S. V. K. P. & Dr. K. S. RAJU ARTS & SCIENCE COLLEGE (AUTONOMOUS)

Accredited by NAAC with grade 'A'
Recognized by UGC as "College with Potential for Excellence"

PENUGONDA-534320, W. G. Dist., A.P.

(Affiliated to Adikavi Nannaya University)

Dept of Computer Science (MCA Programme)

SYLLABUS
I MCA I SEMESTER

Master of Computer Applications(MCA)

Course Structure and Scheme of Valuation

SVKP & Dr K S RAJU ARTS & SCIENCE COLLEGE(A), PENUGONDA

Master of Computer Applications(MCA)

Course Structure and Scheme of Valuation

I MCA I Semester

Code	Name of the Subject	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
19MCAT11	Probability, Statistics and Queuing Theory	75	25	100	4	-	4
19MCAT12	Management Accountancy	75	25	100	4	-	4
19MCAT13	C & Data Structures	75	25	100	4	-	4
19MCAT14	Computer Organization	75	25	100	4	-	4
19MCAT15	Operating Systems	75	25	100	4	-	4
19MCAP16	C & Data Structures Lab	50	50	100	-	3	2
19MCAP17	Operating Systems Lab	50	50	100	-	3	2
Total Credits							24

19MCAT11 PROBABILITY, STATISTICS & QUEUING THEORY

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I:

Probability: Definitions of probability, Addition theorem, Conditional probability, Multiplication theorem, Bayes' Theorem of Probability.

Random variables and their properties: Discrete Random Variable, Continuous Random Variable, Probability Distribution, Joint Probability Distributions their Properties, Transformation Variables, Mathematical Expectations, Probability Generating Functions.

UNIT II:

Probability Distributions: Discrete Distributions**:** Binomial, Poisson and Their Properties;
Continuous Distributions**:** Uniform, Normal, Exponential Distributions and Their Properties.
Multivariate Analysis: Correlation, Correlation Coefficient, Rank Correlation, Regression Analysis, Attributes, Coefficient of Association, C hisquare – Test For Goodness Of Fit, Test For Independence.

UNIT III:

Estimation: Sample, Populations, Statistic, Parameter, Sampling Distribution, Standard Error, Unbiasedness, Efficiency, Maximum Likelihood Estimator, Notion & Interval Estimation. **Testing of Hypothesis**: Formulation of Null hypothesis, critic al region, level of significance, power of the test;

UNIT IV:

Sample Tests: Small Sample Tests: Testing equality of means, testing equality of variances,
Large Sample tests : Tests based on normal distribution
Queuing Theory: Queue description, characteristics of a queuing model, study state solutions of M/M/1:∞ Model, M/M/1 : N Model,

Text Books :

1. Probability & Statistics for Engineers and Scientists,Walpole, Myers, Myers, Ye. Pearson Education.
2. Probability, Statistics and Random Processes T.Veerarajan Tata McGraw – Hill

Reference Book:

1. Probability & Statistics with Reliability, Queuing and Computer Applications, Kishor S. Triv edi, Prentice Hall of India ,1999

19MCAT12 Management Accountancy

Instruction:4 Periods/week	**Time: 3 Hours**	**Credits:4**
Internal:25 Marks	**External: 75 Marks**	**Total: 100 Marks**

Unit I

Principles Of Accounting: Nature And Scope Of Accounting,Double Entry SystemOf accounting introduction To Basic Books Of Accounts Of Sole Proprietary Concern, closing of books of accounts and Preparation Of Trial Balance.
FinalAccounts: Trading,Profit And Loss Accounts And Balance Sheet Of Sole Proprietary Concern with Normal Closing Entries.(With numerical problems)

Unit II

Ratio Analysis:Meaning, Advantages, Limitations, Types of Ratio and Their Usefulness. (Theory only)Fund Flow Statement: Meaning Of The Term Fund, Flow Of Fund, Working Capital Cycle, Preparation and Inter-preparation Of Statement.

Unit III

Costing:Nature, Importance And Basic Principles. Budget and Budgetary Control: Nature And Scope, Importance, Method Of Finalization And Master Budget, Functional Budgets. Marginal Costing:Nature,Scope, Importance,Construction Of Break Even Chart, Limitations And Uses Of Break Even Chart, Practical Applications Of Marginal Costing.(with numerical problems)

Unit IV

Introduction To Computerized Accounting System: Coding Logic And Codes Required,Master Files, Transaction Files,Introduction To DocumentsUsed ForData Collection, Processing Of Different Files And Outputs Obtained.

TextBooks:

1.Introduction to Accountancy.T.S. Grewal.
2.Management Accountancy, S.P.Jain.

ReferenceBook:

Introduction To Accounting,G.Agarwal.

19MCAT13 C & Data Structures

Instruction:4 Periods/week	**Time: 3 Hours**	**Credits:4**
Internal:25 Marks	**External: 75 Marks**	**Total: 100 Marks**

Unit I :

Introduction to C Programming: C Character Set, Identifiers, Keywords, Variables, Constants, Type Conversion, Operators and Expressions, Operator Precedence and Associativity, Formatted Input and Output, Running a Simple C Program ,Control Structures: Using Simple if, if..else and switch, Iteration using while, do..while and for Statements. Break and Continue, Unconditional goto, Conditional Operator.

Functions: Uses, User Defined and Library Functions, Calling Functions by Value and Reference, Storage Classes, Recursion,C Library FunctionsArrays and Strings: Array Uses and Operations, One and Two Dimensional Arrays.

Unit II :

Pointers: Uses of Pointers, Pointer Arithmetic, Pointers to Pointers, Pointers and One Dimensional, Two Dimensional Arrays, Pointers and Functions, Array of Pointers.

Structures and Unions: Declaring and Using Structures, Array of Structures, Pointers to Structures, Unions,. Files: File Structure, File Handling Functions, Create, Read and Write of sequential files.

Unit III

Stack: Primitive operations – stack as an ADT–Implementing the Stack operations, Queue: Queue as ADT– Implementing the Queue operations - Types of Queues – Operations – Linked List: Operations, Implementation of Stacks, Queues, doubly linked lists-applications. Trees: Binary Trees Operations and Applications. Binary Tree Representation: Binary Tree Traversal–Threaded Binary Trees and their Traversal- Binary Search Tree: Insertion in to a Binary Search Tree–Deleting from a Binary Search Tree.

Unit IV

Searching - Linear and binary search methods, sorting - Bubble sort, selection sort, Insertion sort, Quick sort, merge sort. Hashing: Open Addressing-deleting items-Binary Tree hashing-Dynamic Hashing and Extendible Hashing-Choosing a hash function . Graphs: Graphs-Linked Representation of Graphs-Graph Traversals: BFS and DFS.

Text Books:

1. Fundamentals of Computers. V Rajaraman, Neeharika Adabala, Fourth Edition PHI
2. Mastering C. K R Venugopal S R Prasad. Tata Mc Graw Hill.
3. Data Structures Using C and C++ Yedidyah Langsam, Moshe J.Augenstein and Aaron M. Tanenbaum, Prentice Hall of India (2ndEdition)
4. Data Structures, Algorithms and Applications with C++, SahaniMc-GrawHill.
5. File Structures – An Object Oriented Approach with C++ by Michael J. Folk, Bill Zoellick and Greg Riccardi,, Pearson

Reference Books: 1. C The Complete Reference. Herbert Schildt, Fourth Edition. Mc Graw Hill.

19MCAT14 Computer Organization

Instruction:4 Periods/week	**Time: 3 Hours**	**Credits:4**
Internal:25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT-1

Digital Logic Circuits :

Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuit, Flip-flops Sequential Circuits.

Digital Components:

Integrated Circuits, Decoders, Multiplexes, Registers ,Shift Registers, counters, Memory Unit.

UNIT-2

Data Representation:

Data Types, Complements, Fixed-point Representation, Floating point Representation **Register Transfer and Micro Operations:**

Register Transfer Language, Register Transfer, Bus and Memory Transfer, Arithmetic Micro Operations, Assembly language Instructions, 8085 Microprocessor Instruction Set Architecture.

UNIT-3

Basic Computer Organization and Design:

Instruction Codes, Computer Register, Computer Instructions, Timing and Control, Instruction Cycle memory reference Instructions, Input-Output , Interrupt.

Central Processing Unit:

Introduction, General Register Organization, Stack Organization, Instruction formats, addressing modes.

UNIT-4

Input /Output Organization:

Peripherals Devices, I/O Interface, Asynchronous Data Transfer, Mode of Transfer, Priority Interrupt, Direct memory access, Input – Output Processor(IOP).

Memory Organization:

Memory Hierarchy, Main memory, Auxiliary Memory, Associate Memory, Cache Memory and Virtual Memory.

Text Books:

1.Computer System Architecture, M.Morris Mano, Prentice Hall of India Pvt.ltd. Third Edition, Sept. 2008.

Reference Books:*

1.Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd. Eastern Economy Edition, Sixth Edition, 2003.

2.Computer System Architecture John P. Hayes.

3.Computer Architecture A Quantitative approach 3rd Edition John L. Hennessy & David A. Patterson Morgan Kufmann (An Imprint of Elseveir)

19MCAT15 Operating Systems

Instruction:4 Periods/week	**Time: 3 Hours**	**Credits:4**
Internal:25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Introduction: Definition of Operating System, Types Of Operating Systems, Operating System Structures, Operating-System Services, System Calls, Virtual Machines, Operating System Design and Implementation,

Process Management: Process Concepts, Operations on Processes, Cooperating Processes, Threads, Inter Process Communication, Process Scheduling, Scheduling Algorithms, Multiple -Processor Scheduling. Thread Scheduling.

UNIT II

Process Synchronization: The Critical Section Problem, Semaphores, And Classical Problems of Synchronization, Critical Regions, Monitors, Synchronization examples.

Deadlocks: Principles of Deadlocks, System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Avoidance, Detection & Recovery from Deadlocks.

UNIT III

Memory Management: Logical Versus Physical Address, Swapping, Contiguous Memory Allocation, Paging, Structure of the Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing

File System Implementation: Concept of a file, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free Space Management, Directory Management, Device Drivers.

Mass-storage structure: overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling, swap-space management.

UNIT IV

Protection: Goals and Principles of Protection, Access matrix implementation, Access control, Revocation of access rights.

Case study: LINUX, Windows Operating Systems.

Text Book:

1. Operating System Principles by Abraham Silberschatz, Peter Galvin, Greg Gagne. Seventh Edition, Wiley Publication

Reference Books:

1. Operating Systems, William Stallings 5th Edition - PHI
2. Modern Operating Systems, Andrew S.Tanenbaum, , 2nd edition, 1995, PHI.
3. Operating Systems - A concept based approach, Dhamdhere, 2nd Edition, TMH, 2006.
4. Understanding the Linux Kernel, Daniel P Bovet and Marco Cesati, 3rd Edition,' Reilly, 2005.

19MCAP16 C & Data Structures Lab

Instruction : 3 Periods/week	**Time : 3 Hours**	**Credits : 2**
Internal : 50 Marks	**External : 50 Marks**	**Total: 100 Marks**

Cycle-I :

Write programs in C to implement the following concepts / solve the problems.

1. Control Structures
2. Functions: Call by Value and Reference
3. Arrays
4. Pointers
5. Structures and Unions

Cycle-II

1. Linked Lists
2. Implementation of Stack
3. Implementation of Queue
4. Write a C Programming to implement the Sorting techniques
5. Write a C Programming to implement the Searching techniques

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19MCAP17 Operating Systems Lab

Instruction : 3 Periods/week **Time : 3 Hours** **Credits : 2**
Internal : 50 Marks, **External : 50 Marks** **Total : 100 Marks**

List of Experiments:

1. Basic UNIX commands

   Implement the following using Shell Programming
2. Input number even or odd
3. Count the number of lines in the input text

4. Print the pattern

```
    *
   ***
  *****
```

Implement the following using C

5. FCFS CPU scheduling algorithm
6. SJF CPU scheduling algorithm
7. Round Robin CPU scheduling algorithm
8. Priority CPU scheduling algorithm
9. Implement Semaphores
10. Page Replacement algorithms

References :

1. Operating System Principles by Abraham Silberschatz, Peter Galvin, Greg Gagne. Seventh Edition, Wiley Publication
2. Understanding the Linux Kernel, Daniel P Bovet and Marco Cesati, 3rd Edition, Reilly, 2005.
3. Unix programming, Stevens, Pearson Education.
4. Shell programming, Yashwanth Kanetkar.

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Master of Computer Applications(MCA)

Course Structure and Scheme of Valuation

I MCA II Semester

Code	Name of the Subject	Max Marks		Total Marks	Hours per week		Credits
		External	Internal		Theory	Practical	
19MCAT21	Discrete Mathematical Structures	75	25	100	4	-	4
19MCAT22	Information Systems and Organizational Behavior	75	25	100	4	-	4
19MCAT23	Object Oriented Programming through JAVA	75	25	100	4	-	4
19MCAT24	Formal Languages and Automata Theory	75	25	100	4	-	4
19MCAT25	Web Technologies	75	25	100	4	-	4
19MCAP26	Web Technologies Lab	50	50	100	-	3	2
19MCAP27	Object Oriented Programming through JAVA Lab	50	50	100	-	3	2
Total Credits							24

19MCAT21 Discrete Mathematical Structures

Instruction:4 Periods/week **Time: 3 Hours** **Credits:4**
Internal:25 Marks, **External: 75 Marks** **Total: 100 Marks**

Unit I

Introduction: Logic-Prepositional Equivalences-Truth tables-Totalogies-Predicates and Quantifiers-Sets-Operations on sets-Sequences and Summations -Growth functions - relations and their properties- n-ary relations and their applications - Representation of relations-Closures of relations-Equivalence relations-Partial Orderings.

Unit II

Counting Techniques: Basics of Counting- Pigeonhole Principle- Combinations and Permutations-Generalized Per mutations and Combinations

Recurrence relations: Solving Recurrence Relations-Divide and Conquer relations-Inclusion and Exclusion-Applications of Inclusion-Exclusion.

Unit III

Graphs: Introduction to Graphs-Terminology-Relations and Directed Graphs - Representations of Graphs- Isomorphism-Connectivity- Euler and Hamiltonian Paths - Shortest Path problems- Planar Graphs - Graph Coloring-

Trees: Introduction to trees- Applications of trees- Traversals-Trees and sorting-Spanning Trees-Minimum Spanning Trees.

Unit IV

Boolean Algebra and Models of Computation: Boolean Functions-Representing Boolean Functions -Logic Gates-Minimizations of Circuits-Languages and Grammars-Finite State Machines with and with no output.

Text Book:

Discrete mathematics and its applications, Keneth. H. Rosen, Tata McGraw-Hill Publishing Company, New Delhi

Reference Books:

1) Discrete Mathematics for computer scientists & Mathematicians, Joe L. Mott, Abraham Kandel & T. P. Baker,Prentice Hall of India Ltd, New Delhi
2) Discrete mathematics, Richard Johnsonbaug, Pearson Education, New Delhi

19MCAT22 Information Systems and Organizational Behavior

Instruction: 3 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT I

Organization Structure: Features of Good Organization Structures, Designing of Organization Structure, Types of Organization Structures-Functional, Product, Geographic and Matrix Organization Structures

UNIT II

Motivation: Nature and importance of motivation, Theories of motivation – Maslow's, Herzberg's and Mc Gregor's X and Y Theories of Motivation. Leadership: Meaning and definition, Importance of Leadership, Leadership styles, Communication: Process of Communication, Importance, Forms of Communication and Barriers in Communication.

UNIT III

Group Dynamics: Types of Groups, Stages of Group Development, Group Behavior and Group Performance Factors. Organizational Conflicts: Reasons for Conflicts, Consequences of Conflicts in Organizations, Types of Conflict, Strategies for Managing Conflicts, Organizational Climate and Culture.

UNIT IV

Management Information System: Nature and Scope, Characteristics and Functions. Classification of MIS - Transaction Processing System, Management Information System, Decision Support System, Executive Support System, Office Automation System and Business Expert System.

Text Books:

1. Elements of Organizational Behavior, Robbins, 7th Edition, Pearson Education
2. Management Information Systems – D.P.Goyal, Macmillan Publishers India Ltd.

Reference Books:

1. Organizational Behaviour – L.M.Prasad, Sultan Chand and sons
2. Management Information Systems - L.M.Prasad, Usha Prasad , Sultan Chand and sons
3. Management Information Systems – Kanter Jerma , PHI

19MCAT23 Object Oriented Programming through JAVA

Instruction:4 Periods/week **Time: 3 Hours** **Credits:4**
Internal:25 Marks, **External: 75 Marks** **Total: 100 Marks**

UNIT - I :

Fundamentals of Object Oriented Programming: Introduction, Object Oriented Paradigm, Basic Concepts of OOP, Benefits of OOP, Applications of OOP, Java Features ; Overview of Java Language : Introduction, Simple Java Program Structure, Java Tokens, Java Statements, Implementing a Java Program, Java Virtual Machine, Command Line Arguments; Constants, Variables and Data Types : Introduction, Constants, Variables, Data Types, Declaration of Variables, Giving Value to Variables, Scope of Variables, Symbolic Constants, Typecasting, Getting Value of Variables, Standard Default Values, Operators and Expressions.

UNIT - II :

Decision Making and Branching : Introduction, Decision making with if statement, Simple if statement, if else statement, nesting of if else statements, the else if ladder, the switch statement, the conditional operator. **Looping** : Introduction, the while statement, the do-while statement, the for statement, jumps in loops.

Classes, Objects and Methods : Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class Members, Constructors, Method Overloading, Static Members, Nesting of Methods.

Inheritance : Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control.

UNIT - III :

Arrays, Strings and Vectors : Arrays, One-diemensional Arrays, Creating an Array, Two-dimensional Arrays, Strings, Vectors, Wrapper Classes.

Interfaces : Multiple Inheritance : Introduction, Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables.

Multi-threaded Programming : Introduction, Creating Threads, Extending Threads, Stopping and Blocing a Thread, Lifecycle of a Thread, Using Thread Methods, Thread Exceptions, Thread Priority, Synchronization, Implementing the 'Runnable' Interface.

Managing Errors and Exceptions : Types of Errors : Compile-time Errors, Run-time Errors, Exceptions, Exception Handling, Multiple Catch Statements, Using Finally Statement.

UNIT - IV :

Applet Programming : Local and Remote Applets, Applets and Applications, Building Applet Code, Applet Life Cycle : Initialization State, Running State, Idle or Stopped State, Dead State, Display State.

Packages : Introduction, Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes.

Managing Input/Output Files in Java : Introduction, Concept of Streams, Stream Classes, Byte Stream Classes : Input Stream Classes, Output Stream Classes, Character Stream Classes : Reader Stream Classes, Writer Stream Classes, Using Streams, Reading and Writing Files.

Prescribed Book:

1. E .Balaguru swamy, Programming with JAVA, A primer, 3e, TATA McGraw-Hill Company.

Reference Books:

1. John R. Hubbard, Programming with Java, Second Edition, Schaum's outline Series, TMH.
2. Deitel &Deitel. Java TM: How to Program, PHI (2007)
3. Java Programming: From Problem Analysis to Program Design- D.S Mallik
4. Object Oriented Programming Through Java by P. Radha Krishna, Universities Press (2008)
5. Java The Complete Reference, Herbert Schildt, Oracle Press
6. Programming in Java, Sachin Malhotra & Saurabh Choudhary, Oxford University Press

19MCAT24 Formal Languages and Automata Theory

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT-I

Finite Automata and Regular Expressions: Basic Concepts of Finite State Systems, Chomsky Hierarchy of Languages, Deterministic and Non-Deterministic Finite Automata, Finite Automata with ϵ -moves, Regular Expressions.

Regular sets &Regular Grammars: Basic Definitions of Formal Languages and Grammars, Regular Sets and Regular Grammars, Closure Properties of Regular Sets, Pumping Lemma for Regular Sets, Decision Algorithm for Regular Sets, Minimization of Finite Automata.

UNIT-II

Context Free Grammars and Languages: Context Free Grammars and Languages, Derivation Trees, simplification of Context Free Grammars, Normal Forms, Pumping Lemma for CFL, Closure properties of CFL's.

Push down Automata: Informal Description, Definitions, Push-Down Automata and Context free Languages, Parsing and Push-Down Automata.

UNIT-III

Turing Machines: The Definition of Turing Machine, Design and Techniques for Construction of Turing Machines, Combining Turing Machines.

Universal Turing Machines and Undecidability: Universal Turing Machines. The Halting Problem, Decidable & Undecidable Problems - Post Correspondence Problem.

UNIT-IV

The Propositional calculus: The Prepositional Calculus : Introduction – Syntax of the Prepositional Calculus – Truth-Assignments – Validity and Satisfiability – Equivalence and Normal Forms – resolution in Prepositional Calculus.

The Predicate calculus: Syntax of the Predicate Calculate Calculus – Structures and Satisfiability – Equivalence – Un-solvability and NP-Completeness.

Text books:

1. Introduction to Automata Theory, Languages and Computations – J.E. Hopcroft, & J.D. Ullman , Pearson Education Asia.
2. Elements of The Theory Of Computation, Harry R Lewis, Cristos h. Papadimitriou, Pearson Education / Prentice-Hall of India Private Limited.

Reference books:

1. Introduction to languages and theory of computation – John C. Martin (MGH)
2. Theory of Computation, KLP Mishra and N. Chandra Sekhar, IV th Edition, PHI
3. Introduction to Theory of Computation – Michael Sipser (Thomson Nrools/Cole)

19MCAT25 Web Technologies

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I :

Introduction to HTML , Core Elements , Links and Addressing, Images , Text , Colors and Background, Lists, Tables and Layouts , Frames, Forms , Cascading Style Sheets.
Introduction to Java Scripts, Elements of Objects in Java Script, Dynamic HTML with Java Script

UNIT II :

Document type definition, XML Syntax, XML Schemas, Document Object model, Presenting XML, Using XML Processors.
JDBC OBJECTS- JDBC Driver Types, JDBC Packages, Database Connection, Statement Objects, Result Set.

UNIT III :

Introducing PHP: What is PHP, Why Use PHP, Namespaces, Goto Operator,
,Nowdoc Syntax, Installing PHP on Windows, Testing Your Installation, Running and Compiling PHP, Embedding PHP within HTML.
PHP Language Basics: Using Variables in PHP, Naming and Creating Variables,Understanding Data Types,Testing the Type of the Variable, Changing Type by Casting, Operators and expressions, Operator Types, Understanding Operator Precedence, Decisions and Loops, If Statement, Switch statement, Do…While loop,While Loop,For Statement and Break Statement

UNIT IV :

Strings: Creating and Accessing Strings, Searching Strings, Replacing Text with in Strings
Arrays: Creating Arrays, Accessing Array Elements, Looping Through Arrays with foreach ,Working with Multidimensional Arrays, Manuplating Arrays, Sorting Arrays,Adding and Removing Array Elements.
Functions:What is a Function?,Calling Fuctions,Working with Variable Functions, Writing your Own Functions, Writing Recursive Functions.

Text Books:

1. Web Programming, building internet applications, 2nd Ed., Chris Bates, Wiley Dreamtech
2. The complete Reference HTML and DHTML, Thomas A. Powey
3. Beginning PHP 5.3, Matt Doyle, Wiley Publishing Inc.

Reference Books:

1. Internet , World Wide Web , How to program, Dietel , Nieto, PHI/PEA
2. Web Tehnologies, Godbole, kahate, 2nd Ed., TMH
3. Web Technologies Black Book, Kogent Learning Solutions Inc., Dreamtech Press Wiley India Pvt.Ltd

19MCAP26 Web Technologies Lab

Instruction : 3 Periods/week **Time : 3 Hours** **Credits : 2**
Internal : 50 Marks **External : 50 Marks** **Total : 100 Marks**

List of Experiments:

1. Create web pages for an application demonstrating the working of different features of HTML and DHTML.
2. Demonstrate the use of CSS in organizing the layout of webpages

Implement at least two Java Script programs to demonstrate the working of

3. Conditional statements
4. Looping statements.
5. Arrays
6. Functions.
7. Event handling
8. Validation controls.

Develop simple applications for the following

9.Write PHP program using Control Structures.
10.Write PHP program using Functions.

References:

1. Web Technologies, Godbole, Kahate, 2nd Ed., TMH
2. Internet & World Wide Web How to program, Dietel & Deitel Fourth Edition, PHI
3. Web Programming, building internet applications, 2nd Ed., Chris Bates, Wiley Dreamtech
4. Beginning PHP 5.3, Matt Doyle, Wiley Publishing Inc.
5. Web Technologies Black Book, Kogent Learning Solutions Inc., Dreamtech Press Wiley India Pvt.Ltd

19MCAP27 Object Oriented Programming through JAVA Lab

Instruction : 3 Periods/week **Time : 3 Hours** **Credits : 2**
Internal : 50 Marks **External : 50 Marks** **Total : 100 Marks**

Iimplement the following concepts / solve the problems using Java

1. Classes, Objects and methods.
2. Constructors
3. Inheritance
4. Overriding methods
5. Arrays, Strings, Vectors
6. Interfaces
7. Multithread programming
8. Exception handling
9. Applets
10. Packages

(ANNEXURE – I)

SVKP & Dr K S RAJU ARTS & SCIENCE COLLEGE(A), PENUGONDA

Dept of Computer Science (MCA Program)

MCA Course Structure (AB 2019-20)

MCA, SEMESTER -I

S.No.	Course	Paper title	Paper Code	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	Paper-I	Probability Statistics and Queuing Theory	19MCAT11	100	25	75	4	4
2	Paper-II	Management Accountancy	19MCAT12	100	25	75	4	4
3	Paper-III	C & Data Structures	19MCAT13	100	25	75	4	4
4	Paper-IV	Computer Organization	19MCAT14	100	25	75	4	4
5	Paper-V	Operating Systems	19MCAT15	100	25	75	4	4
6	Lab Practical-I	C & Data Structures Lab	19MCAP16	100	50	50	3	2
7	Lab Practical-II	Operating Systems Lab	19MCAP17	100	50	50	3	2
Total				700	225	475	26	24

MCA, SEMESTER -II

S.No.	Course	Paper title	Paper Code	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	Paper-I	Discrete Mathematical Structures	19MCAT21	100	25	75	4	4
2	Paper-II	Information Systems and Organizational Behavior	19MCAT22	100	25	75	4	4
3	Paper-III	Object Oriented Programming through JAVA	19MCAT23	100	25	75	4	4
4	Paper-IV	Formal Languages and Automata Theory	19MCAT24	100	25	75	4	4
5	Paper-V	Web Technologies	19MCAT25	100	25	75	4	4
6	Lab Practical-I	Web Technologies Lab	19MCAP26	100	50	50	3	2
7	Lab Practical-II	Object Oriented Programming through JAVA Lab	19MCAP27	100	50	50	3	2
Total				700	225	475	26	24

MCA, SEMESTER –III

S.No.	Course	Paper title	Paper Code	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	Paper-I	Operations Research	19MCAT31	100	25	75	4	4
2	Paper-II	Internet of Things	19MCAT32	100	25	75	4	4
3	Paper-III	Computer Networks	19MCAT33	100	25	75	4	4
4	Paper-IV	Artificial Intelligence	19MCAT34	100	25	75	4	4
5	Paper-V	Database Management Systems	19MCAT35	100	25	75	4	4
6	Lab Practical-I	Computer Networks Lab	19MCAP36	100	50	50	3	2
7	Lab Practical-II	Database Management Systems Lab	19MCAP37	100	50	50	3	2
Total				700	225	475	26	24

MCA, SEMESTER –IV

S.No.	Course	Paper title	Paper Code	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	Paper-I	Information Security and Cryptography	19MCAT41	100	25	75	4	4
2	Paper-II	Distributed Systems	19MCAT42	100	25	75	4	4
3	Paper-III	Data Mining Concepts and Techniques	19MCAT43	100	25	75	4	4
4	Paper-IV	Object Oriented Software Engineering	19MCAT44	100	25	75	4	4
5	Paper-V	**Elective-I** 1. Embedded Systems 2. Design and Analysis of Algorithms 3. Image Processing	19MCAT45	100	25	75	4	4
6	Lab Practical-I	Data Mining Concepts and Techniques Lab	19MCAP46	100	50	50	3	2
7	Lab Practical-II	Object Oriented Analysis and Design Lab	19MCAP47	100	50	50	3	2
Total				700	225	475	26	24

MCA, SEMESTER –V

S.No.	Course	Paper title	Paper Code	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	Paper-I	Big Data Analytics	19MCAT51	100	25	75	4	4
2	Paper-II	Cyber Security and Forensics	19MCAT52	100	25	75	4	4
3	Paper-III	**Elective II** 1. Blockchain Technology 2. Foundations of Data Science 3. Human-Computer Interaction	19MCAT53	100	25	75	4	4
4	Paper-IV	**Elective-III** 1.Python Programming 2.Pearl Programming 3.PHP programming	19MCAT54	100	25	75	4	4
5	Paper-V	**Elective-IV** 1. Machine Learning 2. Cloud Computing 3. Robotics	19MCAT55	100	25	75	4	4
6	Lab Practical-I	Big Data Analytics Lab	19MCAP56	100	50	50	3	2
7	Lab Practical-II	Mini Project*	19MCAP57	100	50	50	3	2
Total				700	225	475	26	24

* Mini Project should be done with Elective-III

MCA, SEMESTER –VI

S.No.	Course	Paper title	Paper Code	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	Project	Project	19MCAP61	200	100	100	--	16
Total				200	100	100	--	16

Total Marks: **3700** Total Credits : **136**

MCA, SEMESTER –III

S.No.	Course	Paper title	Paper Code	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	Paper-I	Operations Research	19MCAT31	100	25	75	4	4
2	Paper-II	Internet of Things	19MCAT32	100	25	75	4	4
3	Paper-III	Computer Networks	19MCAT33	100	25	75	4	4
4	Paper-IV	Artificial Intelligence	19MCAT34	100	25	75	4	4
5	Paper-V	Database Management Systems	19MCAT35	100	25	75	4	4
6	Lab Practical-I	Computer Networks Lab	19MCAP36	100	50	50	3	2
7	Lab Practical-II	Database Management Systems Lab	19MCAP37	100	50	50	3	2
Total				700	225	475	26	24

Course Code &Title: 19MCAT31 OPERATIONS RESEARCH
Semester & Year of study: III & 2020-2021
Course Index: C301

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about Operations Research and Linear Programming.
To learn about the concept of Dual problems and Transportation Model.
To learn about Network Models, Integer Programming, Dynamic Programming.
To learn about the concept of Deterministic Inventory Models, Game theory.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C301.1	Understand Operations Research and Linear Programming.
C301.2	Understand the concept of Dual problems and Transportation Model.
C301.3	Understand about Network Models, Integer Programming, Dynamic Programming.
C301.4	Understand the concept of Deterministic Inventory Models, Game theory.

19MCAT31 OPERATIONS RESEARCH

Instruction:4 Periods/week	**Time: 3 Hours**	**Credits:4**
Internal:25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Overview of Operations Research: OR models – OR Techniques

Linear Programming: Introduction – Graphical solution; Graphical sensitivity analysis- The standard form of linear programming problems – Basic feasible solutions- unrestricted variables – simplex algorithm – artificial variables – Big M and two phase method – Degeneracy - alternative optima – unbounded solutions – infeasible solutions.

UNIT II

Dual Problems: Relation between primal and dual problems – Dual simplex method

Transportation Model: Starting solutions, North West corner Rule - lowest cost method, Vogels approximation method – Transportation algorithms – Assignment problem – Hungarian Method.

UNIT-III

Network Models: Definitions – CPM and PERT – Their Algorithms

Integer Programming: Branch and Bound Algorithms cutting plan algorithm.

Dynamic Programming: Recursive nature of dynamic programming – Forward and Backward Recursion

UNIT-IV

Deterministic Inventory Models: Static EOQ Models – Dynamic EOQ models.

Game theory: Two person Zero Sum Games – Mixed strategy games and their Algorithms.

Text Books:

1. Operations Research – An Introduction, Handy A Taha – Pearson Education.
2. Operations Research Panneer Selvan Prentice Hall of India.

Reference Books:

1. Operations Research, SD Sharma
2. Operations Research Kanti Swaroop, PK Gupta, Man Mohan – Sultan Chand & Sons Education

Course Code &Title: 19MCAT32 INTERNET OF THINGS
Semester & Year of study: III & 2020-21
Course Index: C302

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Introduction to Internet of Things, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs
To learn about the IOT & M2M, SNMP
To learn about the IoT Platforms Design Methodology
To learn about the IoT Physical Devices & Endpoints

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C302.1	Able to understand about the Introduction to Internet of Things, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs
C302.2	Able to understand about the IOT & M2M, SNMP
C302.3	Able to understand about the IoT Platforms Design Methodology
C302.4	Able to understand about the IoT Physical Devices & Endpoints

19MCAT32 INTERNET OF THINGS

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT-I

Introduction to Internet of Things: Definition & Characteristics of IoT, Physical Design of IoT Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates Domain Specific IoTs: Home, Cities, Environment, Energy systems, Logistics, Agriculture, Health & Lifestyle

UNIT-II

IOT & M2M: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT, 1 Need for IoT Systems Management, Simple Network Management Protocol (SNMP) , Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG,NETOPEER

UNIT-III

IoT Platforms Design Methodology: IoT Design Methodology, Case Study on IoT System for Weather Monitoring , Motivation for Using Python , IoT Systems - Logical Design using Python ,Installing Python , Python Data Types & Data Structures ,Control Flow , Functions, Modules, Packages , File Handling l, Date/Time Operations , Classes ,Python Packages of Interest for IoT

UNIT-IV

IoT Physical Devices & Endpoints: Raspberry Pi , About the Board , Linux on Raspberry Pi , Raspberry Pi Interfaces , Programming Raspberry Pi with Python , Other IoT Devices, IoT Physical Servers & Cloud Offerings , Introduction to Cloud StorageModels & Communication APIs , WAMP - AutoBahn for IoT , Xively Cloud for IoT , Python Web Application Framework - Django , Designing a RESTful Web API , Amazon Web Services for ,SkyNet IoT Messaging Platform

Text Book:

1. Internet of Things, A.Bahgya and V.Madisetti, Univesity Press, 2015

Reference Book:

1. Fundamentals of Python, K.A.Lambert and B.L.Juneja, Cengage Learning, 2012

Course Code &Title: 19MCAT33 COMPUTER NETWORKS
Semester & Year of study: III & 2020-2021
Course Index: C303

Course Objectives:
The learning objectives of this course are:

Course Objectives

To learn about the basics of computer networks and Data Communication.
To learn about Data Link Layer, IEEE Standards, design issues in networks.
To learn about Internet Transport Protocols and different types of protocols.
To learn about various types of Network Devices and different types of Networks

Course Outcomes:
By the end of the course, the student will be

C303.1	Understand the basics of computer networks and Data Communication.
C303.2	Understand about Data Link Layer, IEEE Standards, design issues in networks.
C303.3	Understand Internet Transport Protocols and different types of protocols.
C303.4	Overview of various types of Network Devices and different types of Networks

19MCAT33 COMPUTER NETWORKS

Instruction:4Hrs/week	**Time:3 Hours**	**Credits:4**
Internal:25Marks	**External:75Marks**	**Total: 100Marks**

UNIT I

Introduction to Computer Networks: Introduction, Network Hardware, Network Software, Reference Models, Data Communication Services & Network Examples, Internet Based Applications.

Data Communications: Transmission Media, Wireless Transmission, Multiplexing, Switching, Transmission in ISDN, Broad Band ISDN, ATM Networks

UNIT II

Data Link Control, Error Detection & Correction, Sliding Window Protocols, LANs & MANs: IEEE Standards for LANs & MANs-IEEE Standards 802.2, 802.3, 802.4, 802.5, 802.6, High Speed LANs.

Design Issues in Networks: Routing Algorithms, Congestion Control Algorithms, Network Layer in the Internet, IP Protocol, IP Address, Subnets, and Internetworking.

UNIT III

Internet Transport Protocols: Transport Service, Elements of Transport Protocols, TCP and UDP Protocols, Quality of Service Model, Best Effort Model, Network Performance Issues.

Over View of DNS, SNMP, Electronic Mail, FTP, TFTP, BOOTP, HTTP Protocols, World Wide Web, Firewalls.

UNIT IV

Network Devices: Over View of Repeaters, Bridges, Routers, Gateways, Multiprotocol Routers, Brouters, Hubs, Switches, Modems, Channel Service Unit CSU, Data Service Units DSU, NIC, Wireless Access Points, Transceivers, Firewalls, Proxies.

Overview of Cellular Networks, Ad-hoc Networks, Mobile Ad-hoc Networks, Sensor Networks

Text Books:

1. Computer Networks, Andrews S Tanenbaum, Edition 5, PHI, ISBN: -81-203-1165-5
2. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw-Hill Co Ltd, Second Edition

Reference Books:

1. Computer networks, Mayank Dave,Cengage.
2. Computer Networks, A System Approach, 5th ed, Larry L Peterson and Bruce S Davie,Elsevier.
3. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
4. Understanding Communications and Networks, 3rd Edition, W.A. Shay, Thomson.

Course Code &Title: 19MCAT34 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS
Semester & Year of study: III & 2020-2021
Course Index: C304

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the basic concept of Artificial Intelligence.
To learn about the algorithms and logics in Artificial Intelligence.
To learn about the theories and functions related to Artificial Intelligence.
To learn about the concept, characteristics and applications of Expert Systems.

Course Outcomes:
By the end of the course, the student will be

C304.1	Understand the basic concept of Artificial Intelligence.
C304.2	Understand the algorithms and logics in Artificial Intelligence.
C304.3	Understand about the theories and functions related to Artificial Intelligence.
C304.4	Understanding the concept, characteristics and applications of Expert Systems.

19MCAT34 ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

What is AI, The Foundations of AI, The History of AI, Agents and Environments, The Concept of Rationality, The Nature of Environments, The Structure of Agents, Problem Solving Agents, Example Problems, Searching for Solutions, Uninformed Search Strategies: Breadth First, Depth First, Depth Limited; Informed Search Strategies: Greedy Best First, A* Algorithms

UNIT II

Heuristic Functions, Local-Search Algorithms and Optimization Problems: Hill Climbing, Simulated Annealing, Genetic Algorithms; Constraint Satisfaction Problems, Backtracking Search For CSPs, Games, Optimal Decisions in Games

Knowledge Based Agents, The Wumpus World, Logic, Propositional Logic, Reasoning Patterns in Propositional Logic, Syntax and Semantics of First Order Logic, Using First Order Logic, Inference in First-Order Logic: Unification, Resolution.

UNIT III

Acting Under Uncertainty, Basic Probability Notation, The Axioms of Probability, Inference Using Full Joint Distribution, Independence, Bayes Rule and Its Use, Other Approaches To Uncertain Reasoning: Dempster Shafer Theory, Fuzzy Sets and Fuzzy Logic

Combining Beliefs Under Uncertainty, The Basis of Utility Theory, Utility Functions, Multi Attribute Utility Functions, Decision Theoretic Expert Systems

UNIT IV

Expert System, Concepts and Characteristics, Applications and Domains of Expert System, Elements of an Expert System, Stages in the Development of an Expert System, Semantic Nets, Frames

Speech Recognition, Forms of Learning, Inductive Learning, Learning Decision Trees, Single Layer Feed Forward, Multi-Layer Feed Forward Neural Networks.

Text Books:

1. Artificial Intelligence: A Modern Approach. Stuart Russell, Peter Norvig, Pearson Education 2nd Edition.
2. Expert Systems: Principles and Programming. Joseph C Giarratano, Gary D Riley Thomson Publication, 4thEdition.

Reference Books:

1. Elaine Rich and Kevin Knight: Artificial Intelligence, Tata McGrawHill.
2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice Hall of India.
3. David W Rolston: Principles of Artificial Intelligence and Expert System Development, McGraw Hill.

Course Code &Title: 19MCAT35 DATABASE MANAGEMENT SYSTEMS
Semester & Year of study: III & 2020-2021
Course Index: C305

Course Objectives:
The learning objectives of this course are:

Course Objectives

To learn about the Introduction of Database System, Data Modeling Using the Entity-Relationship Model
To learn about Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries
To learn about Relational Database Design, Indexing Structures for files
To learn about Transaction Processing, Concurrency Control Techniques

Course Outcomes:
By the end of the course, the student will be

C305.1	Able to understand the Introduction of Database System, Data Modeling Using the Entity-Relationship Model
C305.2	Able to understand Relational Data Model and Relational Database Constraints, Relational Algebra and Relational Calculus, Schema Definition, Basic Constraints and Queries
C305.3	Able to understand Relational Database Design, Indexing Structures for files
C305.4	Able to understand Transaction Processing, Concurrency Control Techniques

19MCAT35 DATABASE MANAGEMENT SYSTEMS

Instruction:4Periods/week **Time:3 Hours** **Credits:4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Database and Database Users: Data models, schemas, and instances, three-schemas architecture and data independence, database languages and interfaces, the database system environment, Centralized and client/ server architectures for DBMSs, Classification of database management system.

Data Modeling Using the Entity-Relationship Model: Using High—Level Conceptual data model, Entity types, entity sets Attributes and keys, Relationships types, relationship sets, roles and structural constraints, Weak Entity types, ER diagrams Meaning conventions and design issues, Enhance Entity Relationship model,

Relational data model and relational database constraints: Relational model constraints and relational schemas, update operations.

UNIT II

Relational Algebra and Relational Calculus: Unary Relational operations, Relational Algebra operations, Binary Relational operation, Additional Relational operation, Examples of Queries in Relational Algebra, Domain Relational Calculus.

Relational database design by ER and EER Relational Mapping: Relational database design using ER to Relational Mapping, Mapping EER Model Construct to Relations, **Schema Definition, Basic Constraints and Queries:** SQL Data definition, Specifying basic constraints in SQL, Schema change Statements in SQL, Basic queries in SQL, More complex SQL queries, INSERT DELETE UPDATE queries in SQL, Views in SQL, Data base stored Procedures

UNIT III

Relational Database Design: Informal design Guide lines for Relation Schema, Functional Dependences, Normal forms based on Primary keys, General definitions of Second and Third Normal form, BOYCE-CODE Normal form, Algorithm for Relational database schema design, Multi-valued dependencies and fourth Normal forms,

File Organization and Indexes: Introduction, Secondary Storage Devices, Buffering Blocks, placing file records on disk, Operations on Files, Hashing Techniques, Parallelizing Disk Access using RAID Technology, Indexing Structures for files.

UNIT IV

Algorithm for query processing and Optimization: Translating SQL Queries into Relational Algebra, Algorithms for SELECT and JOIN Operations, Algorithms for PROJECT and SET Operations,

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Process, Transaction and System Concepts, Characterizing Schedules, Concurrency Control Techniques, Database Recovery Concepts, Recovery Techniques.

Text Book:

1. Fundamentals of Database System, Elmasri, Navathe, Pearson Education.

References Books:

1. Database Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw- Hill.
2. Database Concepts, Abraham Silberschatz ,Henry FKorth, SSudarshan, McGraw-Hill

Course Code &Title: 19MCAP36 COMPUTER NETWORKS LAB
Semester & Year of study: III & 2020-2021
Course Index: C306

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to implement data framing methods
Learn how to implement error detecting techniques
Learn how to implement routing algorithms
Learn how to implement security encryption algorithms

Course Outcomes:
By the end of the course, the student will be

C306.1	Able to implement data framing methods
C306.2	Able to implement error detecting techniques
C306.3	Able to implement routing algorithms
C306.4	Able to implement security encryption algorithms

19MCAP36 COMPUTER NETWORKS LAB

Practical: 3Periods/week **Time:3Hours** **Credits: 2**
Internal:50Marks **External:50Marks** **Total: 100Marks**

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1. Implement the data link layer framing methods such as character, character stuffing, and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP 15.
3. Implement Dijkstra‘s algorithm to compute the Shortest Path through a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table for each node using distance vector routing algorithm
5. Take an example subnet of hosts. Obtain broadcast tree for it.
6. Take a 64 bit playing text and encrypt the same using DES algorithm.
7. Write a program to break the above DES coding.
8. Using RSA algorithm encrypts a text data and Decrypt the same.

Text Books:

1. Computer Networks, Andrews S Tanenbaum, Edition 4, PHI.

2. Data Communications and Networking, Behrouz A Forouzan, Tata McGraw-Hill CoLtd, Second Edition.

Course Code &Title: 19MCAP37 DATABASE MANAGEMENT SYSTEMS LAB
Semester & Year of study: III & 2020-2021
Course Index: C307

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to write SQL queries using DDL, DML, DCL commands
Learn how to write SQL queries on aggregate and conversion functions
Learn how to write PL/SQL programs on exception handling, control structures
Learn how to write PL/SQL programs on cursors, procedures, triggers.

Course Outcomes:
By the end of the course, the student will be

C307.1	Able to write SQL queries using DDL, DML, DCL commands
C307.2	Able to write SQL queries on aggregate and conversion functions
C307.3	Able to write PL/SQL programs on exception handling, control structures
C307.4	Able to write PL/SQL programs on cursors, procedures, triggers.

19MCAP37 DATABASE MANAGEMENT SYSTEMS LAB

Practical: 3Periods/week **Time:3Hours** **Credits: 2**
Internal:50Marks **External:50Marks** **Total: 100Marks**

SQL

1) Simple queries to understand DDL, DML and DCLcommands
2) Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
3) Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
4) Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
5) Queries using Conversion functions like (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions like (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char,to_date)

PL/SQL

1) Simple programs to understand PL/SQL
2) Write a PL/SQL program to demonstrate exception–handling
3) Demonstrate the working of COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
4) Develop a program that includes the features NESTED IF, CASE and CASE expression.
5) Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE-APPLICATIONERROR.
6) Programs using CURSORS
7) Programs development using creation of procedures and functions.
8) Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers

Text Books:

1. Oracle Database 11g, Jason Price, Oracle Press
2. Oracle PL/SQL for Dummies, Michael Rosenblum, Paul Dorsey, Wiley Publications.

MCA, SEMESTER –IV

S.No.	Course	Paper title	Paper Code	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	Paper-I	Information Security and Cryptography	19MCAT41	100	25	75	4	4
2	Paper-II	Distributed Systems	19MCAT42	100	25	75	4	4
3	Paper-III	Data Mining Concepts and Techniques	19MCAT43	100	25	75	4	4
4	Paper-IV	Object Oriented Software Engineering	19MCAT44	100	25	75	4	4
5	Paper-V	Elective-I 1. Embedded Systems 2. Design and Analysis of Algorithms 3. Image Processing	19MCAT45	100	25	75	4	4
6	Lab Practical-I	Data Mining Concepts and Techniques Lab	19MCAP46	100	50	50	3	2
7	Lab Practical-II	Object Oriented Analysis and Design Lab	19MCAP47	100	50	50	3	2
Total				700	225	475	26	24

Course Code &Title: 19MCAT41 INFORMATION SECURITY AND CRYPTOGRAPHY
Semester & Year of study: IV & 2020-2021
Course Index: C401

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the security approaches and techniques, Introduction to number theory
To learn about Symmetric key and Asymmetric key cryptographic algorithms
To learn about User Authentication Mechanisms ,System security
To learn about Internet Security Protocols and Network Security

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C401.1	Able to understand the security approaches and techniques, Introduction to number theory
C401.2	Able to Symmetric key and Asymmetric key cryptographic algorithms
C401.3	Able to understand the User Authentication Mechanisms ,System security
C401.4	Able to understand the Internet Security Protocols and Network Security

19MCAT41 INFORMATION SECURITY AND CRYPTOGRAPHY

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits:4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Introduction: The need for security-security approaches-principles of security-Plain Text and Cipher Text-substitution and Transposition Techniques-Encryption and Decryption-Symmetric and Asymmetric Cryptography-Stenography-key range and key size-types of attacks.

Number Theory: Introduction to number theory- Modular Arithmetic, Euclidean algorithm, Euler theorem, Fermat Theorem, Totient Function, Multiplicative and Additive Inverse.

UNIT II

Symmetric Key Cryptographic Algorithms: Algorithm types and modes-overview of symmetric key cryptography – DES – IDEA – Blowfish – AES-Differential and Linear Cryptanalysis.

Asymmetric Key Cryptographic Algorithms: Overview of asymmetric key cryptography-RSA algorithm-symmetric and asymmetric key cryptography together-digital signatures.

UNIT III

User Authentication Mechanisms: Introduction-Authentication basics – passwords-authentication tokens-certificate based authentication-biometrics authentication-Hash functions-SHA1.

System Security: Intruders, Viruses, Related Threats, Trusted Systems.

UNIT IV

Internet Security Protocols: Basic concepts-SSL-SHTTP-TSP-SET-SSL versus SET- 3D secure protocol-Electronic money-Email security-WAP security-security in GSM.

Network Security: Brief Introduction to TCP/IP -Firewalls -IP security-Virtual Private Networks.

Text Books:

1. Cryptography and Network security, Atul Kahate, Tata McGraw-Hill Pub company Ltd., New Delhi
2. Network Security Essentials Applications and Standards, William Stallings, Pearson Education, New Delhi

Reference Books:

1. Network Security Private Communication in a public world, Charlie Kaufman, Radia Perlman & Mike Speciner, Prentice Hall of India Private Ltd., New Delhi
2. Network Security: The Complete Reference by Roberta Bragg, Mark Phodes - Ousley, Keith Strass berg Tata McGraw-Hill.

Course Code &Title: 19MCAT42 DISTRIBUTED SYSTEMS
Semester & Year of study: IV & 2020-2021
Course Index: C402

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about Introduction to Distributed Systems: Goals, Design Issues, Hardware Concepts
To learn about the Communication in distributed systems, Client-server model, Clock synchronization Algorithms
To learn about the Processes and Processors, Threads , System models, Distributed File Systems
To learn about the Distributed Shared Memory**,** Consistency Models, Page based distributed shared memory, Synchronization

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C402.1	Able to understand about the Introduction to Distributed Systems: Goals, Design Issues, Hardware Concepts
C402.2	Able to understand about the Communication in distributed systems, Client-server model, Clock synchronization Algorithms
C402.3	Able to understand about the Processes and Processors, Threads , System models, Distributed File Systems
C402.4	Able to understand about the Distributed Shared Memory**,** Consistency Models, Page based distributed shared memory, Synchronization

19MCAT42 DISTRIBUTED SYSTEMS

Instruction:4Periods/week **Time: 3Hours** **Credits:4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Introduction to Distributed Systems: Distributed systems: Goals, Hardware Concepts: Bus Multiprocessor Timesharing Systems, Design Issues: Reliability, Performance, Scalability etc.

UNIT II

Communication distributed systems: ATM Networks: Asynchronous Transfer Mode, The ATM Physical Layer, The ATM Layer, The ATM Adaptation Layer, ATM Switching, Applications of ATM for DS, Client-server model: Clients and Servers, Addressing, Blocking versus Nonblocking Primitives, Buffered versus Unbuffered Primitives, Reliable versus Unreliable Primitives, Implementing the Client-Server Model. Remote procedure call:RPC Operation, RPC semantics in the presence of Failures, Implementation issues.

Synchronization: Clock synchronization: Logical Clocks, Physical Clocks, Clock Synchronization Algorithms, Use of Synchronized Clocks, Mutual exclusion: Centralized Algorithm, Distributed Algorithm, Token Ring Algorithm, Comparison of the Three Algorithms, Election Algorithms: The Bully Algorithm, A Ring Algorithm, Atomic Transactions: Introduction, The Transaction Model, Implementation, concurrency Control, Dead locks.

UNIT III

Processes and Processors: Threads: Introduction, Thread Usage, Design Issues for Thread packages, implementing a Thread Package, Threads and RPC, System models: The Workstation Model, The Processor pool model, A hybrid model, Processor allocation – Scheduling in Distributed Systems, Fault tolerance: Component Faults, System failures, Real time distributed systems: Design Issues, Real Time Communication, Real Time Scheduling.

Distributed file systems: Distributed File system design: File Service Interface, Directory Server interface, File System Implementation: File Usage, System Structure, Caching, Replication.

UNIT IV

Distributed Shared Memory: Introduction, Bus based multi processors, Ring based multiprocessors, Switched multiprocessors, Comparison of shared memory Systems, Consistency Models: Strict Consistency, Sequential Consistency, Causal Consistency, PRAM Consistency and Processor Consistency, Weak Consistency, Release Consistency, Entry Consistency, Page based distributed shared memory: Replication, Granularity, Achieving Sequential Consistency, Finding the owner, finding copies, page replacement, Synchronization.

Text Book:

1. Andrew S. Tanenbaum: Distributed Operating System, Prentice Hall Intl Inc. 1995.

Reference Book:

1. Distributed Systems – Concepts and Design, George Coulouris, Jean Dollimore, Tim Kindberg, Pearson Education.

Course Code &Title: 19MCAT43 DATA MINING CONCEPTS AND TECHNIQUES
Semester & Year of study: IV & 2020-2021
Course Index: C403

Course Objectives:
The learning objectives of this course are:

Course Objectives

To learn about the overview of Data Warehouse Basic Concepts, Data Warehouse Modelling, Pre-processing

To learn about the Introduction to Data Mining , Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity

To learn about the Concept Description, Generalization by AOI , Mining Frequent Patterns, Associations and Correlations, Mining Frequent Itemset

To learn about the Basic Concepts of Classification ,Different Methods of Classification

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C403.1	Able to understand about the overview of Data Warehouse Basic Concepts, Data Warehouse Modelling, Pre-processing
C403.2	Able to understand about the Introduction to Data Mining , Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity
C403.3	Able to understand about the Concept Description, Generalization by AOI , Mining Frequent Patterns, Associations and Correlations, Mining Frequent Item set
C403.4	Able to understand about the Basic Concepts of Classification ,Different Methods of Classification

19MCAT43 DATA MINING CONCEPTS AND TECHNIQUES

Instruction:4Periods/week Time:3Hours Credits: 4
Internal:25Marks External:75Marks Total: 100Marks

UNIT I

Data Warehouse and OLAP Technology: An overview Data Warehouse Basic Concepts, Data Warehouse Modeling: Data Cube and OLAP, Data Warehouse Implementation Data Preprocessing: An Overview, Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization, From Data Warehousing to Data Mining

UNIT II

Introduction to Data Mining: Motivation and importance, what is Data Mining, Data Mining on what kind of data, what kinds of patterns can be mined, which technologies are used, which kinds of applications are targeted, Major issues in Data Mining. Getting to know your Data: Data Objects and Attribute Types, Basic Statistical Descriptions of Data, Data Visualization, Measuring data Similarity and Dissimilarity

UNIT III

Concept Description: Characterization and comparison What is Concept Description, Data Generalization by Attribute-Oriented Induction(AOI), AOI for Data Characterization, Efficient Implementation of AOI, AOI for Class comparisons. Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Frequent Itemset Mining Methods: Apriori method, generating Association Rules, Improving the Efficiency of Apriori, Pattern-Growth Approach for mining Frequent Item sets, Mining Frequent Itemsets using vertical data format, Mining Closed and Max Patterns.

UNIT IV

Classification Basic Concepts: Basic Concepts, Decision Tree Induction: Decision Tree Induction, Attribute Selection Measures, Tree Pruning, Bayes Classification Methods, Classification by Back Propagation, Support Vector Machines. Cluster Analysis: Cluster Analysis, Partitioning Methods, Hierarchal methods, Density based methods-DBSCAN and OPTICS.

Text Book:

1. Data Mining Concepts and Techniques—JiaweiHan, Micheline Kamber and Jian Pei, Morgan Kaufman Publications 3rd edition.

Reference Books:

1. Introduction to Data Mining –Pang-Ning Tan, Michael Steinbach, Vipin Kumar
2. Introduction to Data Mining, Adriaan, Addison Wesley Publication
3. Data Mining Techniques, A.K.Pujari, University Press

Course Code &Title: 19MCAT44 OBJECT ORIENTED SOFTWARE ENGINEERING
Semester & Year of study: IV & 2020-2021
Course Index: C404

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about Introduction to Object Oriented Software Engineering, Object Orientation, Requirements Engineering
To learn about the Unified Modeling Language & Use Case Modeling, Class Design and Class Diagrams
To learn about the Software Design , Architecture and Design Patterns
To learn about the Software Testing, Software Project Management, Software Process Models

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C404.1	Able to understand about the Introduction to Object Oriented Software Engineering, Object Orientation, Requirements Engineering
C404.2	Able to understand about the Unified Modeling Language & Use Case Modeling, Class Design and Class Diagrams
C404.3	Able to understand about the Software Design and Architecture, Design Patterns
C404.4	Able to understand about the Software Testing, Software Project Management, Software Process Models

19MCAT44 OBJECT ORIENTED SOFTWARE ENGINEERING

Instruction:4Periods/week **Time: 3Hours** **Credits:4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Introduction to Object Oriented Software Engineering: Nature of the Software, Types of Software, Software Engineering Activities, Software Quality

Introduction to Object Orientation: Data Abstraction, Inheritance & Polymorphism, Reusability in Software Engineering, Examples: Postal Codes, Geometric Points.

Requirements Engineering: Domain Analysis, Problem Definition and Scope, Types of Requirements, Techniques for Gathering and Analyzing Requirements, Requirement Documents, Reviewing Requirements, Case Studies: GPS based Automobile Navigation System, Simple Chat Instant Messaging System.

UNIT II

Unified Modeling Language & Use Case Modeling: Introduction to UML, Modeling Concepts, Types of UML Diagrams with Examples; User-Centered Design, Characteristics of Users, Developing Use Case Models of Systems, Use Case Diagram, Use Case Descriptions, The Basics of User Interface Design, Usability Principles.

Class Design and Class Diagrams: Essentials of UML Class Diagrams, Associations and Multiplicity, Generalization, Instance Diagrams, Advanced Features of Class Diagrams, Process of Developing Class Diagrams, Interaction and Behavioural Diagrams: Interaction Diagrams, State Diagrams, Activity Diagrams, Component and Deployment Diagrams.

UNIT III

Software Design and Architecture: Design Process, Principles Leading to Good Design, Techniques for Making Good Design Decisions, Good Design Document, Software Architecture, Architectural Patterns: The Multilayer, Client-Server, Broker, Transaction Processing, Pipe & Filter And MVC Architectural Patterns.

Design Patterns: Abstraction-Occurrence, General Hierarchical, Play-Role, Singleton, Observer, Delegation, Adaptor, Façade, Immutable, Read-Only Interface and Proxy Patterns.

UNIT IV

Software Testing: Effective and Efficient Testing, Defects in Ordinary Algorithms, Numerical Algorithms, Timing and Co-ordination, Stress and Unusual Situations, Testing Strategies for Large Systems.

Software Project Management: Introduction to Software Project Management, Activities of Software Project Management, Software Engineering Teams, Software Cost Estimation, Project Scheduling, Tracking and Monitoring.

Software Process Models: Waterfall Model, The Phased Released Model, The Spiral Model, Evolutionary Model, The Concurrent Engineering Model, Rational Unified Process.

Text Book:

1. Object Oriented Software Engineering: Practical Software Development using UML and Java. Timothy C Lethbridge & Robert, Langaneire, Mc Graw Hill

Reference Books:

1. The Unified Modeling Language User Guide. Grady Booch,James Rumbaugh and Ivar Jacobson.Addison-Wesley.
2. Software Engineering; A Practitioner’s Approach. Roger SPressman.
3. Object-Oriented Software Engineering: Using UML, Patterns and Java, Bernd Bruegge and Allen H. Dutoit, 2nd Edition, Pearson EducationAsi

Course Code &Title: 19MCAT45 EMBEDDED SYSTEMS(ELECTIVE I)
Semester & Year of study: IV & 2020-21
Course Index: C505

Course Objectives:
The learning objectives of this course are:

Course Objectives
To study the basics of embedded systems its examples, the 8051 Microcontroller architecture and its instruction set.
To discuss various software architectures in embedded systems.
To learn about Advanced Controller and Processors,Advanced Microcontrollers ATOM processor - Architecture-Instruction set.
To study various embedded software development tools.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C405.1	Able to understand the basic architecture of 8051 micro controller
C405.2	Able to understand various software architectures in embedded systems.
C405.3	Able to understand Advanced Controller and Processors, Advanced Microcontrollers ATOM processor - Architecture-Instruction set.
C405.4	Able to understand embedded software development tools.

19MCAT45 EMBEDDED SYSTEMS(ELECTIVE I)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT-I

Introduction to Embedded System: Introduction to Embedded system - Microprocessor V/s Micro-controller - 8051 Microcontroller - General architecture - Instruction set and Assembly programs - Embedded C programs.

UNIT-II

Memory and Interface: Memory organization and interfacing - I/O devices and interfacing Counters and Timers - Serial data communication - Interrupts.
Interfacing Peripherals: Interfacing LCD Display – Keypad Interfacing – Generation of Gate signals for Converters and Inverters – Motor Control – Controlling AC appliances – Measurement of frequency – Standalone Data Acquisition System.

UNIT-III

Advanced Controller and Processors: Advanced Microcontrollers - PIC - ARM - ATOM processor - Architecture-Instruction set.

UNIT-IV

Designing and Development of Applications: Design methodologies and tools - designing hardware and software components - system analysis and architecture design - system integration – debugging - case studies

Text Books

1. Muhammad Ali Mazidi, Janice Gillispie Mazidi., "The 8051 Microcontroller and Embedded systems", Second Edition, Pearson Education, 2008.
2. Lyla B.Das “Embedded systems an integrated approach”, Pearson Education, 2013.
3. Wayne wolf “Computers as components”, second edition, Elsevier, 2011.

References

1. Muhammad Ali Mazidi, Rolin D. Mckinlay, Danny Causey, “PIC Microcontroller an Embedded Systems using Assembly and C for PIC18”, Pearson Education, 2008.
2. Andrew N Sloss, D. Symes, C. Wright, ” Arm system developers guide”, Morgann Kauffman / Elsevier, 2006.
3. Peter Bary Patrick Crowley “Modern Embedded computing”, Elsevier, 2012.

Course Code &Title: 19MCAT45 DESIGN AND ANALYSIS OF ALGORITHMS (ELECTIVE – I)

Semester & Year of study: IV & 2020-2021

Course Index: C405

Course Objectives:

The learning objectives of this course are:

Course Objectives

To learn about the Asymptotic Notations, Mathematical Analysis of Non-recursive and recursive Algorithms and sorting techniques.
To learn about the Divide-and-Conquer technique, Decrease-and-Conquer and Transform-and-Conquer techniques.
To learn about the Dynamic Programming and Greedy Technique
To learn about the Decision Trees, P, NP and NP- complete problems, Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.

Course Outcomes:

By the end of the course, the student will be

C405.1	Understand about the Asymptotic Notations, Mathematical Analysis of Non-recursive and recursive Algorithms and Selection Sort and Bubble sort, Sequential Search and Exhaustive Search.
C405.2	Understand about the Divide-and-Conquer technique, Decrease-and-Conquer and Transform-and-Conquer techniques.
C405.3	Understand the Optimal Binary Search Trees, The Knapsack Problem Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.
C405.4	Understand about the Decision Trees, P, NP and NP- complete problems, Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.

19MCAT45 DESIGN AND ANALYSIS OF ALGORITHMS

Instruction:4Periods/week	**Time: 3Hours**	**Credits:4**
Internal:25Marks	**External:75Marks**	**Total: 100Marks**

UNIT I

Introduction: Fundamentals of algorithmic problem solving, important problem types, fundamental data structures.

Fundamentals of analysis of algorithms and efficiency: Analysis framework, Asymptotic Notations and Basic Efficiency classes, Mathematical Analysis of Non-recursive Algorithms, Mathematical Analysis of recursive Algorithms, Empirical Analysis of Algorithms, Algorithm Visualization.

Brute Force: Selection Sort and Bubble sort, Sequential Search and Exhaustive Search.

UNIT II

Divide-and-Conquer: Merge Sort, Quick sort, Binary Search, Binary Tree Traversals and Related Properties.

Decrease-and-Conquer: Insertion Sort, Depth-First Search and Breadth-First Search-Topological Sorting, Decrease-by-a-Constant-Factor Algorithms, Variable-Size-Decrease Algorithms.

Transform-and-Conquer: Presorting, Balanced Search Trees, Heaps and Heap sort, Problem Reduction.

UNIT III

Space and Time Tradeoffs: Sorting by Counting, Hashing, B-Trees.

Dynamic Programming: Warshall's and Floyd's Algorithm, Optimal Binary Search Trees, The Knapsack Problem and Memory Functions.

Greedy Technique: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees

UNIT IV

Limitations of Algorithm Power: Lower-Bound Arguments, Decision Trees, P, NP and NP-complete problems.

Coping with the Limitations of Algorithms Power: Backtracking, Branch-and-Bound, Approximation Algorithms for NP-hard Problems.

Text Book:

1. Introduction to Design & Analysis of Algorithms by Anany Levitin, Pearson Education, New Delhi, 2003

Reference Books:

1. Introduction to Algorithms by Thomas H. Corman, Charles E. Leiserson, Ron ald R. Rivest& Clifford Stein, Prentice Hall of India, NewDelhi.
2. The Design and Analysis of computer Algorithms, Aho, Hopcroft & Ullman, Pearson Education, New Delhi, 2003
3. Fundamentals of algorithmics, Gilles Brassard & Paul Bratley, Prentice Hall of India, NewDelhi

Course Code &Title: 19MCAT45 IMAGE PROCESSING (ELECTIVE I)
Semester & Year of study: IV & 2020-2021
Course Index: C405

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Fundamentals of Image Processing, Basics of Histogram , Definition and Algorithm of Histogram Equalization
To learn about the Image Transforms**:** A Detail Discussion On Fourier Transform, DFT,FFT, Image Enhancement
To learn about the EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters, Image Compression
To learn about the Image Segmentation, Morphology

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C405.1	Able to understand about the Fundamentals of Image Processing, Basics of Histogram , Definition and Algorithm of Histogram Equalization
C405.2	Able to understand about the Image Transforms**:** A Detail Discussion On Fourier Transform, DFT,FFT, Image Enhancement
C405.3	Able to understand about the EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters, Image Compression
C405.4	Able to understand about the Image Segmentation, Morphology

19MCAT45 IMAGE PROCESSING (ELECTIVE I)

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Fundamentals of Image Processing: Image Acquisition, Image Model, Sampling, Quantization, Relationship Between Pixels, Distance Measures, Connectivity, Image Geometry, Photographic Film.

Histogram: Definition, Decision Of Contrast Basing On Histogram, Operations Basing on Histograms Like Image Stretching, Image Sliding, Image Classification. Definition and Algorithm of Histogram Equalization.

UNIT II

Image Transforms: A Detail Discussion On Fourier Transform, DFT, FFT,

Image Enhancement:

a) Arithmetic and Logical Operations, Pixel or Point Operations, Size Operations,
b) Smoothing Filters-Mean, Median, Mode Filters – Comparative Study
c) Edge Enhancement Filters – Directorial Filters, Sobel, Laplacian, Robert, KIRSCH Homogeneity
d) Low Pass Filters, High Pass Filters, Sharpening Filters. – Comparative Study

UNIT III

Image Enhancement: Design of Low Pass, High Pass, EDGE Enhancement, Smoothening Filters in Frequency Domain. Butter Worth Filter, Homomorphic Filters in Frequency Domain Advantages of Filters in Frequency Domain, Comparative Study of Filters in Frequency, Domain and Spatial Domain.

Image Compression: Run Length Encoding, Contour Coding, Huffman Code, Compression Due to Change in Domain, Compression Due to Quantization Compression at the Time of Image Transmission. Brief Discussion on:-Image Compression Standards.

UNIT IV

Image Segmentation: Characteristics of Segmentation, Detection of Discontinuities, Thresholding Pixel Based Segmentation Method. Region Based Segmentation Methods, Segmentation by Pixel Aggregation, Segmentation by Sub Region Aggregation, Histogram Based Segmentation, Spilt and Merge Technique, Motion in Segmentation.

Morphology: Dilation, Erosion, Opening, Closing, Hit-And-Miss Transform, Boundary Extraction, Region Filling, Connected Components, Thinning, Thickening, Skeletons, Pruning Extensions to Gray – Scale Images, Application of Morphology inIP

Text Book:

1. Digital Image Processing, Rafael C. Gonzalez and Richard E. Woods, Addison Wesley

Reference Books:

1. Fundamentals of Electronic Image Processing By Arthyr– R – Weeks, Jr.(PHI)
2. Image Processing, Analysis, And Machine Vision by Milan Sonka Vaclan Halava Roger Boyle, Vikas Publishing House.
3. Digital Image Processing, S. Jayaraman, S. Esakkirajan & T. Veera Kumar,TMH
4. Fundamentals of Digital Image Processing, Chris Solomon, Tobi Breckon, Wiley-Blackwell

Course Code &Title: 19MCAP46 DATA MINING CONCEPTS AND TECHNIQUES LAB
Semester & Year of study: IV & 2020-2021
Course Index: C406

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the aware of usage of few packages, functions and libraries of R
To learn about the basic R commands, Interact data, Clean Data, Visualize statistical measures, data frame
To learn about how to Apply group of functions, rbind, cbind and some more libraries
To learn about the K-medoids and density based clustering, decision trees

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C406.1	Able to aware of usage of few packages, functions and libraries of R
C406.2	Able to implement basic R commands, Interact data, Clean Data, Visualize statistical measures, data frame
C406.3	Able to implement Apply group of functions, rbind,cbind and some more libraries
C406.4	Able to implement K-medoids and density based clustering, decision trees

19MCAP46 DATA MINING CONCEPTS AND TECHNIQUES LAB

Practical: 3Periods/week **Time:3Hours** **Credits: 2**
Internal:50Marks **External:50Marks** **Total: 100Marks**

Students should be aware of usage of few packages and libraries of R. They should also be familiar with few functions used in R for visualization.

1. Implement all basic R commands
2. Interact data through .csv files (Import from and export to .csv files).
3. Get and Clean data using swirl exercises. (Use 'swirl' package, library and install that topic from swirl).
4. Visualize all Statistical measures (Mean, Mode, Median, Range, Inter Quartile Range etc., using Histograms, Boxplots and Scatter Plots).
5. Create a data frame with the following structure.

EMP ID	EMP NAME	SALARY	START DATE
1	Satish	5000	01-11-2013
2	Vani	7500	05-06-2011
3	Ramesh	10000	21-09-1999
4	Praveen	9500	13-09-2005
5	Pallavi	4500	23-10-2000

a. Extract two column names using column name.
b. Extract the first two rows and then all columns.
c. Extract 3rd and 5th row with 2nd and 4th column.

6. Write R Program using 'apply' group of functions to create and apply normalization function on each of the numeric variables/columns of iris dataset to transform them into
   i. 0 to 1 range with min-max normalization.
   ii. a value around 0 with z-score normalization.
7. Create a data frame with 10 observations and 3 variables and add new rows and columns to it using 'rbind' and 'cbind' function.
8. Create a function to discretize a numeric variable into 3 quantiles and label them as low, medium, and high. Apply it on each attribute of iris dataset to create a new data frame. 'discrete_iris' with Categorical variables and the class label.
9. Create a simple scatter plot using toothgrowth dataset using 'dplyr' library. Use the same data to indicate distribution densities using boxwhiskers.
10. Write R program to implement linear and multiple regression on 'mtcars' dataset to estimate the value of 'mpg' variable, with best R^2 and plot the original values in 'green' and predicted values in 'red'.
11. Write R Programs to implement k-means clustering, k-medoids clustering and density based clustering on iris dataset.
12. Write a R Program to implement decision trees using 'readingSkills' dataset.
13. Implement decision trees using 'iris' dataset using package party and 'rpart'.

References:

1. www.tutorialspoint.com/r
2. www.r-tutor.com
3. R and Data Mining: Examples and Case Studies Yanchang Zhao.

Course Code &Title: 19MCAP47 OBJECT ORIENTED SOFTWARE ENGINEERING LAB
Semester & Year of study :IV & 2020-2021
Course Index: C407

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn how to specify, visualize, construct and document the artifacts of software systems.
To learn how to use Rational Rose Enterprise Edition for modeling
To learn about the Software Project Management and Software Engineering activities to specify customized according to the features of the project.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C407.1	Able to understand how to specify, visualize, construct and document the artifacts of software systems
C407.2	Able to understand how to use Rational Rose Enterprise Edition for modelling
C407.3	Software Project Management and Software Engineering activities specified can be customized according to the features of the project.

19MCAP47 OBJECT ORIENTED SOFTWARE ENGINEERING LAB

Practical: 3Periods/week	**Time:3Hours**	**Credits: 2**
Internal:50Marks	**External:50Marks**	**Total: 100Marks**

The Unified Modeling Language (UML) is a standard language for specifying, visualizing, constructing and documenting the artifacts of software systems. The primary goal of UML is to provide users a ready-to-use, expressive visual modeling language so that they can develop and exchange meaningful models.

This lab deals with object oriented analysis and design of a software problem using UML concepts and notations. The tool used is Rational Rose Enterprise Edition. Any other open source tool is also recommended.

Document the Software Project Management and Software Engineering activities for any two of the following projects. Any other project of interest also can be chosen.

1. Student Result Management System
2. Library Management System
3. Payroll System
4. Bank Loan System
5. Railway Reservation System
6. Automatic Teller Machine
7. Hostel Management System
8. Hospital Management System
9. Online Shopping System
10. Blood Bank Management System
11. GPS
12. Journal Publication System
13. Chatroom Application
14. Social Media Application

Software Project Management and Software Engineering activities specified below can be customized according to the features of the project.

- Problem Statement
- Feasibility Study
- Software Requirements Specification Document
- Estimation of Project Metrics
- Entity Relationship Diagram
- Use Case Diagrams
- Class Diagram
- Sequence Diagrams
- Activity Diagrams
- State Chart Diagrams
- Test coverage

References:

1. The Unified Modeling Language User Guide. Grady Booch,James Rumbaugh and Ivar Jacobson. Addison-Wesley.
2. Object Oriented Software Engineering: Practical Software Development using UML and Java. Timothy C Lethbridge & Robert, Langaneire, Mc Graw Hill

MCA, SEMESTER –V

S.No.	Course	Paper title	Paper Code	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	Paper-I	Big Data Analytics	19MCAT51	100	25	75	4	4
2	Paper-II	Cyber Security and Forensics	19MCAT52	100	25	75	4	4
3	Paper-III	Elective II 3. Blockchain Technology 4. Foundations of Data Science 3. Human-Computer Interaction	19MCAT53	100	25	75	4	4
4	Paper-IV	Elective-III 1.Python Programming 2.Pearl Programming 3.PHP programming	19MCAT54	100	25	75	4	4
5	Paper-V	Elective-IV 1. Machine Learning 2. Cloud Computing 3. Robotics	19MCAT55	100	25	75	4	4
6	Lab Practical-I	Big Data Analytics Lab	19MCAP56	100	50	50	3	2
7	Lab Practical-II	Mini Project*	19MCAP57	100	50	50	3	2
Total				700	225	475	26	24

* Mini Project should be done with Elective-III

Course Code &Title: 19MCAT51 BIG DATA ANALYTICS
Semester & Year of study: V & 2021-2022
Course Index: C501

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about introduction to Big Data and Hadoop
To learn about Real Time Analytics, Map Reduce Programming
To learn about Streaming in Spark, Machine Learning, Map Reduce Advanced Programming
To learn about Graph Representation in Map Reduce, Graph Analytics in Spark, Programming with RDDs-Basics, Spark SQL overview

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C501.1	Understand about introduction to Big Data and Hadoop
C501.2	Understand about Real Time Analytics, Map Reduce Programming
C501.3	Understand about Streaming in Spark, Machine Learning, Map Reduce Advanced Programming
C501.4	Understand about Graph Representation in Map Reduce, Graph Analytics in Spark, Programming with RDDs-Basics, Spark SQL overview

19MCAT51 BIG DATA ANALYTICS

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Data structures in Java: Java concepts required for developing Map Reduce Programs: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization.
Introduction to Big Data: Big Data-definition, Characteristics of Big Data (Volume, Variety, Velocity, Veracity, Validity), Importance of Big Data, Patterns for Big Data Development, Data in the Warehouse and Data in Hadoop[Zikopoulos]

UNIT II

Introduction to Hadoop: Hadoop- definition, Understanding distributed systems and Hadoop, Comparing SQL databases and Hadoop, Understanding MapReduce, Counting words with Hadoop—running your first program, History of Hadoop, Starting Hadoop - The building blocks of Hadoop, NameNode, DataNode, Secondary NameNode, JobTracker and Task Tracker
HDFS: Components of Hadoop -Working with files in HDFS, Anatomy of a MapReduce program, Reading and writing the Hadoop Distributed File system -The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File system, The Java Interface, Data Flow, Parallel Copying with distcp, Hadoop Archives.

UNIT III

MapReduce Programming: Writing basic Map Reduce programs - Getting the patent data set, constructing the basic template of a Map Reduce program, counting things, Adapting for Hadoop's API changes, Streaming in Hadoop.
MapReduce Advanced Programming: Advanced MapReduce - Chaining Map Reduce jobs, joining data from different sources.

UNIT IV

Graph Representation in MapReduce: Modeling data and solving problems with graphs,Shortest Path Algorithm, Friends-of-Friends Algorithm, PageRank Algorithm, Bloom Filters.

Text Books:

1. Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data by Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, 1st Edition, TMH,2012.
2. Hadoop in Action by Chuck Lam, MANNING Publishers.
3. Hadoop in Practice by Alex Holmes, MANNING Publishers

Reference Books:

1. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
2. Big Java Fourth Edition Cay Horstmann Wiley, John Wiley &Sons
3. Mining of massive datasets, AnandRajaraman, Jeffrey D Ullman, Wiley Publications.

Course Code &Title: 19MCAT52 CYBER SECURITY AND FORENSICS
Semester & Year of study: V & 2021-2022
Course Index: C502

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about information security and Threats, Data Leakage
To learn about Cyber Security Introduction, Cyber Security Evolution
To learn about Cyber Security Objectives, Guidance for Decision Makers, Cyber Governance Issues
To learn about Cyber User Issues, Cyber Conflict Issues, Cyber Management Issues, Cyber Infrastructural Issues

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C502.1	Understand about information security and Threats, Data Leakage
C502.2	Understand about Cyber Security Introduction, Cyber Security Evolution
C502.3	Understand about Cyber Security Objectives, Guidance for Decision Makers, Cyber Governance Issues
C502.4	Understand about Cyber User Issues, Cyber Conflict Issues, Cyber Management Issues, Cyber Infrastructural Issues

19MCAT52 CYBER SECURITY AND FORENSICS

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT – I

Information Security and Threats: Information Security, Information Assets, Threats to Information Assets

Fundamentals of Information Security: Elements of information security, Principles and concepts – data security, Types of controls

UNIT – II

Data Leakage: Introduction – Data Leakage, Organizational Data Classification, Location and Pathways, Content Awareness, Content Analysis Techniques, Data Protection, DLP Limitations, DRM-DLP Conundrum.

Information Security Policies, Procedures, Standards and Guidelines: Information Security Policies, Key Elements of a Security Policy, Security Standards, Guidelines and Frameworks, Laws, Regulations and Guidelines

UNIT – III

Information Security Performance Metrics: Introduction – Security Metrics, Types of Security Metrics, Using Security Metrics, Developing the Metrics Process, Metrics and Reporting, Designing Information Security Measuring Systems

Risk Assessment: Risk Overview, Risk Identification, Risk Analysis, Risk Treatment, Risk Management Feedback Loops, Risk Monitoring

Log Correlation and Management: Event Log Concepts, Log Management and its need Log Management Process, Configuring Windows Event Log, IIS Log Files, Analysis and Response

Data Backup: Data Backup, Types of Backup, Backup Procedures, Types of Storage, Features of a Good Backup Strategy

UNIT – IV

Computer Forensics Analysis and Validation: Determining What Data to Collect and Analyze-Validating Forensic Data-Addressing Data-Hiding Techniques- Performing Remote Acquisitions.

E-mail Investigations: Exploring the Role of E-mail in Investigations- Exploring the Roles of the Client and Server in E-mail- Investigating E-mail Crimes and Violations- Understanding E-mail Servers-Using Specialized E-mail Forensics Tools.

Cell Phone and Mobile Device Forensics: Understanding Mobile Device Forensics-Understanding Acquisition Procedures for Cell Phones and Mobile Devices.

Text Books:

1. NASSCOM, Handbook of Security Analyst, SSC/Q0901,2015.
2. Jennifer L. Bayuk, J. Healey, P. Rohmeyer, Marcus Sachs, Jeffrey Schmidt, Joseph WeissCyber Security Policy Guidebook, John Wiley & Sons2012.

Reference Books:

1. Rick Howard, Cyber Security Essentials, Auerbach Publications2011.
2. Richard A. Clarke, Robert Knake, Cyberwar: The Next Threat to National Security &What to Do About It, Ecco2010.
3. Dan Shoemaker Cyber security The Essential Body of Knowledge, 1st ed. Cengage Learning2011.
4. Augastine, Paul T., Cyber Crimes and Legal Issues", Crecent Publishing Corporation,2007.

Course Code &Title: 19MCAT53 BLOCK CHAIN TECHNOLOGIES (ELECTIVE II)
Semester & Year of study: V & 2021-2022
Course Index: C503

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about introduction to Block Chain, Basic Distributed System Concepts
To learn about Cryptography in Blockchain, Cryptography algorithms
To learn about Bitcoin-Cryptography, Hyperledger Fabric
To learn about Use cases of Blockchain, Financial Service, healthcare, energy markets, media, Cyber Crime, e-Governance, Tax payments, land registry trcords and blockchain in IoT

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C503.1	Understand about introduction to Block Chain, Basic Distributed System Concepts
C503.2	Understand about Cryptography in Blockchain, Cryptography algorithms
C50.3	Understand about Bitcoin-Cryptography, Hyperledger Fabric
C503.4	Understand about Use cases of Blockchain, Financial Service, healthcare, energy markets, media, Cyber Crime, e-Governance, Tax payments, land registry trcords and blockchain in IoT

19MCAT53 BLOCKCHAIN TECHNOLOGY (ELECTIVE-II)

Instruction: 4 Periods/week **Time: 3 Hours** **Credits: 4**
Internal: 25 Marks **External: 75 Marks** **Total: 100 Marks**

UNIT – I

CRYPTOGRAPHY IN BLOCKCHAIN: Blockchain Definitions – Blockchain versus Databases – History – Motivation – Characteristics – Types – Overview - Hashing in Blockchain – Linking blocks in blockchain – Linking blocks using SHA256 – Block structure – Blockchain functionality – Creating Blockchain – Byzantine failure problem in blockchain – Digital signatures in blockchain – Blockchain wallets

UNIT – II

BLOCKCHAIN DESIGN PRINCIPLES: Networked Integrity – Distributed Power- Value as Incentive – Security – Privacy – Rights Preserved – Inclusion – Centralized Registries versus Distributed Ledgers – Public versus Private Ledgers – Transparency as a Strategic Risk – Transparency as a Strategic Asset - Zero Knowledge Proofs

UNIT – III

CONSENSUS ALGORITHMS: Proof of Work – Pure Stake Based Consensus – Proof of Stake - Leased Proof of Stake – Delegated Proof of Stake – Hybrid Form of PoS and PoW – Practical Byzantine Fault Tolerance – Ripple –Tendermint – Proof of Elapsed Time – Proof of Activity – Proof of Burn – Hyperledger Fabric.

UNIT – IV

BLOCKCHAIN OPTIMIZATIONS AND ENHANCEMENTS: Blockchain Optimizations – Transaction Exchange – Off-chain Transactions – Block size improvements – Blockchain enhancements – Sharding – Evolution of consensus algorithm – Proof of Stake – Proof of Activity – Byzantine Fault Tolerance Consensus Models – Proof of Elapsed Time – Cross-chain Protocol – Privacy Enhancement – Blockchain Security – Transaction Security Model – Decentralized Security Model – Attacks on Blockchain

Text Books:

1. Koshik Raj, “Foundations of Blockchain”, Packt Publishers, 2019.
2. S. Shukla, M. Dhawan, S. Sharma and S. Venkatesan, “Blockchain Technology: Cryptocurrency and Applications”, Oxford University Press, 2019.

Reference Books:

1. Josh Thompson, “Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming”, Create Space Independent Publishing Platform, 2017.
2. Andreas M. Antonopoulos, “Mastering Bitcoin: Unlocking Digital Cryptocurrencies”, Oreilly Media, 1st Edition, 2014.
3. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. “Bitcoin and cryptocurrency technologies: a comprehensive introduction”, Princeton University Press, 2016.

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Course Code &Title: 19MCAT53 FOUNDATIONS OF DATA SCIENCE (ELECTIVE II)
Semester & Year of study: V & 2021-2022
Course Index: C503

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about Key concepts in data science, including tools, approaches, and application scenarios
To learn about Topics in data collection, sampling, quality assessment and repair
To learn about Topics in statistical analysis and machine learning
To learn about State-of-the-art tools to build data-science applications for different types of data, including text and CSV data

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C503.1	Understand about Key concepts in data science, including tools, approaches, and application scenarios
C503.2	Understand about Topics in data collection, sampling, quality assessment and repair
C50.3	Understand about Topics in statistical analysis and machine learning
C503.4	Understand about State-of-the-art tools to build data-science applications for different types of data, including text and CSV data

19MCAT53 FOUNDATIONS OF DATA SCIENCE (ELECTIVE-II)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

INTRODUCTION TO DATA SCIENCE: Data science process – roles, stages in data science project, setting expectations, Loading data into R – working with data from files, working with relational databases. Exploring data – Using summary statistics to spot problems, spotting problems using graphics and visualization. Managing data – cleaning and sampling for modelling and validation.

UNIT II

MODELING METHODS: Choosing and evaluating models – mapping problems to machine learning tasks, evaluating models, validating models – cluster analysis – Kmeans algorithm, Naïve Bayes, Memorization Methods – KDD and KDD Cup 2009, building single variable models, building models using multi variable, Linear and logistic regression, unsupervised methods – cluster analysis, association rules.

UNIT III

INTRODUCTION TO R Language: Reading and getting data into R, viewing named objects, Types of Data items, the structure of data items, examining data structure, working with history commands, saving your work in R.

PROBABILITY DISTRIBUTIONS in R - Binomial, Poisson, Normal distributions. Manipulating objects - data distribution.

UNIT IV

DELIVERING RESULTS: Documentation and deployment–producing effective presentations –Introduction to graphical analysis – plot() function – displaying multivariate data– matrix plots – multiple plots in one window - exporting graph – using graphics parameters in R Language.

Text Books

1. Nina Zumel, John Mount, “Practical Data Science with R”, Manning Publications,2014.
2. Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman, “Mining of Massive Datasets”, Cambridge University Press,2014.
3. Mark Gardener, “Beginning R - The Statistical Programming Language”, John Wiley &Sons, Inc.,2012.

Reference Books

1. W. N. Venables, D. M. Smith and the R Core Team, “An Introduction to R”,2013.
2. Tony Ojeda, Sean Patrick Murphy, Benjamin Bengfort, Abhijit Dasgupta, “PracticalData Science Cookbook”, Packt Publishing Ltd.,2014.
3. Nathan Yau, “Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics”, Wiley,2011.
4. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071,2015.

Course Code &Title: 19MCAT53 HUMAN COMPUTER INTERACTION (ELECTIVE II)
Semester & Year of study: V & 2021-2022
Course Index: C503

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about interaction design is and how it relates to human computer interaction and other fields. (MS -SOC B human computer interaction)
To learn about cognition is and why it is important for interaction design.
To learn about the social mechanisms that are used by people to communicate and collaborate.
To learn about Outlining the nature of user frustration and how to reduce it.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C503.1	Able to understand about interaction design is and how it relates to human computer interaction and other fields. (MS -SOC B human computer interaction)
C503.2	Able to understand about cognition is and why it is important for interaction design.
C50.3	Able to understand about the social mechanisms that are used by people to communicate and collaborate.
C503.4	Able to understand about Outlining the nature of user frustration and how to reduce it.

19MCAT53 HUMAN COMPUTER INTERACTION (ELECTIVE-II)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT-I

Introduction: Usability of Interactive Systems- introduction, usability goals and measures, usability motivations, universal usability, goals for our profession Managing Design Processes: Introduction, Organizational design to support usability, Four pillars of design, development methodologies, Ethnographic observation, Participatory design, Scenario Development, Social impact statement for early design review, legal issues, Usability Testing and Laboratories.

UNIT-II

Command and Natural Languages:Introduction, Command organization Functionality, Strategies and Structure, Naming and Abbreviations, Natural Language in Computing Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory Interfaces, Displays- Small and large.

UNIT-III

Quality of Service:Introduction, Models of Response-Time impacts, Expectations and attitudes, User Productivity, Variability in Response Time, Frustrating Experiences Balancing Function and Fashion: Introduction, Error Messages, Nonanthropomorphic Design, Display Design, Web Page Design, Window Design, Color.

UNIT-IV

Information Search:Introduction, Searching in Textual Documents and Database Querying, Multimedia Document Searches, Advanced Filtering and Searching Interfaces Information Visualization: Introduction, Data Type by Task Taxonomy, Challenges for Information Visualization

Text Books

1. Designing the User Interface, Strategies for Effective Human Computer Interaction, 5ed, Ben Shneiderman, Catherine Plaisant, Maxine Cohen, Steven M Jacobs, Pearson
2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

Reference Books

1. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.
2. Designing the user interface. 4/e, Ben Shneidermann , PEA.
3. User Interface Design, Soren Lauesen , PEA.
4. Interaction Design PRECE, ROGERS, SHARPS, Wiley.

Course Code &Title: 19MCAT54 PYTHON PROGRAMMING (ELECTIVE III)
Semester & Year of study: V & 2021-2022
Course Index: C504

Course Objectives:
The learning objectives of this course are:

Course Objectives
To introduce to the basics of Python Programming language
To discuss various functions and methods of Python Programming
To learn about Multithread Programming and GUI Programming
To study Web Programming and Database Programming

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C504.1	Able to understand the basics of Python Programming language
C504.2	Able to use various functions and methods of Python Programming
C504.3	Able to comprehend Multithread Programming and GUI Programming
C504.4	Able to understand Web Programming and Database Programming

19MCAT54 PYTHON PROGRAMMING (ELECTIVE III)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT - I

Python Basics, Objects- Python Objects, Standard Types, Other Built-in Types, Internal Types, Standard Type Operators, Standard Type Built-in Functions, Categorizing the Standard Types, Unsupported Types.

Numbers - Introduction to Numbers, Integers, Floating Point Real Numbers, Complex Numbers, Operators, Built-in Functions, Related Modules, Sequences - Strings, Lists, and Tuples, Mapping and Set Types

UNIT - II

FILES: File Objects, File Built-in Function [open()], File Built-in Methods, File Built-in Attributes, Standard Fil0es, Command-line Arguments, File System, File Execution, Persistent Storage Modules, Related Modules

Exceptions: Exceptions in Python, Detecting and Handling Exceptions, Context Management, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions, Creating Exceptions

Modules: Modules and Files, Namespaces, Importing Modules, Importing Module Attributes, Module Built-in Functions, Packages, Other Features of Modules

UNIT - III

Multithreaded Programming: Introduction, Threads and Processes, Python, Threads, and the Global Interpreter Lock, Thread Module, Threading Module, Related Modules

GUI Programming: Introduction, Tkinter and Python Programming, Brief Tour of Other GUIs, Related Modules and Other GUIs

UNIT – IV

WEB Programming: Introduction, Wed Surfing with Python, Creating Simple Web Clients, Advanced Web Clients, CGI-Helping Servers Process Client Data, Building CGI Application Advanced CGI, Web (HTTP) Servers

Database Programming: Introduction, Python Database Application Programmer's Interface (DB-API), Object Relational Managers (ORMs), Related Modules.

TEXTBOOKS:

1. Core Python Programming, Wesley J. Chun, Second Edition, Pearson.
2. Mark Lutz ,"Learning Python", O Reily, 4thEdition, 2009

REFERENCES:

1. Tim Hall and J-P Stacey ,"Python 3 for Absolute Beginners" , 2009
2. Magnus Lie Hetland , "Beginning Python: From Novice to Professional", 2nd Edition, 2009

Course Code &Title: 19MCAT54 PERL PROGRAMMING (ELECTIVE III)
Semester & Year of study: V & 2021-2022
Course Index: C504

Course Objectives:
The learning objectives of this course are:

Course Objectives
To study the syntax and semantics of the Perl language and their similarity and differences from other programming languages
To discuss various forms of data representation and structures supported by the Perl language
To learn about Files and File handles, Runtime Evaluation & Error Trapping
To study CGI Programming and Administration

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C504.1	Able to understand the basic syntax and semantics of the Perl language
C504.2	Able to understand various forms of data representation and structures supported by the Perl language
C504.3	Able to understand Files and Filehandles, Runtime Evaluation & Error Trapping
C504.4	Able to understand CGI Programming and Administration

19MCAT54 PERL PROGRAMMING (ELECTIVE III)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

Introduction: What is Perl? ,Scripts vs. Programs, Comparison with Other Programming Languages: C/C++,PHP, Java/JSP, ASP, Hello World program and execution, Literals, **Manipulation of Data Structures:** Scalar Variables, Lists and Arrays, Hashes, Contexts.

UNIT II

Conditionals, Loops & Subroutines: Subroutines, Packages, Conditionals, Loops, **References:** Creating a Reference, Using References, Pass By Reference, Type globs, **Object-Oriented Programming:** Object-Oriented Concepts, OOP Primer: Statistics, Inheritance.

UNIT III

Files and Filehandles: Filehandles, File Input and Output Functions Directory Traversal Functions, File Test Operators, File Locking, **Regular Expressions:** Building a Pattern, Regular Expression Operators. **Runtime Evaluation & Error Trapping:** Warnings and Exceptions, Error-Related Functions, eval, Backticks and system (), Why Runtime Evaluation Should Be Restricted, Next Generation Exception Handling, Other Methods to Catch Programming Errors.

UNIT IV

CGI Programming: Static Content and Dynamic Content, CGI, CGI Program ,GET vs. POST, File Upload, Important HTTP Header Fields and Environment Variables, Server Side Includes, Security Issues, **Administration:** CPAN, Accessing the Module Database on the Web, Package Managers, Installing Modules using CPAN, Installing Modules -The Traditional Way.

TEXT BOOKS:

1. Perl 5 Tutorial First Edition, Chan Bernard Ki Hong, Prepared from LATEX source files, Web site: http://www.cbkihong.com
2. Learning Perl Making Easy Things Easy and Hard Things Possible, O'REILLY, 7th Edition, Randal L.Schwartz, Brain D'foy and Tom Phoenix,

REFERENCES:

1. Perl: The Complete Reference, Second Edition, Martin C. Brown
2. Beginning Perl, Curtis Poe, John Wiley & Sons 27-Sep-2012

Course Code &Title: 19MCAT54 PHP PROGRAMMING (ELECTIVE III)
Semester & Year of study: V & 2021-2022
Course Index: C504

Course Objectives:
The learning objectives of this course are:

Course Objectives
To introduce the fundamentals of PHP
To familiarize students with the process of PHP on the web
To learn to create databases in PHP
To study the functioning of FTP in PHP

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C504.1	Able to understand the fundamentals of PHP
C504.2	Able to understand the PHP programming works on Web
C504.3	Able to create databases in PHP
C504.4	Able to read databases and the functioning of FTP in PHP

19MCAT54 PHP PROGRAMMING (ELECTIVE III)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT I

PHP FUNDAMENTALS: PHP – Exploring the PHP Environment – HTML Embedding, Comments – Variables, Data types – Operators – PHP String functions, Controls Structures, Arrays – Types – Multi dimension array – Array functions, Functions in PHP.

UNIT II

WEB PAGES WITH PHP: Embedding into HTML, User Input, Safe Handling user Input, PHP Form, form processing, Working with Form Data, GET, POST, REQUEST, Reading Data in web Pages, Performing Data validation, required data, number, text, Cookies and Session in PHP

UNIT III

WORKING WITH DATABASE: MySQL, Creating Database and Table, CURD, JOIN, Aggregate Queries, Connecting to MySQL with PHP, Accessing and Updating Database with PHP, SQL injections, Prepared Statements.

UNIT IV

ADVANCED CONCEPTS: File Handling -Create, Open, read, write to files, Working with FTP in PHP, PHP mail functions, Advanced mail functions, Building and Formatting dates and times, PHP filters.

TEXT BOOKS:

1. Steven Holzner, “PHP: The Complete Reference”, Tata McGraw Hill Education, 1st Edition,2007.

REFERENCES:

1. Luke Welling, Laura Thomson, “PHP and MySQL Web Development”, Pearson, 4th Edition.
2. Larry Ullman, “PHP and MySQL for Dynamic Web Sites”, Prentice Hall, 4th Edition.
3. George Schlossnagle,“Advanced PHP Programming”, First Edition, Sams Publishing.

Course Code &Title: 19MCAT55 MACHINE LEARNING (ELECTIVE IV)
Semester & Year of study: V & 2021-2022
Course Index: C505

Course Objectives:
The learning objectives of this course are:

Course Objectives
To introduce students to the basic concepts and techniques of Machine Learning
To discuss Decision Tree learning, Artificial Neural Networks
To learn about Bayesian learning, Instance-Based Learning
To study various Genetic Algorithms, Learning Sets of Rules

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C505.1	Able to understand the basic concepts and techniques of Machine Learning
C505.2	Able to understand Decision Tree learning, Artificial Neural Networks
C505.3	Able to understand Bayesian learning, Instance-Based Learning
C505.4	Able to understand Genetic Algorithms, Learning Sets of Rules

19MCAT55 MACHINE LEARNING (ELECTIVE IV)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT - I

Introduction - Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept earning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

UNIT - II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks

UNIT - III

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, an example learning to classify text, Bayesian belief networks The EM algorithm

Instance-Based Learning- Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

UNIT - IV

Genetic Algorithms – Motivation, Genetic Algorithms, an illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution

Text Books:

1. Machine Learning–Tom Mitchell, McGraw Hill Education; First edition(1July2017) **ISBN-10:**1259096955
2. Machine Learning: An Algorithmic Perspective, Second Edition, Stephen Marsl and, Taylor & Francis (CRC) 2014. ISBN-13: 978-1-4665-8333-7 (eBook -PDF)

Reference Books:

2. Machine Learning Methods in the Environmental Sciences, Neural Networks, William WHsieh, Cambridge University Press. 2009. ISBN-13978-0-511-59557-8
3. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley &Sons Inc., 2001. ISBN:978-0-471-05669-0
4. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.ISBN-10:0-387-31073-8
5. Machine Learning by Peter Flach, Cambridge. 2012. ISBN978-1-107-09639-4

Course Code &Title: 19MCAT55 CLOUD COMPUTING (ELECTIVE – IV)
Semester & Year of study: IV & 2020-2021
Course Index: C505

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn about the Cloud Computing basics, Intranet and Cloud, Services and Business Applications, Salesforce.com, Organization and Cloud Computing
To learn about the Hardware and Infrastructure , Overview of Software as a Service, Overview of Industries Software plus Services, Mobile device Integration
To learn about Developing the Applications like Google, Microsoft, Intuit QuickBase, Local Clients and thin clients
To learn about Migrating the Cloud, Cloud Services

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C505.1	Able to understand about the Cloud Computing basics, Intranet and Cloud, Services and Business Applications, Salesforce.com, Organization and Cloud Computing
C505.2	Able to understand about the Hardware and Infrastructure , Overview of Software as a Service, Overview of Industries Software plus Services, Mobile device Integration
C505.3	Able to understand about Developing the Applications like Google, Microsoft, Intuit QuickBase, Local Clients and thin clients
C505.4	Able to understand about the Migrating the Cloud, Cloud Services

19MCAT55 CLOUD COMPUTING (ELECTIVE – IV)

Instruction:4Periods/week **Time:3Hours** **Credits: 4**
Internal:25Marks **External:75Marks** **Total: 100Marks**

UNIT I

Cloud Computing Basics - Cloud Computing Overview, Applications, Intranets and the Cloud, First Movers in the Cloud. The Business Case for Going to the Cloud - Cloud Computing Services, Business Applications, Deleting Your Datacenter, Salesforce.com, Thomson Reuters.

Organization and Cloud Computing - When You Can Use Cloud Computing, Benefits, Limitations, Security Concerns, Regulatory Issues, Cloud Computing with the Titans - Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM Partnerships.

UNIT II

Hardware and Infrastructure - Clients, Security, Network, Services. Accessing the Cloud - Platforms, Web Applications, Web APIs,Web Browsers. Cloud Storage - Overview, Cloud Storage Providers, Standards - Application, Client, Infrastructure, Service.

Software as a Service - Overview, Driving Forces, Company Offerings, Industries Software plus Services - Overview, Mobile Device Integration, Providers, Microsoft Online.

UNIT III

Developing Applications - Google, Microsoft, Intuit QuickBase, Cast Iron Cloud, Bungee Connect, Development, Troubleshooting, Application Management.

Local Clouds and Thin Clients - Virtualization in Your Organization, Server Solutions, Thin Clients, Case Study: McNeilus Steel.

UNIT IV

Migrating to the Cloud - Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, Migration, Best Practices and the Future of Cloud Computing - Analyze Your Service, Best Practices, How Cloud Computing Might Evolve.

Text Books:

1. Cloud Computing-A Practical Approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter. McGrawHill.

Reference Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, MKElsevier.
2. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press

Course Code &Title: 19MCAT55 ROBOTICS (ELECTIVE IV)
Semester & Year of study: V & 2021-2022
Course Index: C505

Course Objectives:
The learning objectives of this course are:

Course Objectives
To study the basics of control systems and components
To discuss robot end effectors its Types, Tools as End Effectors, Gripper Selection and Design Forward and Inverse Kinematics.
To learn about machine vision, Sensor Characteristics, Image processing and Analysis, Robotic Applications
To study robot programming, Motion Commands, program Control and Subroutines. Programming methods and Branching

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C505.1	Able to understand the basic of control systems and components
C505.2	Able to understand robot end effectors its Types, Tools as End Effectors, Gripper Selection and Design Forward and Inverse Kinematics
C505.3	Able to understand machine vision, Sensor Characteristics, Image processing and Analysis, Robotic Applications
C505.4	Able to understand robot programming, Motion Commands, program Control and Subroutines. Programming methods and Branching.

19MCAT55 ROBOTICS(ELECTIVE IV)

Instruction: 4 Periods/week	**Time: 3 Hours**	**Credits: 4**
Internal: 25 Marks	**External: 75 Marks**	**Total: 100 Marks**

UNIT-I

CONTROL SYSTEMS AND COMPONENTS: Basic Control Systems Concepts and Models, Controllers, Control System Analysis,Classification, Components, Characteristics, Applications Robot Activation and Feedback Components, Power Transmission Systems, Robot Joint Control Design.

UNIT-II

ROBOT END EFFECTORS**:** Types, Mechanical Grippers and Other types, Tools as End Effectors, The Robot/End Effector Interface, Considerations in Gripper Selection and Design.Position Analysis, Robots as Mechanisms, Matrix Representation, Transformation Matrices, Forward and Inverse Kinematics.

UNIT-III

MACHINE VISION:Introduction,Sensor Characteristics, Description of Different Sensors. The Sensing and Digitizing function, Image processing and Analysis,Training and Vision Systems, Robotic Applications Characteristics of Actuating Systems, Actuating Devices and Control.

UNIT-IV

ROBOT PROGRAMMING: The Textual Robot languages, Generations of Robot programming languages, Robot language Structures, Constants, Variables, and other data Objects, Motion Commands, program Control and Subroutines. Programming methods, Robot program as a path in space, Motion Interpolation, WAIT, SGNAL, DELAY Commands, Branching.

TEXT BOOK:

1. Mikell P. Groover , Mitchell Weiss , Roger N. Nagel , Nicholas G. Odrey Industrial Robotics: Technology, Programming, and Applications , 1st edition, McGraw-Hill International Edition, 1986

2. Saeed B. Niku, Introduction to Robotics Analysis, Application, Pearson Education Asia, 2001.

REFERENCE BOOK:

1. K.S.Fu, R.C Gonzalez, C.S.G.Lee , ROBOTICS , Control, Sensing , Vision and Intelligence , 1st edition, McGraw-Hill International Edition, 1987.

2. R.K.Mittal and I J Nagrath, Robotics and Control, TMH, 2003.

3. Computational Intelligence, Davis Poole, Alan Mackwath, Randy Coehel, Oxford University Press 1998.

Course Code &Title: 19MCAP56 BIG DATA ANALYTICS LAB
Semester & Year of study: V & 2021-2022
Course Index: C506

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn how to implement data structures, generic types
Learn how to setup and install Hadoop
Learn how to implement file management tasks and programs in Hadoop

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C505.1	Able to implement data structures, generic types
C505.2	Able to setup and install Hadoop
C505.3	Able to implement file management tasks and programs in Hadoop

19MCAP56 BIG DATA ANALYTICS LAB

Practical: 3Periods/week **Time:3Hours** **Credits: 2**
Internal:50Marks **External:50Marks** **Total: 100Marks**

List of Experiments:

1. Write a Java Program to implement Linked Lists, Stacks and Queues.
2. Write Java Program that implements Generic Types which collects pair of elements of different types.
3. Write a Java Program that uses object serialization and deserialization.
4. Know about setting up and Installing Hadoop in its three operating modes and implement in Standalone.
5. Implement the following file management tasks in Hadoop: Adding, Retrieving and deleting files.

Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

6. Write a Map-Reduce Program to find average of numbers.
7. Implement Matrix Multiplication with Hadoop Map Reduce
8. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

REFERENCES:

1. Big Java Fourth Edition Cay Horstmann Wiley, John Wiley & Sons
2. www.hadoop.apache.org
3. www.gist.github.com

19MCAP57 MINI PROJECT

Practical: 3Periods/week **Time:3Hours** **Credits: 2**

Internal:50Marks **External:50Marks** **Total: 100Marks**

- **Do Mini Project by using ELECTIVE - III**

MCA, SEMESTER –VI

S.No.	Course	Paper title	Paper Code	Total Marks	Mid Sem Exam	Sem End Exam	Teaching Hours	Credits
1	Project	Project	19MCAP61	200	100	100	--	16
Total				200	100	100	--	16

Total Marks: **3700** Total Credits : **136**