statements – Control statements – Looping statements – Arrays – Strings and string functions – Procedures – Functions – User defined functions – Built-in-functions including all graphics commands.

Unit 2: Pointers Arrays and Functions **10hrs**

Introduction to pointers – Operators - expressions, passing on addressing to a function, function returning pointers. Pointers and Arrays – Passing an array element to a function – Multidimensional Arrays - array of pointers.

Unit 3: Pointers and Strings **14hrs**

Pointers and strings – Strings – Standard library functions - array of pointers to string - limitation of array of pointers - Pointers and structures – array of structure -structure pointer - dynamic memory allocations - Pointers and miscellaneous – Pointers to function - Command line arguments – Near, far and huge pointers.

Unit 4: Structures **14hrs**

Structure definition - processing a structure, user defined data types –typedef array of structures – Self referential structures – More about structures – Union – Files – C pre-processor

Unit 5: Low Level Programming **10hrs**

Advanced concepts – pointers and type casting - ROM-BIOS Functions –Basics of TSR – Introduction to Network programming and Interface – introduction to Low level programming

Textbook

1. Yashwant Kanetkar, “Understanding C pointers”, BPB Publications, New Delhi, 2009.

References

1. Henry Mullish Herbert L. Cooper, “The Spirit of C”, Jaico Publishing House, 1987.
2. Les Han Cock, Morris Kriger, “C primer”, 3rd Edition, Tata McGraw Hill, 1991.
3. Yashwant Kanetkar, “Writing TSRs through C”, BPB Publications, 1995.
4. Barry Nance, “Network Programming in C”, PHI, New Delhi, 2002.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3		2				
CO4			3		5	
CO5				4		6

MCA 4459 Digital Principles and Computer Organization 4Hrs/4cr

Objective

This course aims to give the students basic ideas regarding digital hardware components at the level of Gate and realization of sequential circuits and combinatorial circuits. Also will enable the students to design digital systems employing the techniques and give better insights into the basic digital hardware building blocks.

Upon completion of this course students will be able to:

i. Understand the need for digital system and Perform conversion, arithmetic calculations on number system
ii. Gain Knowledge to apply digital principles to create and synthesize combinatorial logic circuits and simplify problems using Boolean algebra and K map.
iii. Evaluate and design the data processing circuits and various types of flip flops
iv. Design and synthesize the sequential logic circuits
v. Acquire knowledge on memory subsystem organization and different types of memory

Unit 1: Digital System Concepts 10hrs

Introduction to digital systems and computers – Applications of digital systems Number systems and Codes - Conversion Binary to Decimal – Hexadecimal – octal – Representation of Negative Numbers, Complements in other Number systems 1's Complement – 2's Complement _ BCD Representation. ASCII, Excess_3, Gray, Weighted and unweighted codes.

Unit 2: Basic Building Blocks 10hrs

Introduction to logic circuits – Basic building blocks - Boolean algebra - Universal gates - De Morgan's Law - Truth tables - Boolean Expressions –Sum of products - Products of sum methods - Karnaugh map – Don't care conditions

Unit 3: Data Processing Circuits and Sequential Logic Circuits 15hrs

Multiplexers – De_Multiplexers - Decoder- Encoder - Introduction to Flip Flops -RS Flip-flop - Clocked Flip Flop – D Flip Flop - JK Flip Flop -JK Master -Slave Flip Flop.

Unit 4: Memory Element and Basic Computer Organization 15hrs

Introduction to Registers -Types of Registers - Introduction to Counters – Counter Design - Basic computer Organization – System buses – instruction cycles. CPU Organization .

Unit 5: Memory Subsystem Organization 10hrs

Memory subsystem organization – Types of memory – memory subsystem configuration – I/O Subsystem Organization

Textbooks

1. Malvino AP & Leach DP, "Digital Principles and Applications", Tata McGraw Hill Publications, 6th Edition 2002.
2. John D Carpinelli, Computer systems Organization & Architecture, Pearson Education, 1st Edition, 2012

References

1. TC Bartee, "Digital Computer Fundamentals", Tata McGraw Hill, 6th Edition, 2011.
2. Morris Mano, "Digital Design", Prentice Hall of India Pvt. Ltd, 2012.
3. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, 2nd Edition, 2013.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1	1				
CO2			2	2	2	2
CO3			3	3		
CO4		4	4	4		
CO5		5				

MCA 4661 Operating System (TL)(4+2) 6Hrs /6Cr

Objective

This course aims at to teach the students about the evolution of Operating systems and to understand the organization and strategies of the Operating Systems. This course makes the student to create an environment in which a user can execute programs in a convenient manner.

Upon completing the course students will be able to

i. Understand the structure and functions of OS.
ii. Learn about processes and threads.
iii. Implementing the principles of concurrency scheduling algorithms and deadlocks.
iv. Learn and Implement the different memory management schemes.
v. Understand and Implement the different Input, Output and file management schemes.

Unit 1: Introduction 15hrs

Architecture of OS (Ex. Monolithic, Microkernel, Layered, Exokernel) - Virtual Computers, Interaction of O. S. & hardware architecture - Evolution of operating systems, Batch, multiprogramming. Multitasking - Multiuser, parallel, distributed & real –time O.S. Computers and Software – Operating System Strategies – The abstract model of computing- resources – processes – threads – Operating System Organization – Device Management – Process Management – Storage Management-Scheduling-Computing Environment-Mobile Operating system.

Unit 2: Processes and Threads 20hrs

Basic Synchronization principles – Interacting and Coordinating Processes, Semaphores - High-level synchronization – Monitors – Inter process Communication – Deadlock – Memory Management – Virtual Memory – Paging, Segmentation and algorithms - Operating System Services- Operating System Structure-System calls and its types- Operating System Design and Implementation-Virtual Machines- Operating System Generation-System Boot.

Unit 3: Concurrency and Scheduling 15hrs

Threads-Multithreads-Thread Libraries-Models File Management – Protection and Security – Remote Files – Distributed Computing-CPU Scheduling-Deadlocks-Three Memory Management (Main Memory, Virtual Memory, Secondary Memory) - Storage Management.

Unit 4: Memory Input/Output and File Systems 20hrs

Introduction to UNIX and the Shell – UNIX Directories and Pathnames - Working with UNIX files – Shell Programming -User and system administration – pipelining – Communicating with other user and systems – Accessing other Unix systems on the network or Internet – Accessing

Unix from windows – Unix and the internet-Production and Security(Cryptography, Firewall)-Distributed File System-Seven Special-Purpose Systems(Real Time and Multimedia)

Unit 5: Case Studies **20hrs**

Case Studies on LINUX, WINDOWS, MAC-OS, ANDROID and IOS- protection and security.

Textbook

1. Gary Nutt, "Operating Systems a Modern Perspective", Pearson Education Asia, 2010.

References

1. Deital & Deital , "Operating Systems", Addison Wesley publications, 2013.
2. Milan Milenkovic, "Operating Systems", Tata McGraw Hill, 2012.
3. Tanenbaum, "Operating systems", Tata McGraw Hill, 2011.
4. W. Richard stevens, Stephen A. Rago – "Advanced programming in the Unix environments", second Edition – Addison Wesley publication, 2013.
5. Steart E. Madnick, John J. Donovan – "Operating Systems" – Tata McGraw-Hill-2009 edition.

Bloom's Taxonomy	K1	K2	K3	K4	K5	K6
CO1	**1**					
CO2		**2**				
CO3			**3**			
CO4				**4**		**6**
CO5					**5**	

MCA 4663 Web Programming (TL)(4+2) 6 Hrs/6 Cr

Objective

This course aims at preparing the students to gain theoretical skills and practical experience required for designing web pages and use variety of latest technologies to create responsive websites.

Upon completing the course students will be able to

i. Recall Web Basics, history of Internet and use HTML tags, attributes and write simple web pages
ii. Apply DHTML to web pages and make it dynamic
iii. Compare XML with HTML and develop xml documents.
iv. Build interactive web pages using Java Script.
v. Define PHP commands, write programs and establish database connectivity in Mysql.

Unit 1: Web Basics and HTML 20hrs

Introduction, Concept of Internet- History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser. Introduction, History of HTML, Structure of HTML Document: Text Basics, Structure of HTML Document: Images and Multimedia, Links and webs, Document Layout, Cascading Style Sheet- HTML 4 style sheet features, Creating Forms, Frames and Tables.

Unit 2: Dynamic HTML 15hrs

Introduction of DHTML- HTML vs. DHTML, Advantages of DHTML, CSS of DHTML, Event Handling, Data Binding, Browser Object Models.

Unit 3: XML 15hrs

Introduction of XML- Some current applications of XML, Features of XML, Anatomy of XML document, The XML Declaration, Element Tags- Nesting and structure, XML text and text formatting element, Table element, Mark-up Element and Attributes, Document Type Definition (DTD), types.

Unit 4: Javascript 20hrs

JAVA SCRIPT – Introduction – Usage of variables – operations – control structures – looping structures – predefined keywords – arrays – predefined functions – user defined functions – arrays and functions – mathematical functions – string functions – objects – expressions –pattern matching using RegEXp Class – String Class – Exception Handling – Built–in objects – Bgcolor/Fgcolor – Date Object – Events and Event Handling – Validations – Window – Confirmation, alert message.

Unit 5: PHP and MySQL **20hrs**

Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP. Basic commands with PHP examples, Connection to server, creating database, selecting a database, listing database, listing table names, creating a table, inserting data, altering tables, queries, deleting database, deleting data and tables, PHPMyAdmin and database bugs.

Textbook

1. "HTML5 Black Book: Covers CSS3, JavaScript, XML, XHTML, Ajax, PHP and Jquery", Kogent Learning Solutions Inc 2016.

References

1. Ecky Putrady, "Practical Web Development with Haskell: Master the essential skills to build fast and scalable web applications", !st edition , Apress, 2018
2. Danny Goodman, "Dynamic HTML" 3rd Edition, O'reilly, 2006.
3. Media Paul Colton, R Allen Wyke, Richard Wagner, "JavaScript Unleashed", Sams Publication, 3rd Edition, 2000.
4. Eric. C Richardson, "Programming web server", Galgotia Publications, 1996.
5. Joe Fawcett, Danny Ayers, Liam R.E Quin, "Beginning XML", 5th Edition, Wrox, 2012
6. Jon Duckett, "PHP & MYSQL Server side development", 1st edition 2019.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3				4		
CO4			3			
CO5					5	

MCA 4465 **Lab 1 - C Programming** **4 Hrs / 4Cr**

Objective

The course aims at training the students in the developing the following programs and enable them to develop a mini project.

Upon completing the course students will be able to

i. Apply different types of User Defined Functions and Arrays.
ii. Summarize application software using pointers on different Data Types.
iii. Create code using Structure and Union.
iv. Solve problems using File Handling Techniques.
v. Design TSR and simple Network Programs.

Lab Cycle

1. I/O Statements and Control Structures
2. Arrays and strings
3. Functions
    i) Call by Value
    ii) Call by Reference
    iii) User defined
    iv) Built-in
4. Pointers
    i) Operators & expressions
    ii) Pointers and arrays
    iii) Pointers and strings
    iv) Pointers and structures
    v) Pointers to function
5. Structures and Unions
6. C Preprocessors, Command line arguments
9. File Handling
10. TSR programs
11. Simple network programming
12. Program to implement Client / Server concepts
13. Interface programming

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2	1	2				
CO3		2	3			
CO4				4		
CO5						6

MCA4656 Mathematical Foundation for Computer Application -II 6Hrs / 6 Cr

Objective

This course aims to solve the various statistical methods such as Distribution of Random variables, Distributions and analyse sample using different method. Solve the Linear programming problem, transportation problem and assignment problem and also help to understand network modeling for planning and scheduling the project activities and different models on queuing theory

Upon completing the course students will be able to

i. Illustrate the characterization of probability density functions
ii. Test and analyses mean and variance of small and large samples
iii. Management problems convert to L.P.P and find the optimum solution for it.
iv. Find the solution for transportation problem and Assignment problem and construct network diagram and obtain critical path and project length.
v. Identify and analyze queue model and find the different values.

Unit 1: Mathematical Expectations 15hrs

Distributions of Random Variables – probability set function – Distribution function – probability models – mathematical expectations – Some special mathematical Expectations – Conditional probability -marginal and conditional distributions.

Unit 2: Sampling Theory 20hrs

Sampling theory - confidence intervals for means – confidence intervals for difference of variance – Hypothesis – Examples and Definitions – T_Tests – Chi_square Tests – F_Test – The Analysis of Variance.

Unit 3: Simplex Method 20hrs

Mathematical Formulation - Graphical Solution of linear programming models – Simplex method –Artificial variable Techniques- Two Phase Method.

Unit 4: Transportation Problem 15hrs

Transportation problem- assignment problem-Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling

Unit 5: Queuing Models 20hrs

Characteristics of Queuing Models – Poisson Queues - (M / M / 1) : (FIFO / ∞ /∞), (M / M / 1) : (FIFO/ N / ∞), (M / M / C) : (FIFO / ∞ / ∞), (M / M / C) : (FIFO / N / ∞) models.

Textbooks

1. Freund, "Mathematical Statistics", 5th Edition, Prentice Hall India, 1997.
2. Taha H.A., "Operations Research: An Introduction", 8th Edition, Pearson Education, 2008

References

1. S.C. Gupta & VK Kapoor Sultan Chand, "Elements of Mathematical Statistics", New Delhi, 1992
2. A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2005

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3		2	3			
CO4				4	5	
CO5						6

MCA4658 Design and Analysis of Algorithm using C++ 4hrs/4cr

Objective

The aim of this course is to enable the student to understand and apply OOP features to solve different computer algorithms. This course also aims at making the student to implement and analyse the basic operations of data structures and the programming techniques such as Divide and Conquer, Greedy method, Dynamic programming, Graph Algorithms and Back Tracking.

Course Outcomes

i. Understand Object Oriented Programming and its features
ii. Advanced features of OOP
iii. Understand the concepts of data types, data structures and linear structures analyse linear data sorting
iv. Sort and Searching algorithms.
v. Greedy Method and Dynamic Programming.

Unit 1: OOPS 16hrs

Introduction – Programming Paradigms –Advantages and Features of OOP – objects - classes- Data Abstraction-User Defined Types – Namespace -Abstract Types- Inline Functions - Friend function-Virtual Functions - Constructor and destructor functions – Overloading Functions - Passing objects and returning objects in functions – Using pointers to objects – the this pointer – Using new and delete functions.

Unit 2: Additional Features in OOPS 14hrs

Operator overloading – Inheritance –Types of inheritance –Virtual base classes - Pointers to derived classes – Virtual functions - Applying polymorphism + File Handling in C++ -Templates and exception handling - class templates-function templates.

Unit 3: Data Structures 15hrs

Computer Algorithms - Introduction – Algorithm as technology – Designing an algorithm - Analysing an algorithm — Asymptotic notations – Standard notations and common functions - Elementary Data Structures – Types – Implementation Examples - Implementing pointers and objects - Trees – Hashing – Types of Sorting – Examples.

Unit 4: Sorting and Searching 14hrs

Divide and Conquer-Merge sort – Quick Sort – performance of quick sort – randomized version of quick sort - Binary Search Tree – Insertion and deletion in Binary Search Tree – Red Black Trees – Implementations.

Unit 5: Greedy Method and Dynamic Programming **16hrs**

Greedy Method- Optimal Storage on Tapes – Knapsack Problem – Minimum Spanning Trees – Single Source Shortest Path- Bellman-Ford algorithm – Dijkstra's algorithm. Dynamic Programming - General Method – Multistage Graphs – Optimal Binary Search Trees – 0/1 Knapsack – Reliability Design – Travelling Sales Man Problem --Eight queen problem-backtracking.

Textbook

1. Herbert Schildt, "C++ Complete reference, Osborne McGraw Hill", 2ndEdition, 2012.
2. Thomas H Cormen, Charles E Leiserson, Ronald L Rivest, Clifford Stein, "Introduction to algorithms ", 2nd edition,PHI,2011.

References

1. Robert Latfore, "Object Oriented Programming in Microsoft C++", Galgotia publication, 2009.
2. E Balagurusamy, "Object Oriented programming with C++", PHI 6th Edition
3. Debasish Jana, "C++ and Object Oriented Programming Paradigm", PHI, NewDelhi, 2010.
4. Ellis Horowitz, SartajSahni, "Fundamentals of Computer Algorithms", Galgotia Publications, 2010.
5. Donald E Knuth, "Fundamental algorithms -The art of computer programming", PearsonEducation, 3rd Edition, 2002.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2	3			
CO3			3			
CO4				4		
CO5					5	

MCA 4660 Advanced Database Management Systems (TL)(4+2) 6 Hrs/ 6Cr

Objective

This course aims to train the students to design databases in an efficient manner. In these course fundamental concepts in DBMS, Data models, and relational algebra concepts are discussed. Hands on training is given using ORACLE.

Upon completion of this course students will be able to

i. Obtain basic knowledge on database, relational database, data Models and ER model.
ii. Demonstrate the DDL, DML, TCL using SQL constructs.
iii. Apply PL/SQL using Programming language constructs.
iv. Understand the Data Management concepts to organize the data.
v. Understand and Design Advanced Databases systems.

Unit 1: Introduction to DBMS 15hrs

Introduction to DBMS – Data Models – Database Languages – Database System Structures – ER Model – Relational Model

Unit 2: Introduction to RDBMS 20hrs

Introduction to RDBMS-SQL – Introduction to ORACLE – Data types - DDL – DML – TCL – QBE. Sub queries – Functions and Procedures – Triggers.

Unit 3: PL/SQL 20hrs

Packages - Types – Objects – Methods – Collectors – PL/SQL – Built in Functions – Programming constructs – Cursors – Error Handling-normalization.

Unit 4: Data Management 20hrs

Data Storage and Indexing – File Organizations – Query Optimization – Security -Transaction Management – Concurrency Control – Crash Recovery.

Unit 5: Introduction to Advanced Database Systems 15hrs

Introduction to: Parallel and Distributed Databases – Internet Databases – Decision Support - Data Mining – Object Database Systems – ORDBMS – OODBMS.

Textbook

1. Silberschatz, Sudharshan and Koth, "Database System Concepts", McGraw Hill Publications, 6th Edition, 2010.

References

1. Ramakrishnan and Gehrke, “Database Management Systems”, McGrawHill, 3rd Edition, 2012.
2. Loney and Koch, “ORACLE 9i - The Complete Reference”, Tata McGraw Hill Edition, 2010.
3. Urman, “ORACLE PL/SQL programming”, Tata McGraw Hill, 1997.
4. McFadden, Hoffer and Prescott, “Modern Database Management”, Pearson Education, 5th Edition, 2001.
5. Nilesh Shah , Database Management Systems using Oracle, Pearson Education, 2015.
6. Arun Majumdar & Pritimoy Bhattacharya, Database Management systems, TMH publications,2007.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2	1	2				
CO3		2	3			
CO4			3	4		
CO5					5	

MCA 4462 **Embedded System (TL)(2+2)** **4 Hrs/4cr**

Objective

This course facilitates to gain an understanding of the overall system architecture involving hardware and software components as well as of its complex communication structures, enabling them to understand the underpinnings of modern design methodology.

Upon completing the course students will be able to

i. Understanding the concepts and development of microprocessor
ii. Exploring the TASM / MASM / NASM
iii. To know Microcontroller based system design and applications
iv. Exploring advanced micro processor
v. Knowledge up gradation on recent trends in digital design for embedded systems

Unit 1: Microcomputer Architecture **15hrs**

Microcomputer architecture- The IntelCPU's-8086/8088 CPU components: Bus interface unit-execution unit - 8086 CPU registers- instruction set: addressing modes. Programmable peripheral Interface-8279 Programmable keyboard / display interface-8254 Timer – 8251A Communications interface-DMA – Interrupts - A Simple Micro Controller – Parallel I/O Ports – Serial I/O Interface – Counter Timer – Interrupt Control Mechanism - Assembly Language Programming For Micro Controllers - Micro Controllers For Embedded Systems.

Unit 2: Assembly Language **10hrs**

Assembly language fundamentals: segment and end directives—data definition directives – the assume directives - Input/output services - interrupts – Dos function calls - Assembly language program development tools - editor – assembler (MASM/TASM) – linker – loader – debugger - simple assembly programs - Interfacing Assembly Language Routines to High Level Language Programmes.

Unit 3: Processor **15hrs**

Introduction to ES-What is ES, Examples of ES-Inside ES : processor, memory, peripherals, software.- Embedded Processors , Memories &Peripherals ,Microcontrollers 8051 -Discrete processors : 8-bit architecture, 16/32 bit CISC, RISC, DSP-Integrated processors : ARM RISC-Choosing a processor-Memory systems : types (SRAM, DRAM, FLASH), organization, access-time, validating the contents of memory-Basic peripherals : parallel ports, timers, clocks

Unit 4: Microprocessor and Controller **10hrs**

Advanced Microprocessors - EDA tools – Coprocessors: Math Coprocessor (8087) – Microcontrollers: introduction – architecture – addressing modes. Case study: X86 compatible VIA C7, Via Nano, AMD's Geode, Athlon Neo, Intel Atom.

Unit 5: Case Study **10hrs**

Case study on strain sensors, Temperature sensors, Pressure sensors, Humidity sensors, Accelerometers, Gyroscopes, RF MEMS Switch, phase shifter and smart sensors. Case study of MEMS pressure sensor Packaging – real time interfacing with raspberry pi -arduino board.

Textbook

1. Barry B Brey, "The Intel Microprocessor 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium and Pentium Pro Processor: Architecture, programming and Interfacing", 4th Edition, Prentice Hall of India 2011.

References

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky , "Computer Organization", McGraw Hill Higher Education, Fifth Edition, 2013.
2. Douglas V Hall, "Microprocessor and Interfacing – Programming and Hardware", McGraw-Hill, 2011.
3. Muhammad Ali Mazidi, Janice GillispieMazidi, "The 8051 Micro controller and Embedded systems", Pearson Education Asia, 2002.
4. Christian Hill, Learning Scientific Programming with Python, Cambridge university press, 2016.
5. Internet Sites: www.chips.ibm.com, www.intel.com, www.nexgen.co

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3		2				
CO4			3			
CO5			3	4		6

MCA 4464 OOAD and UML (TL)(4+2) 4 Hrs/4cr

Objective

This course is to enable the students to understand the existing system and to provide practical guidance on construction of Object-Oriented Systems. Here the basic concepts in systems analysis and design are introduced with emphasis to Object-Oriented Analysis and Design. UML is used for the realization of OOAD. In UML the basic structural, behavioural and architectural modellings are discussed.

Upon completion of this course students will be able to

i. Understand and apply the software development life cycle concepts.
ii. Design and Analyze systems using the design principles.
iii. Understand and Design using the Object Oriented Methodology.
iv. Understand and Apply UML for visualizing, specifying, constructing, and documenting information about software – intensive systems.
v. Model the structure of the run-time system and their physical hardware elements.

Unit 1: Introduction to Systems 15hrs

Systems - Role of System Analyst - SDLC – Feasibility Analysis – Fact Finding Techniques – SSAD - ER Diagrams – DFD – Decision Table – Decision Trees – Structured English.

Unit 2: System Design 15hrs

System Design - Application Architecture and Modelling – Database Design - Input and Output Design - User Interface Design – System Construction and Implementation – System Operations and Support.

Unit 3: System Modelling 10hrs

OOAD - Comparison of SSAD and OOAD - Modelling as a Design Technique – Object Modelling – Dynamic Modelling - Functional Modelling – Object Design – OOD Design Process.

Unit 4: Introduction to UML 10hrs

Introduction to UML – Basic Structural Modelling – Classes – Relationships Common Mechanisms – Class Diagrams – Behavioural Modelling – Interaction – Uses cases - Architectural Modelling.

Unit 5: UML Diagrams **10hrs**

Component Diagrams – Deployment Diagrams – Collaboration - Case Study.

Textbook

1. Sen, "System Analysis and Design", Tata McGraw Hill, 1989.

References

1. Jeffrey, "Structured System Analysis and Design", Tata McGraw Hill 2002.
2. Rumbaugh, Blaha, Premerlani, Eddy and Lorensen, "Object-Oriented Modeling and Design", PHI, 1997.
3. Booch, Rumbaugh and Jacobson, "The Unified Modeling Language User Guide", Pearson Education, 2003.
4. Jason, "UML - A Beginners Guide", Tata McGraw Hill, 2003.
5. Yourdon, "Object-Oriented Analysis", Pearson Education, 2nd Edition, 2001.
6. Object- Oriented Analysis and Design with Applications, Addison-Wesley Professional, 2nd Edition, 2007.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1	1	3	4	5	6
CO2		2	3	4		6
CO3		2	3			6
CO4		2	3	4		6
CO5		2	3	4		6

MCA 4466 Lab 2 - Computer Algorithms using C++ 4 hrs/4cr

Objective

This course aims at training the student to implement the following problems which includes the important Computer Algorithms.

Upon completing the course students will be able to

i. Explain different types of User Defined Functions through OOP.
ii. Create code using Reusability Techniques.
iii. Categorize different types of Polymorphism.
iv. Solve problems using different Data Structures.
v. Implement different problem solving techniques such as Divide and Conquer, Greedy Method and Dynamic Programming.

Lab cycle Objectives:

1. Different User Defined Functions.
2. Function Overloading
3. Functions with default arguments
4. Constructors and Destructor
5. Passing objects to functions
    a. By Value and By Reference
    b. Friend functions and Inline functions
    c. Call by Reference and Return by Reference
6. Operator overloading
7. Virtual Function
8. Inheritance Types
9. Function and Class Templates
10. Implementations of linear Data Structures.
11. Implementations of nonlinear Data Structures.
12. Sorting Techniques
13. Implementation of Divide and Conquer method.
14. Implementation of Greedy method.
15. Implementation of Dynamic Programming approach.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2	1	2				
CO3		2	3			
CO4				4		
CO5						6

MCA5655 Data Science using Python (TL)(4+2) 6hrs / 6crs

Objective

This course is to enable the students to learn program and concepts acquiring programming skills in python. To Train the students to analysis and visualize the different type on Data.

Upon completing the course students will be able to

i. Built-in Data Types, introduces you to Python built-in data types
ii. Explain the modules and its features.
iii. Illustrate different type of analytic
iv. Ability to done testing ,GUI and script
v. Describe the Data Science by analysis and visualize

Unit 1: Python Basics 15hrs

Introduction to Python — Built-in data types -Control Statements-Iterations – Conditional Programming – Looping - Functions

Unit 2: Modules 20hrs

Modules- Importing module -Math module - Random module Packages – Composition-Testing – Profiling – Dealing with Exceptions – GUIs and Scripts

Unit 3: Data Science Skills 15hrs

Skills required for Data Science – Deep Dive of Analytics – Descriptive Analytics – Diagnostic Analytics – Predictive Analytics – Prescriptive Analytics – Classification – Forecasting – Recommendations – Optimization – Simulation

Unit 4: Python 20hrs

Hands on Data Analysis with Python – Manipulating Data Streams - Working with flat files - Working with unstructured files - Interacting with relational databases – Interacting with web-based data

Unit 5: Data Analysis 20hrs

Exploratory Data Analysis and Visualization with Python – Creating basic graph – Adding measurements – Graph with styles and color – Graph with annotations and legends

Textbook

1. Introduction to Computing and Problem Solving Using Python, Balagurusamy,McGraw Hill Education India Private Limited; First edition ,2017

References

1. Python for Data Science for Dummies – by Luca Massaron and John Paul Mueller
2. Think Python: How to Think Like a Computer Scientist, Allen B. Downey, Updated for Python 3, Shroff/O'Reilly Publishers,2nd edition, 2016.
3. Core Python Programming , R. NageswaraRao ,Dreamtech Press,2016
4. An Introduction to Python – Revised and updated for Python 3.2, Guido van Rossum and Fred L. Drake Jr, Network Theory Ltd., 2011

Websites

1. www.learnpython.org
2. www.codecademy.com/learn/learn-python

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3			3			
CO4				4		6
CO5					5	

MCA 5557 Advanced Software Engineering 5 Hrs/5crs

Objective

This course aims to equip the students to analyse, estimate and design new software with quality standards. In this course the Essentials in Software Engineering, software processes and the various software engineering paradigms are introduced. Software testing methods and quality maintenance strategies are included.

Upon completion of this course students will be able to

i. Define diverse software application domains with different process models used in software development.
ii. Elucidate the need for software specifications and requirements with their gathering techniques.
iii. Transform requirements model into design model and demonstrate software and UI design principles.
iv. Differentiate SCM and SQA models, classify testing strategies and tactics and evaluate them.
v. Generate project schedule and construct, design and develop network diagrams for different types of Projects.

Unit 1: Introduction to Software and Software Engineering 15hrs

The Nature of Software – The Unique Nature of WebApps – Software Engineering - The Software Process- Software Engineering Practice – Software Myths – Process Models: A Generic process Model – Process Assessment and improvement - Prescriptive process Models – Specialized Process Models- Unified process - personal and team process models.

Unit 2: Modelling: Principles that guide practice 15hrs

Software Engineering Knowledge – Core Principles – Principles that guide Each Framework Activity. Understanding Requirements: Requirements engineering Establishing the Groundwork – Eliciting Requirements – Requirements Modelling: Scenarios, Information, and analysis Classes: Requirements Analysis- Scenario-Based Modelling - UML Models that supplement that use case – Data Modelling Concepts – Class-Based Modelling.

Unit 3: Design Concepts 15hrs

Design with the Context of software Engineering – The Design Process – Design Concepts – The design Model. Architecture Design: Software Architecture- Architecture Genres – Architecture Styles - Architecture Design. QUALITY MANAGEMENT: Quality Concepts: What is quality? – Software Quality –The Software Quality Dilemma – Achieving Software Quality.

Unit 4: Software Testing Strategies **15hrs**

A Strategic Approach to Software Testing- Strategic Issues – Test Strategies for Conventional Software – Validation Testing – System Testing – Testing Conventional Applications - Software Testing Fundamentals – Internal and External Views of Testing – White Box Testing – Basis Path Testing – Control Structure Testing - Black Box Testing.

Unit 5: Managing Software Products **15hrs**

Project Management Concepts: - The Management Spectrum – People – The Product – The Process – The Project – The W5HH Principle – Critical Practices. Project Scheduling: Basic Concepts - Project Scheduling – Scheduling. Risk Management: Reactive versus Proactive Risk Strategies - Software Risks – Risk Identification - Risk Projection – Risk Refinement.

Textbook

1. "Software Engineering a Practitioner's Approach", Roger S. Pressman, McGraw – Hill International Edition, Seventh Edition 2013.

References

1. Roger S Pressman, " Software Engineering -A Practical Approach" Tata McGraw Hill, 7th Edition, 2013
2. Stephen R Schach, " Object Oriented and Classical Software Engineering", Tata McGraw Hill, 8th Edition,2010
3. Watts S Humphrey, "A Discipline for Software Engineering", Pearson Education, 2001.
4. Boriz and Beizer, "Software Testing Techniques", DreamTech, 2nd Edition, 2000.
5. "Software Engineering", Ian Sommer Ville, Pearson Education, Nineth Edition, 2011.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1	2	3			
CO2		2	3	4	5	6
CO3			3	4	5	6
CO4		2	3	4		
CO5	1	2	3	4	5	

MCA 5559 Advanced Java Programming 5hrs/5cr

Objective

This course aims at developing the students to understand the power of Java and make them develop Web Applications using Java Servlet, JSP and create J2EE applications and also create database connectivity using JDBC.

Upon completion of this course students will be able to

i. Develop simple java programs to demonstrate OOPs concepts.
ii. Define Web Basics and Java Servlets
iii. Explain Java Server Page features & database connectivity using JDBC
iv. Analyze Enterprise architecture
v. Create Java Applications using the features learnt.

Unit 1: Core Java 15hrs

Introduction -Genesis of Java- Types of Java applications – Java Virtual Machine - Data types, Variables - Control statements - Arrays – String – Classes and Objects - Methods – Constructors - Inheritance - Interfaces - Packages – Exception Handling - to AWT - Java Applets- Life Cycle of An Applet – AWT controls **-:** Introduction to Java Foundation Classes(JFC) – Swings.

Unit 2: Introduction to Java Servlets 15hrs

Java Server Technologies - Basics of Web Application, Architecture and challenges of Web Application, Introduction to servlet, Servlet life cycle, Developing and Deploying Servlets, Exploring Deployment , Descriptor (web.xml), Handling Request and Response Tracking Session.

Unit 3: JSP & Database Connectivity 15hrs

JSP Architecture ,JSP Standard / Implicit Objects, JSP Page Implementation Class, JSP Basics & Syntax, JSP Directive Tags, JSP Action Tags, JSP Script related Tags, Using Java Beans from JSP, UseBean Tag, setProperty Tag, getProperty Tag, JSP Custom Tag Library. Database Programming using JDBC Introduction to JDBC, JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases.

Unit 4: J2EE Architecture 15hrs

J2EE Platform Introduction -Enterprise Architecture Styles - J2EE Architecture - J2EE Technologies -Developing J2EE Applications - Naming and directory services - Application Servers - Implementing the J2EE Specifications - J2EE packaging and Deployment - J2EE packaging overview - Configuring J2EE packages.

Unit 5: Struts **15hrs**

Basics of Struts, Core Components, Struts Action, Struts Configuration, Interceptors, Struts Validation, Aware Interfaces, Zero Configuration, Struts with Tiles2, Hibernate with Struts, spring with Struts, Project Development in Struts.

Textbooks

1. Patrick Naoghton and Herbert Schidt, "The Complete Reference - JAVA" 9th Edition Tata McGraw Hill, 2014.
2. John Hunt and Chris Loftus, "Guide to J2EE: Enterprise Java", 2nd Edition, Springer, 2012

References

1. Santosh Kumar K., Kogent Solutions Inc., Santosh Kumar K. And Kogent Solutions Inc, "Jdbc Servlets, And Jsp Black Book," New Edition (With Cd) , Dreamtech Press, 2008
2. Bryan Basham, Kathy Sierra, Bert Bates, "Head First Sevlets and JSP: Passing the Sun Cetified Web Component", 2nd edition, O'Reilly Media, 2008
3. Kogent Solutions Inc, "JAVA SERVER PROGRAMMING , JAVA EE5", 1st edition, Dreamtech Press, 2008.
4. Ted Husted Cedric Dumoulin, "Struts in Action", 1st edition, Manning – Dreamtech Press, 2007.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3			3			
CO4				4		
CO5						6

MCA 5661 Computer Networks (TL)(4+2) 6hrs/6cr

Objective

In order to play role in this era network-based computing, student must have a thorough understanding of these emerging networking technologies and applications.

Upon completion of this course students will be able to

i. Basic Networking Concepts
ii. Fundamental Radio Propagation Waves
iii. Basic wireless networking concepts: Wifi, MAC protocols, mobile networking, 5G MILLI METER WAVES, ULTRA DENSE NETWORKS.
iv. Network function virtualization and software defined networking
v. Machine Learning Assisted Networking.

Unit 1: OSI Model 20hrs

Uses of computer networks – Network hardware – Network software – Reference models – The OSI Reference models – The TCP / IP Reference– A comparison of the OSI and TCP Reference models – Example networks – Novell NetWare, The ARPANET – NSFNET – The Internet – X.25 networks – network standardization.

Unit 2: Application Layer 15hrs

Fourier analysis – Bandwidth limited signals – The maximum data rate of a channel – Transmission media –Wireless transmission – The telephone system – Structure of the telephone system – The local loop – Cellular radio – Communication Satellites.

Unit 3: Network Layer 20hrs

The channel allocation problem – Multiple accesses protocols – IEEE standard for LANS and MANS – Bridges – High speed LANS – Satellite networks - Data link layer design issues – error detection and correction elementary data link protocols. Network layer design issues – Routing algorithms –congestion control algorithms-internetworking- Internet layer in the internet.

Unit 4: Transport Layer 15hrs

The transport – The transport service – Elements of transport protocols – A simple transport protocol - Network security – Domain Name system – Electronic Mail – USENET NEWS – The World Wide Web – Multimedia - Distributed processing

Unit 5: Data Link Layer **20hrs**

Connectivity of vehicles : protocols AND frameworks – Security trust safety and privacy - Information Security –homomarphic encryption for cloud computing – Adhoc and deterministic network for mobility challenges and limitations relating to VANET and MANET- Sensor technologies and networks – ambient Intelligence in the network.

Textbook

1. Andrew S Tanenbaum, "Computer Networks", Prentice Hall of India private Ltd., New Delhi 3rd edition, 2013

References

1. John Freer Pitman, "Computer Communication and Network", Computer system series, 2010.
2. Sitnie, "Computer Network (TCP/IP), Tata McGraw Hill, 2011.
3. Willams Stallings, "Data & computer communications", Pearson Education Asia, Sixth Edition, 2012.
4. RS Rajesh, KS Easwarakumar, R Balasubramanian, "Computer Networks-Fundamentals and Applications", 12th Edition, Vikas Publications, NewDelhi, 2012.

Lab Exercises

1. Implementing a simple client/server application using sockets and TCP/IP
2. Using of open SSH
3. Port forwarding
4. Sniffing
5. Proactive filtering of weak pass words and salting passwords
6. Using open SSH for communication confidentiality and integrity
7. Using open SSL to set up a simple certifying authority
8. Issuing and verifying certificates to avoid MITM attacks
9. Setting up of a firewall
10. Setting up of IP Sec virtual private network (VPN)
11. Packet capturing and packet replay attack
12. ARP spoof, DNS spoof attacks- man in the middle attacks demonstration
13. Logic for brute force attacks
14. Program that using hashing technique. Encryption and Decryption of file program.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3			3			
CO4				4		
CO5					5	

MCA 5463 **Lab -3 Java Programming** **4 hrs/4 crs**

Objective

This course is to train the student to develop problem solving abilities and facilitate them to build the necessary skill set and analytical abilities for developing java based software for real life problems.

Upon completion of this course students will be able to

i. Develop simple java servlets to handle forms, session and Cookies.
ii. Construct programs using JSP, create user defined tags and bean applications
iii. Establish database connectivity and perform DDL, DML operations.
iv. Understand Enterprise architecture and create ee applications
v. Write programs using Struts.

Lab Components

1. Implementation of Array and flow control statement.
2. Write a Java program to count the letters, spaces, numbers and other characters of an input string.
3. Demonstrate the use of constructor or destructor.
4. Implementation of forms using servlet.
5. Develop Session handling using 4 different methods (Cookies, Hidden form field, URL rewriting and HttpSession
6. Demonstrate the advantages of JSP over Servlets.
7. Form handling in JSP
8. Create user defined Tags and demonstrate the same.
9. Write Java bean applications.
10. Create Java database connectivity
11. Perform DDL operations.
12. Perform DML Operations.
13. Develop applications – J2EE, J2ME and JNDI.
14. Design applications using Struts

Bloom Taxonomy	K1	K2	K3	K4	K5	K6
CO1			3		5	
CO2				4		6
CO3		2				6
CO4					5	6
CO5						6

MCA 5456 **Dot Net Programming** **4hrs/4cr**

Objective

The aim of the course is to understand the fundamental concepts of .NET framework and its merits over other programming languages, it will enable the students to develop desktop applications and web applications.

Upon completion of this course students will be able to

i. Define .net technology and its salient features
ii. Explain the attributes of vb.net and write programs.
iii. Perform database connectivity with vb.net and ado.net
iv. Compare the properties of C# with vb.net and C++.
v. Create simple application systems using .net.

Unit 1: Dot Net Technology **10hrs**

Introduction - .Net revolution - Building blocks of .Net, overview of .Net applications .Net framework and its architecture Intermediate Language(IL), Common Language Runtime (CLR), JIT Compilation, Common Type System (CTS), Common Language System (CLS), Assemblies –Components of Assembly – DLL hell and Assembly Versioning

Unit 2: VB.NET **15hrs**

Introduction to VB.Net – and features of VB.NET- Arrays - procedures –scope – built-in functions – classes and objects – features of oops –constructors and destructors – creating property procedures – creating events – namespaces – import keyword - Inheritance, Polymorphism and Interfaces – overriding methods and properties – MyBase Keyword – MyClass Keyword – Abstract Base Classes – Shared members.

Unit 3: ADO.NET **10hrs**

Working with forms – Inheritance in windows forms – loading and showing forms –visual inheritance – adding controls – layout enhancement properties of controls – working with simple controls – adding menus – context menus - delegates -overview of ADO.Net – ADO.NET Architecture – ADO.NET Components – Using ADO.NET – Data form wizard Components and Inter operability.

Unit 4: C#.NET **10hrs**

Overview to C# - C # Compilation and Execution Process – C# Fundamentals (Data types, Operators, Programming constructs) –Inheritance –Sealed Classes – Interface - Polymorphism – Method Hiding – C# Property –Exception Handling.

Unit 5: ASP.NET **15hrs**

ASP.Net- IIS - ASP.Net Page Life Cycle – ASP Vs ASP.Net - HTML Controls Vs Server side Controls –Validation Controls – Data binding in ASP.Net – Caching – Configuration in ASP.Net (web.config) –Session management – View State in ASP.Net.

Textbook

1. Kogent Learning Solutions Inc., ".NET 4.5 Programming 6-in-1, Black Book", 1 st edition, Dreamtech Press, 2013.

Reference

1. Evangelos Petroutsos, "Mastering Visual Basic .NET" 3d Edition, SYBEX, 2006
2. Bill Hamilton, "ADO.NET 3.5 Cookbook: Building Data Centic .net Applications", 2nd edition , O'Reilly, 2008.
3. Joseph Albahari, Ben Albahari, "C# 7.0 in a nutshell: The Definitive Reference", 1st edition, O'Reilly Media, 2017.
4. Dino Esposito, "Programming ASP.NET Core (Developer Reference)", 1st edition, Microsoft Press, 2018.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3			3			
CO4				4		
CO5					5	6

MCA 5558 Data Mining and Warehousing 5 Hrs/5cr

Objective

The aim of the course is to enable the students to understand the basic concepts of data mining and its classification along with its applications. It introduces data mining and data warehousing and its architectures, Tasks under data mining, Association Rules, Classifications of data mining and Application in data mining.

Upon completion of this course students will be able to

i. Understand the basic functionalities and concepts of data mining and data warehousing.
ii. Analyse the need for data pre-processing and various steps involved in it.
iii. Categorize the methodologies and algorithms and be familiar with association rule mining techniques and constraint based association mining.
iv. Analyse the usages of Decision tree Algorithm, Bayesian Classification and Back Propagation techniques.
v. Understand Clustering and Outline the applications and trends in Data mining.

Unit 1: Introduction to Data Mining and Data Warehousing 15hrs

Introduction – Data mining – Data mining functionalities – kinds of patterns can be mined – classification – major issues. Data warehouse – A multidimensional data model – Data warehouse architecture – Data warehouse implementation – From data warehouse to data mining

Unit 2: Data Pre-Processing 15hrs

Data pre-processing – Data cleaning – Data Integration and Transformation – Data Reduction – Discretization and concept hierarchy generation – Data mining primitives – Data mining Task – A data mining query language - Architecture of Data mining systems – Characterization and comparison

Unit 3: Association Rule Mining 15hrs

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

Unit 4: Classification and Prediction 15hrs

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 – prediction – classifier accuracy.

Unit 5: Clustering and Trends in Data Mining **15hrs**

Clustering – Introduction to types of Clustering - Applications and Trends in Data Mining – Data mining system products and Research prototypes – Additional themes on Data mining – Social Impacts of Data Mining – Trends in Data mining.

Textbook

1. Jiawei Han, Michelien Kamber, "Data Mining Concepts and Techniques", 3rd Edition, 2014.

References

1. Arun K. Pujari, "Data Mining Techniques", Universities Press (India) Limited,2 nd Edition, 2013.
2. Alex Berson, Stephen j Smith , Data Warehousing ,Data mining and OLAP (Data warehousing / Data Management) , McGraw Hill 2012.
3. George M Marakas, Modern Data warehousing, Mining and Visualization: core concepts, Prientice Hall , First Edition, 2002
4. John Wang, Encyclopaedia of Data warehousing and Mining, Idea Group Publishing, 2009.
5. Shawkat Ali A B M, Saleh A. Wasimi, "Data Mining: Methods and Techniques ,Third Indian Reprint, Cengage Learning, 2010.
6. Soman K. P., ShyamDiwakar, Ajay V. "Insight into Data Mining Theory and Practice" , Fifth Printing, PHI Learning, 2011.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1	2				
CO2		2	3	4		
CO3		2	3	4		
CO4			3	4		
CO5			3	4		6

MCA 5460 **Soft Computing** **4 Hrs/4cr**

Objective

The aim of this course is to provide the basic idea about Fuzzy sets and fuzzy logics. It also discusses the operations and applications of fuzzy logics. Introduces various ANN structures such as feed forward with back propagation, Counter propagation networks, Hopfield nets, BAM structure and ART architecture.

Upon completion of this course students will be able to

i. Recall the difference between Crisp and Fuzzy sets and recognize Fuzzy Operations.
ii. Design Fuzzy Based Applications.
iii. Compare and contrast Biological and Artificial Neurons and explain the basic ANN algorithm.
iv. Assess different ANN training algorithms
v. Design Recurrent Networks and Elaborate ART architecture

Unit 1: Introduction to Soft Computing **10hrs**

Soft Computing: Meaning and Features - Introduction to Fuzzy Logic - Fuzzy set – Fuzzy Set versus Crisp set – Operation on Fuzzy Sets – Fuzzy Arithmetic - Fuzzy relations.

Unit 2: Fuzzy Set **10hrs**

Constructing Fuzzy Sets and Operations on Fuzzy Set – Fuzzy rule based system: Fuzzy propositions – formation - decomposition & aggregation of fuzzy rules, fuzzy reasoning, fuzzy inference systems, fuzzy decision making & Applications of fuzzy logic.

Unit 3: Neural Networks **15hrs**

Why Neural Networks? - Characteristics of ANN – Training of ANN – Activation function – Multilayer networks - Back Propagation – The training algorithm, Forward pass, reverse pass, Adjusting weights – Advanced Algorithms – Applications.

Unit 4: Propagation **15hrs**

Counter Propagation Networks – Network Structure – Kohonen layer – Training, Interpolative Mode - The Grossberg Layer – An Application. Statistical methods – Training applications - Boltzmann Training - Cauchy Training.

Unit 5: Art **10hrs**

Hopfield Nets – Recurrent Network Configuration, Stability, Associative Memory BAM - Adaptive Resonance Theory – ART Architecture

Textbook

1. Phillip D Wasserman – Neural Computing Theory and Practice – Van Nostrand Reinhold Publications, Newyork, 1989.

References

1. Valluru Rao, Haya Griva Rao and Valluru B Rao – C++ Neural Networks and Fuzzy Logic – Addison Wesley, 1999.
2. Stamastios V Kartalopoulos – Understanding Neural Networks and Fuzzy Logic Basic Concepts and Applications – IEEE press, PHI publications, 1996.
3. Klir, GJ, Youan Bo, "Fuzzy Sets and Fuzzy Logic", Prentice Hall, 2012.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2						6
CO3		2				
CO4					5	6
CO5						

MCA 5462 **Lab -4 Dot Net Programming** **4hrs/4cr**

Objective

This course aims at training the students to develop simple desktop and web applications using Dot Net Technology.

Upon completion of this course students will be able to

i. Recall simple programs and write programs on various concepts of VB.NET
ii. Restate VB.NET forms
iii. Apply ADO.NET on VBNET forms
iv. Illustrate OOPS concepts in C#.net
v. Design web pages in ASP.NET

Lab Exercises

1. Create Simple application using web controls
2. Use of calendar control, Tree view control & Validation controls
3. Query textbox and Displaying records & Display records by using database
4. Implement Single Inheritance and Overloading and Overriding
5. Explore the use of MyBase and MyClass
6. Data binding using data list control.
7. Data binding using data grid & Data grid control template
8. Inserting record into a database & Deleting record from a database
9. Create a complete system for student database
10. Implement Inheritance, Polymorphism in C#.NET
11. Implement Operator Overloading using C#.NET
12. Design a simple web page
13. Create an Digital Advertisement
14. Implement Data Connectivity in a web page
15. Handle Validation Operations in ASP.NET.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1	2				
CO2		2	3			
CO3			3	4		
CO4				4	5	
CO5					5	6

MCA 5964 **Project Viva Voce** **9hrs/4cr**

Objective

This course is to encourage the students to develop a Real Time Application for client with the guidance of internal and external faculty.

Upon successful completion of the course the students will be able to

i. Identify the company's software technology and methodologies
ii. Develop the software projects by understanding the client requirement
iii. Evaluate and analyse the SDLC, understand software design, coding techniques and software testing principle
iv. Analyse a given problem and develop an algorithm to solve the problem
v. Implement the various programming languages like C, C++, VB. Net, Java Construct in the right way

Evaluation Pattern

Internal (3 Presentations) -75 marks
External (Final Presentation and Viva Voce) - 25 marks

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2						6
CO3					5	
CO4			3			
CO5						6

MCA 0440 Android programming (TL) (2+2) 4hrs/4cr

Objective

The aim of this course is to understand the theory as well as practical knowledge of mobile computing using android.

Upon completion of this course students will be able to

i. Describe the features of the WAP
ii. Discuss the Introduction to Android
iii. Construct the different buttons and menus
iv. Illustrate different types of layout
v. Creating different type of view

Unit 1: Wap Overview 15hrs

Overview of the WAP – Components of WAP standard – WAP architecture – Design principles- Design

Unit 2: Android Architecture 10hrs

Introduction to Android – Android Architecture –Features – Applications - Versions – Flavours - Building the project.

Unit 3: Controls 10hrs

User Interface Architecture –Activity life cycle - Intents – Services – Content providers - UI Widgets – Text controls –Button controls – Toggle buttons – Menus – Options menu – Context menu – popup menu.

Unit 4: Layout 10hrs

Layout manager – Relative layout – Linear layout - Table layout – Grid layout – Adaptor – Array adaptor – ArrayList adaptor – Base adaptor – Lists.

Unit 5: Viewing 15hrs

View – Grid view – Web view – Scroll view – Search view – Dynamic list view – Expanded list view – Working with data storage – Shared preferences – Preferences activity – Files access – database connectivity using SQLite. App Development.

Textbook

1. Learning Android, Marko Gargenta, Masumi Nakamura, O'Reilly, 2nd edition, 2014.

References

1. Principles of Mobile Computing, UweHansmann, LotharMerk, Martin S.Nicklous and Thomas Stober , Springer Professional Computing, 2nd Edition, 2008.
2. Mobile Computing Theory and Practice, KumKumGarg, Pearson Education, illustrated edition, 2010.
3. Mobile Computing and Wireless Communications, Amjad Umar, NGE Solutions, 2004.

Websites

1. www.edunotes.in/mobile-computing
2. www.tutorialspoint.com/android.
3. www.javapoint.com/android.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3			3	4		
CO4					5	
CO5						

MCA 0441 **Artificial Intelligence** **4 hrs/4cr**

Objective

The primary objective of this course is to introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals, not on providing a mastery of specific software tools or programming environments.

Upon completion of this course students will be able to

i. Formulate the AI problem using strategies
ii. To solve different problems using AI algorithm
iii. Formulate a given problem in the language/framework of different AI methods.
iv. Illustrate knowledge base system
v. Classify the expert systems

Unit 1: Introduction to AI **12hrs**

Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics - Specialized production system.

Unit 2: AI Algorithms **13hrs**

Problem solving methods – Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction – Related algorithms, Measure of performance and analysis of search algorithms

Unit 3: Knowledge Representation **13hrs**

Game playing – Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

Unit 4: Rules of Inference **11hrs**

Knowledge representation -Production based system, Frame based system. Inference – Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning – Certainty factors, Bayesian Theory-Bayesian Network- Dempster – Shafer theory.

Unit 5: Expert Systems **11hrs**

Expert systems – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems – MYCIN, DART, XOON, Expert systems shells. Introduction to Deep Leaning.

Textbook

1. Stuart Russel and Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education, 2010.

References

1. David W. Rolston, "Principles of Artificial Intelligence and Expert System Development", McGraw Hill Book Company, 1988.
2. Elaine rich, Kevin Knight, "Artificial Intelligence", Tata McGraw Hill.
3. Carl Townsend, "Introduction to Turbo Prolog", 2nd Edition, Sybex Inc, 1987.
4. Stamations V. Kartalopous, "Understanding Neural Networks and Fuzzy Logic", Wiley Press, 1995.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3			3			
CO4				4		
CO5					5	6

MCA 0442 Computer Graphics (TL)(2+2) 4hrs/4cr

Objective

The course aims to provide knowledge and understanding in the fundamental principles of Computer Graphics and Mathematical concepts related to Computer graphical operations. To provide in-depth knowledge of display systems, image synthesis and shape modeling of 3D applications.

Upon completion of this course students will be able to

i. Recall display devices, Line and circle drawing algorithms
ii. Interpret 2d transformations and clipping on images
iii. Apply 3D concept on objects and surface.
iv. Analyse 3D transformation and Projection
v. Create a real life picture with fractals

Unit 1: Computer Graphics Algorithms 10hrs

Introduction to Computer Graphics: Display devices - Hard copy devices – Interactive input devices Graphics System, Application of computer graphics - Line Drawing Algorithms- Circle Generating Algorithms- ellipse generating -Scan-Line Polygon

Unit 2: 2D Transformations and Clipping 15hrs

Two dimensional Geometric Transformations - Composite Transformations -Transformations between Coordinate Systems Raster methods for Transformations- Two Dimension Viewing. TWO-Dimension Viewing- Clipping- Line Clipping- Polygon Clipping – Text Clipping.

Unit 3: 3D Representation 15hrs

Three Dimensional Concepts- Three Dimensional Display Methods viewing – Three Dimensional Object Representations – Polygon Surfaces- Polygon Tables-Polygon Meshes- Bezier Curves - Bezier Surfaces- Sub Division Method – Octrees - BSP Trees.

Unit 4: Projections 10hrs

Three Dimensional Transformations – Projection - Parallel Projection - Perspective Projection Hidden Surface and Hidden – Line Removal-Classification of Algorithms – Back Face Removal – Depth Buffer Method – Scans Line Method

Unit 5: Fractals 10hrs

Fractals : Fractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals – Overview of Ray Tracing – Intersecting rays

with other primitives – Adding Surface texture – Reflections and Transparency – Boolean operations on Objects

Textbook

1. Computer Graphics by Donald Hearn and M Pauline Baker PHI Publications 2013.

References

1. Principles of Interactive computer graphics – William M. Newman & F Sproull.
2. Steven Harrington. Computer Graphics McGraw Hill International Edition 2nd Edition, 1987.
3. Edward Angel, Dave Shreiner, "Interactive Computer Graphics: A Top Down Approach with Webgl", 7th Edition, Pearson, 2014
4. Steven J Gortler, "Foundations of 3D Computer Graphics", 1st edition, MIT Press 2012

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3			3			
CO4				4		
CO5					5	

MCA 0443 BIG DATA ANALYTICS 4Hrs/4cr

Objective

The aim of the course is to explore the fundamental concepts of Big Data Analytics, and analyse the big data using intelligent techniques, and facilitate them to understand various search methods and visualization techniques, and help them to employ the various techniques for mining data stream, and understand the applications using analytics tools to solve big data problems.

Upon completion of this course students will be able to

i. Explain the challenging nature of big data and differentiate it with existing technologies.
ii. Design strategies to collect, manage, store, query, and analyze various datasets.
iii. Develop hands-on experience on large-scale analytics tools to solve big data problems.
iv. Understand the impact of big data in business decisions and strategy designing.
v. Exhibit New skills in Big data analytics

Unit 1: Big Data in the Enterprise 10hrs

Big Data in the Enterprise: Search at Scale- Multimedia Content-Sentiment Analysis- Enriching and Contextualizing Data- Data Discovery or Exploratory Analytics- Operational Analytics or Embedded Analytics- Realizing Opportunities from Big Data- Taming the "Big Data". The New Information Management Paradigm: What Is Enterprise Information Management?- New Approach to Enterprise Information Management for Big Data- Implications of Big Data to Enterprise IT.

Unit 2: Big Data implications for Industry 10hrs

Big Data Implications for Industry: The Opportunity- Big Data Use Cases by Industry Vertical. Emerging Database Landscape: The Database Evolution- The Scale-Out architecture Database Workloads- Database Technologies for Managing the Workloads- Columnar Databases- Requirements for the Next Generation Data Warehouses- Polyglot Persistence: The Next Generation Database Architecture.

Unit 3: Architecture for Big Data and Analytics 15hrs

Application Architectures for Big Data and Analytics: Big Data Warehouse and Analytics- Big Data Warehouse System Requirements and Hybrid Architetures- Enterprise Data Platform Ecosystem- BDW and EDW- How Does Traditional Data Warehouse processes map to tools in Hadoop Environment- How Hadoop Works- The Hadoop Suitability Works- Additional Considerations for Big Data Warehouse- Big Data and Master Data Management- Data quality Implications for Big Data- Putting it all Together- A Conceptual BDW Architecture. Data Modelling Approaches for Big Data and Analytics Solutions: Understanding Data Integration Patterns- Big Data Workload Design Approaches- Map-Reduce Patterns, Algorithms, and Use Cases- No SQL Data Modelling Techniques.

Unit 4: Big Data Analytics Methodology **15hrs**

Big Data Analytics Methodology: Challenges in Big Data Analysis- Big Data Analytics Methodology- Analyze and Evaluate Business Use Case- Develop Business Hypotheses. Extracting Value from Big Data: In Memory Solutions, Real Time Analytics, And Recommendation Systems: Building a Recommendation System.

Unit 5: Data Scientist **10hrs**

Data Scientist: The New Skill: Data Scientist- The Big Data Workflow- Design Principles for Contextualizing Big Data- A Day in the Life of a Data Scientist.

Textbooks

1. "Big Data Principles and best practices of scalable real time data systems" Nathan Marz, James Warren Dreamtech Press Edition, 2015.
2. "Big Data Analytics: Disruptive Technologies for Changing the game", Dr. Arvind Sathi, Elsevier, 2013, ISBN 978-1-58347-380-1.

References

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, Tata McGrawHill, 2012.
3. Anand Rajaraman, Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
4. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
5. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007.
6. Pete Warden, "Big Data Glossary", O'Reilly, 2011.
7. Da Ruan, Guoquing Chen, Etienne E.Kerre, Geert Wets, "Intelligent Data Mining", Springer, 2007.
8. Michael Minelli (Author), Michele Chambers (Author), Ambiga Dhiraj (Author), Big Data, "Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley Publications, 2013.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	**1**	**2**				
CO2	**1**	**2**	**3**			
CO3		**2**	**3**	**4**		**6**
CO4		**2**	**3**	**4**	**5**	
CO5			**3**			**6**

MCA 0444 **Biometrics** **4 Hrs/4cr**

Objective

The aim of this course is to enable the student to understand the security and authentication methods available in biometrics techniques such as finger prints, hand print, face, Iris, Retina, and voice recognition and the technology behind them.

Upon completion of this course students will be able to

i. Exploring the biological characteristics
ii. Individual physically and behaviourally distinctive in a number of ways
iii. Making them to understand technology uses and applications
iv. Exploring with the scientific basis of biometrics
v. Enhancing the security by combining more than one

Unit 1: Introduction **10hrs**

Biometrics – Introduction- Verification vs Identification – Applications – Facts other common Biometric characteristics. Finger print technology - Technical Description – Finger print security characteristics – Technology uses and applications increased or decreased costs.

Unit 2: Face Recognition **15hrs**

Face Technology – Technical Description – Face Recognition security characteristics – Face Technology uses - Face Technology considerations – Network product commonalities. Iris and Retina Vascular Pattern Technology – Technical Description- Technology uses and applications- Implementation criteria – Increased or Decreased costs – Sample product.

Unit 3: Signature **10hrs**

Other Physical Biometrics – Hand Scan Geometry – Hand Print Biometrics – DNA Biometrics – Signature And Hand Writing Technology – Technical Description – Classification – Technology Uses And Applications.

Unit 4: Voice Recognition **15hrs**

Voice Recognition – The speaking voice and factors to consider – How vowels are formed – Rules for modifying vowels – Spectral Analysis – Factors influencing fundamental frequency – Voice qualities and Recognizing Distinctiveness.

Unit 5: Authentication **10hrs**

Multi-biometrics and Two factor authentication – Executive decision – Establish goals – Need analysis – Selection criteria – Ripple security logic – Selection process – Implementation Plan.

Textbook

1. John D Woodward Jr, Nicholos M Orlans and Peter T Higgins, “Biometrics”, Osborne Publications, 2003.

References

1. Julian Ashbourn, “Practical Biometrics: From Aspiration to Implementation”, Springer Professional Computing, 2001.
2. RundBolleJohnathan, H. Connell, Nalini K Ratha, “Guide to Biometrics” Springer Professional Publications, 2000.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3			3			
CO4				4		
CO5					5	

MCA0445 **Compiler Design** **4 Hrs /4cr**

Objective

This course is to enable the students to understand the basic concepts in compiler construction. Fundamental concepts in compilers, structure of the compiler and the tools to write compilers are introduced. Internal process mechanism in a compiler is included. Parsing techniques and Translation schemes are introduced.

Upon completion of this course students will be able to

i. Understand the different phases of compiler.
ii. Design a lexical analyzer for a sample language.
iii. Apply different parsing algorithms to develop the parsers for a given grammar.
iv. Describe syntax-directed translation and run-time environment.
v. Discuss to implement code optimization techniques and a simple code generator.

Unit 1: Introduction **15hrs**

Introduction To Compilers – Structure of a compiler – Lexical Analysis – Role of Lexical Analyzer – Input Buffering – Specification of Tokens – Recognition of Tokens – Lex – Finite Automata – Regular Expressions to Automata – Minimizing DFA.

Unit 2: Parsers **15hrs**

Parsers – Shift-reduce parsing – Operator-precedence parsing – Top-down parsing – Predictive parsers – LR Parsers – The canonical collection of LR (0) items- Constructing SLR parsing tables – Constructing canonical LR parsing tables – Constructing LALR parsing tables – Using ambiguous grammars – An automatic parser generator – Implementation of LR parsing tables – Constructing LALR sets of items.

Unit 3: Syntax **10 hrs**

Syntax-directed translation schemes – Implementation of syntax-directed translators – Intermediate code – Postfix notation

Unit 4: Symbol **10 hrs**

Three-addresses code, quadruples and triples – Postfix translations – The contents of a symbol table – Data structures for symbol tables – Representing scope information.

Unit 5: Lexical and Semantic **10hrs**

Errors – Lexical-phase errors – Syntactic-phase errors – Semantic errors – The principal sources of optimisation – Loop optimization – The DAG representation of basic blocks – Object programs – Problems in code generation – A simple code generator – peephole optimization.

Textbook

1. Aho AV, Ullman JD, Principles of Compiler Design, Narosha Publications, 1999.

References

1. William A Bar, RM Bates, DA Gustaf, John D. Couch, "Compiler Construction", Galgotia Publications 2000
2. V. Raghavan, Principles of Compiler Design‖, Tata McGraw Hill Education Publishers, 2010

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3				4		
CO4			3			
CO5					5	

MCA 0446 Multimedia and Applications (TL)(2+2) 4Hrs/4cr

Objective

This course gives a detailed study of the multimedia systems and the technologies that support the components of multimedia. Hands on training will be given on multimedia applications with the help of Sound Forge, Movie Maker and macro media FlashMX. Advanced concepts of action script in flash will be implemented.

Upon completion of this course students will be able to

i. Recall Distributed Multimedia Systems and the components of Multimedia.
ii. Summarize the need and requirements of Continuous Multimedia Systems.
iii. Develop Audio and Video applications using Authoring Tools.
iv. Create interactive media applications using basic animation techniques in Flash.
v. Build interactive Forms using Action Script and the Objects in Flash.

Unit 1: Introduction 14hrs

Uses of multimedia information – Architectures and issues for distributed multimedia systems – Digital Audio representation and processing - Video Technology - Digital video and Image Compression - Time based media representation and delivery.

Unit 2: Middleware 12 hrs

Operating System support for continuous media applications – Middleware system services - Architecture - Multimedia file systems and information models - Multimedia services over the public network – Knowledge based Multimedia systems.

Unit 3: Audio 14hrs

Introduction to Sound Forge - Non-linear editing: meaning and process -sequencing -Audio Editing Tools - Process of equalization -Applying effects to sound - Audio Mixing - Introduction to Movie maker- Design, create and edit a movie using Movie maker - import audio clips into Movie Maker.

Unit 4: Flash 10hrs

Introduction to Flash MX - Animation Techniques in Flash MX - Action Scripts - constructs – Functions - Objects – Understanding Text usage - Predefined objects.

Unit 5: Forms 10hrs

Using and building Components – Data driven Flash solutions – scrolling, dragging, making menus, dynamic drawing, Using Forms.

Textbook

1. John F Koegel Buford, “Muiltimedia Systems”, Pearson Education, 2001.

References

1. James E Shuman, “Multimedia in Action”, Vikas Publications, 2001.
2. Robert Reinhardt and Joey Lott, “Flash Action Script Programming Bible”, John Willey Dream Tech Publications, 2002.
3. “Macro Media Director 8.5 Shockwave studio user manual”, Macromedia Publications, 2002.
4. Derek Franklin and Jobe Makar, “Flash MX Action scripting training from the source”, Macromedia Press, 2003.
5. Colin Moock, “Action Script for Flash MX”, Oreilly publications 2nd Edition, 2002.
6. Gary Rosenweig, “Special Edition Using Macromedia Director MX”, QUE Publications, 2003.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3			3			
CO4						6
CO5						6

MCA0447 Parallel computing 4Hrs/4cr

Objective

The aim of the course is to enable the students to understand OpenCL standard for programming heterogeneous computers built from CPUs, GPUs and other processors. Using OpenCL to write task-based and data-parallel programs to realize the advantage of these different types of processors in a single system.

Upon completion of this course students will be able to

i. Exploring the parallel computing knowledge
ii. Making them to design software using suitable searching technique.
iii. Exploring Graph algorithm to speed up the processing.
iv. Students to develop program compatible to any gadgets.
v. Develop to optimize the memory usage

Unit 1: Introduction 10hrs

Introduction - Need for Parallel Computing - Scope of Parallel Computing – Issues in Parallel Computing - Models of Parallel Computing - Taxonomy of Parallel Architectures - Dynamic Interconnection Networks - Static Interconnection Networks - Message Transfer - Reduction, Parallel Prefix - GPU thread model

Unit 2: Modelling 15hrs

Performance Modelling - Metrics - Granularity - Scalability – Overhead - Isoefficiency - Matrix Algorithms - Matrix Partitioning - Matrix Transposition - Matrix Vector Multiply - Matrix Multiply - CUDA, vector add, matrix multiply, sequence alignment -Linear Equations - LU(P) Decomposition-Searching and Optimization - The knapsack problem -Branch and Bound - Dynamic Programming -Sorting - Types of sorters -Sorting networks - Radix / Bucket sorts

Unit 3: Graph 10hrs

Graph algorithms -Minimum Spanning Tree - Single Source Shortest Paths -All Pairs Shortest Paths - Fast Fourier Transforms - Fourier Series, basis functions, Euler - Discrete and Fast Fourier Transforms - Convolution, roots of unity, divide and conquer - Evaluation and Interpolation -Recursive, bit reversal, iterative Cooley - Tukey FFT - Pease FFT, locality.

Unit 4: Open CL 15hrs

Introduction to OpenCL - OpenCL Architecture - Programming Model - Getting Started - Software Development Environment and Tools - Debugging tools -Getting into OpenCL Details OpenCL Kernel Programming - Data Types and Type Checking-GPU - specific Features-

Advanced OpenCL - Developing applications on Heterogeneous devices - OpenCL Images - API Features – Graphics API Bindings.

Unit 5: Applications **10hrs**

Generic Application tuning - Evaluating Application Performance - Performance Tuning Tips - Optimizations on Multi - Core CPUs-Optimization on Many - Core Architectures - GPU architectures - GPU Threading Concepts - GPU Memory Hierarchy - ATI GPU Architecture - Nvidia GPU Architecture.

Textbook

1. Kai Hwang and Zhi.WeiXu, "Scalable Parallel Computing", Tata McGraw-Hill, New Delhi, 2003

References

1. David E. Culler &Jaswinder Pal Singh, "Parallel Computing Architecture: A Hardware/Software Approach", Morgan Kaufman Publishers, 1999.
2. Michael J. Quinn, "Parallel Programming in C with MPI &OpenMP", Tata McGraw-Hill, New Delhi, 2003.
3. Kai Hwang, "Advanced Computer Architecture" Tata McGraw-Hill, New Delhi, 2003.
4. David B. Kirk, Wen-mei W. Hwu. Programming Massively Parallel Processors: A Hands-on Approach. Morgan Kaufmann, 2010.
5. http://amd.developers.opencl/

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
CO1	1					
CO2		2				
CO3			3			
CO4				4		
CO5					5	

MCA 421V **Essentials of Management** **4Hrs /4Cr**

Objective

The aim of this course is to introduce the basic Management processes in organizations. It introduces students to the environment of management and covers the basic management Functions like planning, organizing, leading and controlling. Further, it develops an Understanding of the development of management thoughts ages and its applications. This course intends to familiarise the students with the theories and practices of management so as to develop basic managerial way of thinking.

Upon completing the course students will be able to

i. Comprehend the crux of management and the importance of a manager in an enterprise.
ii. Plan viably to keep the goals achieved.
iii. Assimilate Organizing capacity.
iv. Develop communication skills and be an Effective Manager
v. Exercise effective control over the situations.

Unit 1: Introduction to Management and Organizations **15hrs**

Definition of Management – Science or Art – Manager Vs Entrepreneur – types of managers – managerial roles and skills – Evolution of Management – Scientific, human relations, system and contingency approaches – Types of Business organization – Sole proprietorship, partnership, company-public and private sector enterprises – Organization culture and Environment – Current trends and issues in Management.

Unit 2: Planning **10hrs**

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

Unit 3: Organizing **15hrs**

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority – centralization and decentralization – Job Design – Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management, Career planning and management.

Unit 4: Directing **10hrs**

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership –

communication – process of communication – barrier in communication – effective communication –communication and IT.

Unit 5: Controlling **10hrs**

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

Textbook

1. K Natarajan & K P Ganesan, "Principles of Management", Himalaya Publishing House Pvt. Ltd., 2018

References

1. Koontz and Weihrich, "Essentials of Management: An International perspective", 7th Edition, Tata McgrawHill Publications, 2007.
2. Koontz and O Donnel, "Management – A Global Perspective", 10th Edition, Tata McgrawHill Publications.
3. Drucker, "Management Challenges for the 21stcentury", Utterworth-Heinemann Ltd, 2ndEdition, 2007.
4. Stephen P Robbins, Mary Coulter, "Management", Prentice Hall, 2009.
5. Andrew J Dubrin, "Essentials of Management", Thomson South Western, 2010.
6. VSP Rao and VH Krishna, "Management", Excel Books, 2008.
7. Harold and HeinezWeihrich, "Essentials of Management", Tata McGraw Hill, 2009.
8. Joseph and Massie, "Essentials of Management", Prentice Hall, 2009.

Blooms Taxonomy	K1	K2	K3	K4	K5	K6
C01	1					
CO2		2				
CO3		2	3			
CO4			3	4		
CO5				4	5	