GURU KASHI UNIVERSITY

Master of Computer Application
Session: 2023-2024

Department of Computer Applications

GRADUATE OUTCOMES OF THE PROGRAMME

This program has a strong foundation of programming, advanced knowledge and skills in the field of computer science and applications. The primary goal of the MCA program is to produce highly skilled professionals who can excel in various IT-related roles as well as design and develop applications to analyze and solve all computer science related problems.

PROGRAM LEARNING OUTCOMES: After completing the programme, the Learner will be able to:

1. Understand and apply mathematical foundations and computing knowledge to conceptualize computing models for defined problems.
2. Identify, critically analyze, and formulate complex computing problems using the fundamentals of computer science and application domains.
3. Utilize modern programming languages, tools, techniques, and skills necessary for designing, developing, and deploying software-based applications.
4. Apply ethical principles and adhere to professional ethics, responsibilities, and norms in computer practice.
5. Analyze and review literatures to invoke the research skills to design, interpret and make inferences from the resulting data
6. Create and design innovative methodologies to solve complex problems for the betterment of the society.

PREREQUISITE FOR NON BCA STUDENTS

The students holding a Bachelor of Science (B.Sc.), Bachelor of Commerce (B.Com.), Bachelor of Arts (B.A.), or Bachelor of Business Administration (BBA) degree in non-Computer Science or non-IT fields require the prerequisite of completing the Four-weeks Bridge Course .It is necessary to provide them with the essential foundation in computer science and IT, ensure a level playing field for all students, prepare them for advanced concepts, and enhance their employability in the ever-growing field of technology.

Prerequisite for non BCA Students

Course Code	Course Title	L	T	P	Internal Examination
MCA001	Operating System	-	-	-	100
MCA002	Computer Networks	-	-	-	100
MCA003	Computer System Architecture	-	-	-	100
MCA004	Internet Concepts of Web Designing	-	-	-	100
Total					400

Examination 2023

The Pattern of the question paper will be as below mentioned.

S.no	Type of Question	Question No.	Each Question Marks	Total Marks
1.	Subjective very Short Answer Type	1(a) to 1(j) Attempt all Questions	2 marks each	20
2.	Short Answer Type	Question no 2 to Question no 14. Attempt any 10 Questions	5 marks each	50
3.	Long Answer Type	Question no 15 to Question no 19.Attempt any 3 Questions	10 marks each	30
			Grand Total	100

Programme Structure

Semester-I						
Course Code	**Course Title**	**Type of course**	**L**	**T**	**P**	**Credits**
MCA102	Object Oriented Programming using C++	Core	4	0	0	4
MCA112	Database Management System	Core	4	0	0	4
MCA103	Discrete Mathematics	Core	4	0	0	4
MCA107	Object Oriented Programming using C++ Lab	Technical Skill	0	0	4	2
MCA113	Database Management System Lab	Technical Skill	0	0	4	2
Disciplinary Elective I (Any one of the following)						
MCA114	Big Data	Disciplinary Elective I	3	0	0	3
MCA111	Cloud Computing					
MCA115	Software Engineering					
Disciplinary Elective II (Any one of the following)						
MCA116	Machine Learning	Disciplinary Elective II	3	0	0	3
MCA117	IoT and Its Applications					
MCA118	Digital Image Processing					
Total			**18**	**0**	**8**	**22**

Semester-II						
Course Code	**Course Title**	**Type of course**	**L**	**T**	**P**	**Credits**
MCA211	Data Structures	Core	4	0	0	4
MCA212	Artificial Intelligence (USING LISP)	Core	4	0	0	4
MCA202	Programming using Python	Core	4	0	0	4
MCA213	Data Structures Lab	Technical Skill	0	0	4	2
MCA214	Programming using Python Lab	Technical Skill	0	0	4	2
Disciplinary Elective III (Any one of the following)						
MCA215	Analysis & Design of Algorithms	Disciplinary Elective III	3	0	0	3
MCA216	Data Warehousing and Data Mining Techniques					
MCA217	Information and Network Security					
Disciplinary Elective IV (Any one of the following)						
MCA218	Software Project Management	Disciplinary Elective IV	3	0	0	3
MCA219	Mobile Application Development					
MCA220	Advanced Web Technologies					
Value added Course (For other Department)						
MCA221	Communication Skills	**VAC**	2	0	0	2
Total			**20**	**0**	**8**	**24**

Semester-III						
Course Code	**Course Title**	**Type of course**				
			L	**T**	**P**	**Credits**
MCA312	Research Methodology	Compulsory Foundation	4	0	0	4
MCA398	Research Proposal	Research Skill	0	0	8	4
MCA314	Ethics & IPR	Research Skill	2	0	0	2
MCA397	Proficiency in Teaching	Research Skill	2	0	0	2
MCA316	Computer Lab	Research Skill	0	0	4	2
MCA396	Service Learning	Skill Based	0	0	4	2
MCA318	Internship Training* 8 weeks	Skill Based	-	-	-	8
MCA399	XXX	MOOC	-	-	-	4
Total			**8**	**0**	**16**	**28**

Note: * After Second Semester during summer vacation

Semester-IV						
Course Code	**Course Title**	**Type of course**	**L**	**T**	**P**	**Credits**
MCA401	Dissertation	Research Skill	-	-	-	20
Total						**20**
Grand Total			**48**	**0**	**28**	**94**

Evaluation Criteria for Theory Courses

A. Continuous Assessment: [25 Marks]

CA1- Surprise Test (Two best out of three) (10 Marks)
CA2- Assignment(s) (10 Marks)
CA3- Term Paper/Quiz/Presentation (05 Marks)

B. Attendance (5 marks)
C. Mid Semester Test: [30 Marks]
D. End-Semester Exam: [40 Marks]

Bridge Courses

Course Title: Operating System

Course Code: MCA001

Learning Outcomes After completion of this course, the learner will be able to:

1. Describe the fundamental concepts of Operating Systems.
2. Solve the various types of Scheduling Algorithms for better utilization of external memory.
3. Attain the knowledge about deadlock detection algorithms.
4. Demonstrate the components and aspects of concurrency management.

Course Content

UNIT I

Introduction: Basic OS functions, resource abstraction, types of operating systems–multiprogramming systems, batch systems, time sharing systems; operating systems for personal computers & workstations, process control & real time systems.
Operating System Organization Processor and user modes, kernels, system calls and system programs.

UNIT II

Process Management System view of the process and resources, process abstraction, process hierarchy, threads, threading issues, thread libraries; Process Scheduling, non-preemptive and preemptive scheduling algorithms; concurrent and processes, critical section, semaphores, methods for inter-process communication; deadlocks.

UNIT III

Memory Management Physical and virtual address space; memory allocation strategies –fixed and variable partitions, paging, segmentation, virtual memory.

UNIT IV

File and I/O Management Directory structure, file operations, file allocation methods, device management.
Protection and Policy mechanism, Authentication, Internal access Authorization

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Tanenbaum, A. (2009). Modern operating systems. Pearson Education, Inc.,.
- Coffman, E. G., & Denning, P. J. (1973). Operating systems theory (Vol. 973). Englewood Cliffs, NJ: prentice-Hall.
- Madnick, S. E., & Donovan, J. J. (1974). Operating systems (Vol. 197, No. 4). New York: McGraw-Hill.
- Deitel, H. M. (1990). An introduction to operating systems. Addison-Wesley Longman Publishing Co., Inc..

Web Sources

- https://www.guru99.com/operating-system-tutorial.html)
- https://www.tutorialspoint.com/operating_system/os_overview.htm)
- https://www.javatpoint.com/operating-systemand Functions - javatpoint
- https://www.howtogeek.com/361572/what-is-an-operating-system/ (howtogeek.com)

Course Title: Computer Networks
Course Code: MCA002
Learning Outcomes After completion of this course, the learner will be able to:

1. Get knowledge about the layers of the OSI model and TCP/IP.
2. Compare and identify various network topologies.
3. Identify the types of application process protocols.
4. Discuss the various data link layer and network protocols.

Course Content
UNIT I
Data communications concepts: Digital and analog parallel and serial synchronous and asynchronous, simplex, half duplex, full duplex, multiplexing.
Communication channels: Wired transmissions: Telephone lines, leased lines, switch line, coaxial cables, base band, and broadband, optical fiber transmission.
UNIT II
Wireless transmission: Microwave transmission, infrared transmission, laser transmission, radio transmission, and satellite transmission, Communication switching techniques; Circuit switching, message switching, packet switching.
UNIT III
Network reference models: Network topologies, OSI references model.
Overview of TCP/IP protocol suite.
UNIT IV
Routing Algorithms: Optimality principled, shortest path routing, Concept of Internet Working.
Overview of DNS protocol; overview of WWW & HTTP protocol.

Transactional Mode
Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**
Suggested Readings

- Tanenbaum, A. S. (2002). Computer networks. Pearson Education India.
- Peterson, L. L., & Davie, B. S. (2007). Computer networks: a systems approach. Elsevier.
- Kiesler, S. (1986). The hidden messages in computer networks (pp. 46-47). Harvard Business Review Case Services.

Web Sources

- https://www.geeksforgeeks.org/data-communication-definition-components-types-channels/
- https://www.studytonight.com/computer-networks/reference-models-in-computer-networks
- https://www.britannica.com/technology/computer-network

Course Title: Computer System Architecture
Course Code: MCA003

Learning Outcomes After completion of this course, the learner will be able to:

1. Knowledge about the architecture of the central processing unit.
2. Attain the knowledge of memory hierarchy.
3. Exemplify various data transfer modes.
4. Know about the concepts of Memory mapping and Cache memory.

Course Content

UNIT I

Logic gates, boolean algebra, combinational circuits, circuit simplification, flip-flops and sequential circuits, decoders, multiplexers, registers, counters and memory units.

Data Representation and Basic Computer Arithmetic Number systems, complements, fixed and floating point representation, character representation, addition, subtraction, magnitude comparison, multiplication and division algorithms for integers

UNIT II

Basic Computer Organization and Design, Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt, Interconnection Structures, Bus Interconnection design of basic computer

UNIT III

Central Processing Unit: Register organization, arithmetic and logical micro-operations, stack organization, microprogrammed control. Instruction formats, addressing modes, instruction codes, machine language, assembly language, input output programming, RISC, CISC architectures, pipelining and parallel architecture.

UNIT IV

Memory Organization Cache memory, Associative memory, mapping.

Input-Output Organization: Input / Output: External Devices, I/O Modules, Programmed I/O, Interrupt-Driven I/O, Direct

Memory Access, I/O Channels.

Transactional Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Mano, M. M. (1993). Computer system architecture. Prentice-Hall, Inc.*

- *Balch, M. (2003). Complete digital design: a comprehensive guide to digital electronics and computer system architecture. McGraw-Hill Education.*
- *Parhami, B. (2005). Computer architecture. Oxford University Press, New York, NY, USA.*

Web Sources

- *https://www.studytonight.com/computer-architecture/input-output-organisation*
- *https://www.javatpoint.com/computer-organization-and-architecture-tutorial*
- *https://429151971640327878.weebly.com/blog/13-computer-system-architecture*
- *https://www.geeksforgeeks.org/microarchitecture-and-instruction-set-architecture/*

Course Title: Internet Concepts and Web Designing
Course Code: MCA004

Learning Outcomes After completion of this course, the learner will be able to:

1. Recognize the basic HTML Tags, List, Types of lists, Adding graphics to HTML documents.
2. Apply knowledge to create tables, linking documents and frames.
3. Design forms with various attributes, Buttons, Text Area and Radio Button.
4. Develop web site with the help of HTML tags and CSS.

Course Content

UNIT I

Introduction to HTML: What is HTML,
HTML Documents, Basic structure of an HTML document, creating an HTML document, markup tags, heading paragraphs, line breaks, HTML tags

UNIT II

Elements of HTML: Introduction to elements of HTML, working with text, lists, tables, frames, hyperlinks, images, multimedia, forms
and controls.

UNIT III

Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling (Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model (Introduction, Border properties, Padding Properties, Margin properties).

UNIT IV

CSS Advanced: CSS Advanced (Grouping, Dimension,
Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color.
Web Designs: Creating page Layout and Site Designs.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- Duckett, J. (2014). *Web design with HTML, CSS, JavaScript and jQuery set (Vol. 1). IN*: Wiley.
- Raggett, D., Lam, J., Alexander, I., & Kmiec, M. (1998). *Raggett on HTML 4.* Addison-Wesley Longman Publishing Co., Inc

Web Sources

- https://www.tutorialspoint.com/internet_technologies/website_designing.htm
- https://tutorial.techaltum.com/webdesigning.html
- https://www.w3schools.com/css/css_intro.asp
- https://www.w3schools.com/js/js_operators.asp
  https://www.codecademy.com/catalog/subject/web-design
- https://www.entheosweb.com/website_design/responsive_web_design.asp

Semester-I

Course Title: Object Oriented Programming using C++
Course Code: MCA102

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Describe all the basic concepts of C++ and its features such as composition of objects, Operator overloading.
2. Analyze inheritance with the understanding of early binding and late binding.
3. Classify various object oriented concepts to solve different problems.
4. Analyze and explore various Stream classes, I/O operations and exception handling.

Course Content

UNIT I **17 Hours**

Programming Basics: Introduction to Programming, Programming Paradigms, Programming Languages and Types. Introduction to C - Basic Program Structure, Execution flow of C Program, Directives, Basic Input /Output Introduction to Object Oriented Programming- OOP concepts, Advantages, Applications, Comparison of C and C++-Data Types, Control Structures, Operators and Expressions.

Introduction to C++: Structure of a C++ program, Execution flow, Classes and Objects, Access modifiers, Data Members, Member Functions, Inline Functions, passing parameters to a Function (pass by Value, pass by Address, pass by Reference), Function with default arguments, Function Overloading, Object as a Parameter, Returning Object Static data members and functions, Constant Data members and functions

Constructors- Default, Parameterized, Copy, Constructor Overloading, Destructors Arrays, Array as a Class Member, Array of Objects, Strings C style strings and String Class.

UNIT II **14 Hours**

Operator Overloading and Pointers: Operator Functions-Member and Non Member Functions, Friend Functions Overloading Unary operators Overloading binary operators(Arithmetic, Relational, Arithmetic Assignment, equality), Overloading Subscript operator Type Conversion Operators- primitive to Object, Object to primitive, Object to Object Disadvantages of operator Overloading, Explicit and Mutable Pointers, Pointer and Address of Operator, Pointer to an Array and Array of Pointers, Pointer arithmetic, Pointer to a Constant and Constant Pointer, Pointer

Initialization, Types of Pointers(void, null and dangling), Dynamic Memory Allocation, Advantages and Applications of pointers .

UNIT III **13 Hours**

Inheritance and Polymorphism: Inheritance Concept, protected modifier, Derivation of Inheritance- Public, Private and Protected,

Types of Inheritance-Simple, Multilevel, Hierarchical, Multiple, Hybrid, Constructors and Inheritance, Function Overriding and Member hiding Multiple Inheritance, Multipath inheritance – Ambiguities and solutions Polymorphism, Static and Dynamic Binding, Virtual Functions, Pure Virtual Functions, Virtual destructors, Abstract Classes, Interfaces.

UNIT IV **16 Hours**

Streams and Exceptions: Files, Text and Binary Files, Stream Classes, File IO using Stream classes, File pointers, Error Streams, Random File Access, Manipulators, Overloading Insertion and extraction operators Error handling, Exceptions, Throwing and catching exceptions, Custom Exceptions, Built in exceptions

Advanced C++: Casting- Static casts, Const Casts, Dynamic Casts, and Reinterpret Casts. Creating Libraries and header files. Namespaces Generic Programming, Templates, Class Templates, Function Templates, Template arguments.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Kamthane, A. (2012). Programming in C++, 2/e. Pearson Education India.*
- *Salaria, R. S. (2016). Mastering Object-Oriented Programming with C++. KHANNA PUBLISHING HOUSE.*
- *Balagurusamy, E. (2001). Object-Oriented Programming with C++, 7e. McGraw-Hill Education.*

Web Sources

- *https://www.tutorialspoint.com/basic-concepts-of-object-oriented-programming-using-cplusplus*
- *https://www.geeksforgeeks.org/operator-overloading-cpp/*
- *https://www.simplilearn.com/tutorials/cpp-tutorial/types-of-inheritance-in-cpp*

Course Title: Database Management System
Course Code: MCA112

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Interpret the basic concepts and explore the applications of database systems.
2. Describe the basics of SQL and construct queries using SQL.
3. Analyze relational database theory, and be able to write relational algebra expressions for queries.
4. Grasp the design principles for logical design of databases, including the E-R method and normalization approach.

Course Content

UNIT I **12 Hours**

Database Management Systems: Definition, Characteristics, Advantages of Using DBMS Approach, Classification of DBMSs, Data Models, Database Schema and Instance, Three Schema Architecture, Data Independence – Physical and Logical data Independence.

Entity- relationship model: Entities, Relationships, Representation of entities, attributes, Representation of relationship set, Generalization, aggregation.

Normalization: Functional Dependency, Full Functional Dependency, Partial Dependency, Transitive Dependency, Normal Forms– 1NF, 2NF, 3NF, BCNF, Multi-valued Dependency.

UNIT II **18 Hours**

Relational Algebra and Relational Calculus: Relational Algebra: Operations- Union, Intersection, Difference, Cartesian product, Projection, Selection, Division and relational algebra queries; Relational Calculus: Tuple oriented and domain oriented relational calculus and its operations.

Transaction and Concurrency control: Concept of transaction, ACID properties, Serializability, States of transaction, Concurrency control: Locking techniques, Timestamp based protocols, Granularity of data items, Deadlock.

UNIT III **10 Hours**

MySQL: Introduction; Why MySql; Tools provided with MySQL; MySQL Architectural Terminology;

Databases: Creating, Selecting, Dropping and Altering Databases;

Tables: Creating, dropping, Altering, Indexing Tables; Adding new rows,

Retrieving Information, Deleting or Updating Existing rows; Obtaining MySQL Metadata; Joins; Subqueries; Views; Multiple Tables Deletion and Updation; Foreign Keys and Referential Integrity; MySQL Data Types; Sequences.

UNIT IV **20 Hours**

Data Warehousing: Introduction; Features; Data modeling for Data Warehousing; Building Data warehouse; Comparison between Data Warehouse and DBMS Metadata; Problems and issues in Data Warehouse. Data Mining: Overview; Goals of Data Mining; Techniques: Association rules (Market Basket Algorithm, Apriori Algorithm); Classification: Decision Tree, Induction Algorithm; Applications of Data Mining.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Ramez, E. (2007). Fundamentals of Database Systems: For VTU. Pearson Education India.*
- *Date, C. J. (1975). An introduction to database systems. Pearson Education India.*
- *Silberschatz, A., Korth, H. F., &Sudarshan, S. (2002). Database system concepts (Vol. 5). New York: McGraw-Hill.*
- *Date, C. J. (1975). An introduction to database systems. Pearson Education India.*

Web Sources

- *https://www.educba.com/types-of-dbms/*
- *https://www.geeksforgeeks.org/normal-forms-in-dbms/*
- *https://www.tutorialspoint.com/sql/sql-overview.htm*
- *https://www.tutorialspoint.com/dbms/dbms_transaction.htm*

Course Title: Discrete Mathematics
Course Code: MCA103

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Attain all the basic principles of sets and operations in sets.
2. Implement an argument using logical notation and determine if the argument is or is not valid.
3. Solve various methods of Recurrence relations.
4. Classify the various traversal methods for trees and graphs.

Course Content

UNIT I **16 Hours**

Set Theory: Introduction, Sets and Elements, Subsets, Venn Diagrams, Set Operations, Algebra of Sets, Duality, Finite Sets, Counting Principle, Classes of Sets, Power Sets, Partitions, Mathematical Induction.

Relations: Introduction, Product Sets, Relations, Pictorial Representations of Relations, Composition of Relations, Types of Relations, Closure Properties, Equivalence Relations, Partial Ordering Relations

Functions: Introduction, Functions, One-to-One, Onto, and Invertible Functions, Mathematical Functions, Exponential and Logarithmic Functions.

UNIT II **14 Hours**

Logic and Propositional Calculus: Introduction, Propositions and Compound Statements, Basic Logical Operations, Propositions and Truth Tables, Tautologies and Contradictions, Logical Equivalence, Algebra of Propositions, Conditional and Biconditional Statements, Arguments, Propositional Functions, Quantifiers, Negation of Quantified Statements.

Techniques of Counting: Introduction, Basic Counting Principles, Mathematical Functions, Permutations, Combinations, The Pigeonhole Principle, The Inclusion–Exclusion Principle, Principle Recurrence relations and Generating Function.

UNIT III **14 Hours**

Graph Theory: Introduction, Data Structures, Graphs and Multigraphs, Subgraphs, Isomorphic and Homeomorphic Graphs, Paths, Connectivity, Traversable and Eulerian Graphs, Labeled and Weighted Graphs, Complete, Regular, and Bipartite Graphs, Planar Graphs, Graph Colorings, Representing Graphs in Computer Memory and Graph Algorithms. Directed Graphs, Sequential Representation of Directed Graphs, Warshall's Algorithm, and Shortest Paths.

UNIT IV **16 Hours**

Trees: Introduction, Binary Trees, Complete and Extended Binary Trees, Representing Binary Trees in Memory, Traversing Binary Trees, Binary Search Trees, Priority Queues, Heaps, Path Lengths, Huffman's Algorithm, General (Ordered Rooted) Trees Revisited.

Ordered Sets and Lattices: Introduction, Ordered Sets, Hasse Diagrams of Partially Ordered Sets, Lattices, Bounded Lattices, Distributive Lattices, Complements, Complemented Lattices.

Algebraic Systems: Introduction, Operations, Semigroups, Groups, Subgroups, Normal Subgroups, and Homo-morphisms, Rings, Internal Domains, and Fields.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings:

- Lipschutz, S. (1976). Schaum's outline of theory and problems of discrete mathematics.
- Epp, S. S. (2010). *Discrete mathematics with applications*. Cengage learning.
- Kolman, B., Busby, R. C., & Ross, S. (1995). *Discrete mathematical structures*. Prentice-Hall, Inc.
- Doerr, A., &Levasseur, K. (1985). *Applied discrete structures for computer science*. SRA School Group.
- Rosen, K. H., & Krithivasan, K. (2012). *Discrete mathematics and its applications: with combinatorics and graph theory*. Tata McGraw-Hill Education.

Web Sources

- https://byjus.com/maths/basics-set-theory/
- https://discrete.openmathbooks.org/dmoi2/sec_introfunctions.html
- https://byjus.com/maths/graph-theory/

Course Title: Object Oriented Programming using C++ Lab
Course Code: MCA107

L	T	P	Credits
0	0	4	2

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Design an algorithmic solution for a given problem.
2. Debug a given Program.
3. Identify solutions to a problem and apply control structures and use defined functions for solving the problem.
4. Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.

List of Experiments:

1. Write a Program to display Names, Roll No., and grades of 3 students who have appeared in the examination. Declare the class of name, Roll No. and grade. Create an array of class objects. Read and display the contents of the array.
2. Write a Program to swap two Characters of different data types using function overloading.
3. Write a program to demonstrate the use of inline, friend functions and this keyword.
4. Write a program to implement static data members and member functions.
5. Write a Program to implement Constructor and Destructor.
6. Write a Program to demonstrate Constructor Overloading.
7. Write a Program to calculate factorial using Copy Constructor.
8. Write a Program to allocate & deallocate memory using new [ ] and delete [ ].
9. Write a Program to demonstrate the use of function overloading.
10. Write a Program to overload comparison operator operator== and operator! = .
11. Write a Program to create an array of pointers.
12. Create a base class containing the data member roll number and name. Also create a member function to read and display the data using the concept of single level inheritance. Create a derived class that contains marks of two subjects and total marks as the data members.
13. Write a Program to create multilevel inheritance. (Hint: Classes A1, A2, A3)
14. Write a program to demonstrate the concept of function overriding.
15. Write a Program to demonstrate the use of virtual functions and polymorphism.
16. Write a Program to demonstrate the use of pure virtual functions.

17. Write a Program to demonstrate the concepts of abstract class.
18. Write a Program to perform exception handling.
19. Write a Program to copy the contents of one file to another file.
20. Write a Program to create Generic Functions using Template.

Course Title: Database Management System lab

Course Code: MCA113

L	T	P	Credits
0	0	4	2

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Develops an Entity-Relationship model based on user requirements.
2. Implements the role of the database administrator and his responsibilities.
3. Apply Normalization techniques to normalize a database.
4. Declares and enforces integrity constraints on a database

List of Experiments:

1. Implementation of DDL commands of SQL with suitable examples
   Create table · Alter table · Drop Table
2. Implementation of DML commands of SQL with suitable examples
· Insert · Update · Delete
3. Implementation of different types of operators in SQL
· Arithmetic Operators · Logical Operators · Comparison Operator · Special Operator · Set Operation
4. Implementation of different types of Joins
· Inner Join · Outer Join · Natural Join etc.
5. Study and Implementation of
· Group by & having clause · Order by clause · Indexing
6. Study & Implementation of
· Sub queries · Views
7. Study & Implementation of different types of constraints.
8. Study & Implementation of Database Backup & Recovery commands. Study & Implementation of Rollback, Commit, Save point.
9. Implementation Following
   · Creating Database /Table Space · Managing Users: Create User, Delete User · Managing roles: -Grant, Revoke.
10. Write a PL/SQL program to demonstrate Exceptions.
11. Write a PL/SQL program to demonstrate Cursors.
12. Write a PL/SQL program to demonstrate Functions.
13. Write a PL/SQL program to demonstrate Packages.
14. Write PL/SQL queries to create Procedures.
15. Write PL/SQL queries to create Triggers.

Course Title: Big Data
Course Code:MCA114

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1. Discuss the building blocks of Big Data.
2. Articulate the programming aspects of cloud computing (map Reduce etc.).
3. Knowledge about the recent research trends related to Hadoop File System, Map Reduce and Google File System etc.
4. Study different types Case studies on the current research and applications of the Hadoop and big data in industry

Course Content

UNIT I **14 hours**

Introduction to Big Data: Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis Vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - Re-Sampling - Statistical Inference - Prediction Error

UNIT II **9 hours**

Mining Data Streams: Introduction to Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real Time Analytics Platform(RTAP)Applications –- Case Studies - Real Time Sentiment Analysis, Stock Market Predictions.

UNIT III **10 hours**

Hadoop Environment: History of Hadoop- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Hadoop file systems- Java interfaces to HDFS- Basics-Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features - Setting up a Hadoop Cluster - Cluster specification - Cluster Setup and Installation – Hadoop Configuration-Security in Hadoop

UNIT IV **12 hours**

Data Analysis Systems and Visualization: Link Analysis – Pagerank - Efficient Computation of Pagerank- Topic-Sensitive Page Rank – Link Spam- Recommendation Systems- A Model for Recommendation Systems- Content-Based Recommendations - Collaborative Filtering- Dimensionality Reduction- Visualizations - Visual data analysis techniques-interaction techniques- Systems and applications.

Transactional Mode

Project based learning, Team Teaching, Flipped teaching, Open talk, Collaborative Teaching, Case Analysis, Panel Discussions, Group Discussions.

Suggested Readings

- *Chris Eaton, (2012). Dirk deRoos et al., Understanding Big data, McGraw Hill.*
- *Tom White, (2012). HADOOP: The Definitive Guide,OReilly.*
- *Hurwitz, J., Nugent, A., Halper, F., & Kaufman, M. (2013). Big data for dummies (Vol. 336). Hoboken, NJ: John Wiley & Sons.*

Web Sources

- *https://www.youtube.com/watch?v=rHCAu1C6nQ8*
- *https://intellipaat.com/blog/tutorial/big-data-and-hadoop-tutorial/introduction-to-big-data-2/*

Course Title: Cloud Computing
Course Code: MCA111

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1. Recognize the fundamentals and essentials of Cloud Computing.
2. Describe the Concept of Cloud Infrastructure Model.
3. Analyze the key technical and organizational challenges.
4. Interpret the importance of virtualization in distributed computing.

Course Contents

UNIT I **9 Hours**

Introduction to Cloud Computing: Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of Cloud Computing, Cloud Computing Architecture, Basics of Cloud Infrastructure.

UNIT II **11 Hours**

Cloud Computing Delivery Models: Introduction, Cloud Computing Delivery Models, Attributes of Cloud Computing, Software as a Service (SaaS), Platform as a Service (PaaS), Infrastructure as a Service (IaaS), Comparison of Different Services, Combining Different Services, Obstacles for Cloud Technology, Cloud Vulnerabilities, Cloud Challenges, Practical Applications of Cloud Computing.

Migrating to the Cloud: Introduction, Broad Approaches to Migrating to the Cloud, The Seven-step Model of Migration to the Cloud, Service Level Agreements (SLA). Evaluating the Business Need, Cloud vs. Hosted Applications, Cloud vs. Licensed Software Vendors.

UNIT III **12 Hours**

Selection of Cloud Provider: Introduction, A Brief about Leading Cloud Service Providers, Considerations for Selecting a Cloud Solution, Business Considerations, Data Safety and Security, Interoperability, Portability and Integration, Geographical Considerations, Contingency and Recovery Management, Ethical and Legal Considerations, Scalability and Flexibility

UNIT IV **13 Hours**

Abstraction and Virtualization: Introduction to Virtualization Technologies, Understanding Hypervisors, Scheduling and Load Balancing.

Securing the Cloud: Securing the Cloud, Securing Data, Establishing Identity and Presence.

Case-Studies: Using Google Web Services, Using Amazon Web Services, Using Microsoft Cloud Services.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings:

- *Buyya, R., Broberg, J., &Goscinski, A. M. (Eds.). (2010). Cloud computing: Principles and paradigms. John Wiley & Sons.*
- *Sosinsky, B. (2010). Cloud computing bible. John Wiley & Sons.*
- *Miller, M. (2008). Cloud computing: Web-based applications that change the way you work and collaborate online. Que publishing.*
- *Kiswani, J. H., Dascalu, S. M., & Harris Jr, F. C. (2021). Cloud computing and its applications: A comprehensive survey. International Journal of Computer Applications IJCA, 28.*

Web Sources

- *https://www.knowledgehut.com/blog/cloud-computing/what-is-cloud-computing*
- *https://www.exitcertified.com/blog/cloud-computing-service-delivery-models*
- *https://www.checkpoint.com/cyber-hub/cloud-security/what-is-cloud-security/*
- *https://www.tutorialspoint.com/difference-between-abstraction-and-virtualization*

Course Title: Software Engineering
Course Code: MCA115

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1. Understand the given project in various phases of a lifecycle.
2. Identify process models depending on the user requirements.
3. Evaluate life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.
4. Apply the knowledge, techniques, and skills in the development of a software product.

Course Contents

UNIT I **11 Hours**

Introduction to Software Engineering: Problem Domain, Challenges, Software Engineering Approach, Software Development process: Process Characteristics

Process Models: Waterfall, Prototype, Spiral, Iterative Enhancement; Project Management Process, The Inspection process, Software Configuration Management Process, Requirements Change management.

Software Metrics: Software Measurement and Metrics, Designing Software Metrics, Classification of Software Metrics, Issues in Software metrics, Risk Management Software Process Planning, Effort Estimation, Cost estimation models, Project Scheduling and Staffing.

UNIT II **12 Hours**

Software Requirements Analysis and Specification: Requirements Anticipation, Requirements Investigation, Requirements Specifications, Analysis Approaches, Characteristics and Components of SRS, Fundamental problems in defining requirements, requirements validation. Decision Analysis Tools: Decision Tree, Decision Table, Structured English. Entity Relationship Diagram: Identify entity and relationship, Data Dictionary

UNIT III **11 Hours**

Software Design: Design Principles, Module level concepts, Design Notation and Specification, Structured Design Methodology, Verification, Metrics, OO Analysis and OO Design.

User-Interface Design: Introduction to User-Interface Design, Elements, Design Principles, Design Tips and Techniques, Good v/s Bad Interface.

Coding: Programming practice, Verification: code reading, reviews, static analysis, symbolic execution.

UNIT IV **11 Hours**

Software Maintenance: Types of Maintenance, Maintenance Cost, Introduction to legacy systems, Role of documentation in maintenance and types of documentation.

Software Testing: Objectives, Principles, Test case design, White-Box testing and Black-Box testing techniques.

Reverse Engineering: Basics of Software Re-engineering, Re-engineering Process Model.

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Roger Pressman, Software engineering- A Practitioner's Approach, McGraw-Hill International Editions.*
- *Boris Beizer (1990), Software Testing Techniques.*

Web Sources

- *https://www.geeksforgeeks.org/software-testing-basics/*
- *https://www.javatpoint.com/software-engineering-requirement-analysis*
- *https://www.atlassian.com/software-testing*

Course Title: Machine Learning
Course Code: MCA116

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1. Describe the basic concepts of Bayesian Decision Theory.
2. Implement the working of perceptron learning algorithm, criterion and Windrow-Hoff learning algorithm.
3. Depict the algorithms like Nearest Neighbor classification, K-nearest neighbor and their applications.
4. Evaluate the models generated from data.

Course Content

UNIT I **8 Hours**

Overview and Introduction to Bayes Decision Theory: Machine intelligence and applications, pattern recognition concepts classification, regression, feature selection, supervised learning class conditional probability distributions, Examples of classifiers bayes optimal classifier and error, learning classification approaches.

UNIT II **14 Hours**

Linear machines: General and linear discriminates, decision regions, single layer neural network, linear separability, general gradient descent, perceptron learning algorithm, mean square criterion and widrow-Hoff learning algorithm; multi-Layer

Perceptron: two-layers universal approximates, back propagation learning, on-line, off-line error surface, important parameters.

UNIT III **10 Hours**

Learning decision trees: Inference model, general domains, symbolic decision trees, consistency, learning trees from training examples entropy, mutual information, ID3 algorithm criterion, C4.5 algorithm continuous test nodes, confidence, pruning, learning with incomplete data

Instance-based Learning: Nearest neighbor classification, k-nearest neighbor, nearest neighbor error probability.

UNIT IV **13 Hours**

Machine learning concepts and limitations: Learning theory, formal model of the learnable, sample complexity, learning in zero-bayes and realizable case, VC-dimension, fundamental algorithm independent concepts, hypothesis class, target class, inductive bias, Occam's razor, empirical risk, limitations of inference machines, approximation and estimation errors, Trade Offs.

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Alpaydin, E. (2020). Introduction to machine learning. MIT press.*
- *Jordan, M. I., & Mitchell, T. M. (2015). Machine learning: Trends, perspectives, and prospects. Science, 349(6245), 255-260.*
- *Mitchell, T. M., & Mitchell, T. M. (1997). Machine learning (Vol. 1, No. 9). New York: McGraw-hill.*
- *Bishop, C. M., & Nasrabadi, N. M. (2006). Pattern recognition and machine learning (Vol. 4, No. 4, p. 738). New York: Springer.*

Web Sources

- *https://www.javatpoint.com/machine-learning-decision-tree-classification-algorithm*
- *https://data-flair.training/blogs/advantages-and-disadvantages-of-machine-learning/*
- *https://www.w3schools.com/ai/ai_perceptrons.asp*

Course Title: IoT & Its Applications
Course Code: MIT117

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1.Identify the different types of sensors and devices used in IoT.
2. Understand the security and privacy challenges associated with IoT.
3. Compare and contrast different IoT platforms and architectures
4. Develop IoT prototypes using hardware and software components.

Course Content

UNIT I **10 hours**

FUNDAMENTALS OF IoT- Evolution of Internet of Things, Enabling Technologies, M2M Communication, IoT World Forum (IoTWF) standardized architecture, Simplified IoT Architecture, Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, Smart Objects and Connecting Smart Objects.

UNIT II **10 hours**

IoT PROTOCOLS- IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks,6LoWPAN, Application Transport Methods: SCADA, Application Layer Protocols: CoAP and MQTT

UNIT III **12 hours**

DESIGN AND DEVELOPMENT- Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi, Arduino Board details

UNIT IV **13 hours**

Data Analytics: Introduction, Structured Versus Unstructured Data, Data in Motion versus Data at Rest, IoT Data Analytics Challenges, Data Acquiring, Organizing in IoT/M2M

Supporting Services: Computing Using a Cloud Platform for IoT/M2M Applications/Services, Everything as a service and Cloud Service Models.

CASE STUDIES/INDUSTRIAL APPLICATIONS: IoT applications in home, infrastructures, buildings, security, Industries, Home appliances, other IoT electronic equipment's, Industry 4.0 concepts.

Transaction Mode

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry,Cisco(2017) ,IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Press.*
- *Arshdeep Bahga, Vijay Madisetti (2015) ,Internet of Things – A hands-on approach, Universities Press.*
- *Rajkamal, Internet of Things: Architecture, Design Principles and Applications, McGraw Hill Higher Education.*

Web Sources

- *https://www.javatpoint.com/iot-internet-of-things*
- *https://www.simplilearn.com/tutorials/data-analytics-tutorial/what-is-data-analytics*
- *https://www.tutorialspoint.com/iot-network-protocols*

Course Title: Digital Image Processing
Course Code: MCA118

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1. Understand the fundamentals of digital image and its processing
2. Apply image enhancement techniques in spatial and frequency domain.
3. Elucidate the mathematical modeling of image restoration and compression
4. Describe object detection and recognition techniques.

Course Content

UNIT I **12 Hours**

Background: Introduction to electronic systems for image transmission and storage, computer processing and recognition of pictorial data, overview of practical applications.

Fundamentals: Mathematical and perceptual preliminaries, human visual system model, image signal representation, imaging system specification building image quality, role of computers, image date formats.

UNIT II **10 Hours**

Image Processing Techniques: Image enhancement, image restoration, image feature extraction, image data compression and statistical pattern recognition.

Hardware Architecture for image processing: Distributed processing of image data, role of array processing, standard image processor chips (as example).

UNIT III **10 Hours**

Techniques of color image processing: Color image signal representation, color system transformations, extension of processing techniques to color domain.

UNIT IV **13 Hours**

Applications of Image Processing: Picture data archival, machine vision, medical image processing

Image Segmentation: Detection of Discontinuity, Edge linking and Boundary Detection, Thresholding, Region-Oriented Segmentation, The use of Motion in Segmentation.

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Petrou, M. M., &Petrou, C. (2010). Image processing: the fundamentals. John Wiley & Sons.*
- *Gonzalez, R. C., & Woods, R. E. (1992). Digital image processing addison-wesley. Reading, Ma.B. Channda & D.Dutta.Digital Image Processing and Analysis.*
- *Jain, A. K. (1989). Fundamentals of digital image processing. Prentice-Hall, Inc.*
- *Pitas, I. (2000). Digital image processing algorithms and applications. John Wiley & Sons.*
- *Cristóbal, G., Schelkens, P., & Thienpont, H. (Eds.). (2013). Optical and digital image processing: fundamentals and applications. John Wiley & Sons.*

Web Sources

- *https://sisu.ut.ee/imageprocessing/book/1*
- *https://datagen.tech/guides/image-annotation/image-segmentation/*
- *https://open-instruction.com/image-processing/image-restoration/*
- *https://www.javatpoint.com/dip-introduction-to-frequency-domain*

Semester-II

Course Title: Data Structures
Course Code: MCA211

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Restate the fundamentals of basic data structures.
2. Experiment the details of stack, queue and linked list operation.
3. Interpret the knowledge of tree and graphs concepts.
4. Apply algorithms and data structures in various real-life software problems.

Course Content

UNIT I **12 Hours**

Introduction: Basics of C programming: function, structure, pointer, Data Structure, Basic Terminology, Basic Data Structures and Operations, Algorithm Complexity and Time-Space Trade-off.

Linked list: Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Doubly Linked List, Polynomial Representation and Addition, Garbage Collection and Compaction.

UNIT II **10 Hours**

Stacks: Representation and Implementation of Stacks, Operations on Stacks: Create, Push, Pop, Stack Overflow and Stack Underflow, Applications of Stacks: Infix to Postfix Conversion and Evaluation of Postfix Expression.

Queues: Representation and Implementation of Queues, Operations on Queues: Create, Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues, Applications of Queues.

UNIT III **18 Hours**

Trees: Basic Terminology, Binary Trees, Binary Tree Representation, Algebraic Expressions, Complete Binary Tree, Extended Binary Tree, Representation of Binary Trees.

Binary Tree Traversals: Pre-Order, In-Order and Postorder traversals, Binary Search Tree (BST), Insertion and Deletion in BST, Height Balanced Trees (AVL Trees).

Sorting: Insertion Sort, Selection Sort, Bubble Sort, Quick Sort, Merge Sort, Heap Sort, Radix Sort.

Searching: Linear Search, Binary search.

UNIT IV **20 Hours**

Graphs: Terminology and Representation, Directed Graphs, Sequential Representation of Graphs, Adjacency Matrix, Adjacency List, Graph Traversals: Breadth First Search (BFS) and Depth First Search (DFS), Spanning Trees, Topological Sorting. `

Hashing: Hash Table, Hash Functions, Collision Resolution Techniques, Open and Closed Hashing, Hash Table Implementation.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Lipschutz, S. (2011). Data Structures with C (Schaum's Outline Series)*
- *Langsam, Y., Augenstein, M., & Tenenbaum, A. M. (1996). Data Structures using C and C++ (Vol. 2). New Jersey: Prentice Hall.*
- *Samanta, D. (2001). Classic data structures (Vol. 2). Prentice Hall India.*
- *Narahari, Y. (2000). Data structures and algorithms. Retrieved November, 15.2019.*

Web Sources

- *https://www.tutorialspoint.com/data_structures_algorithms/linked_list_algorithms.htm*
- *https://byjus.com/gate/difference-stack-and-queue-data-structures/*
- *https://www.javatpoint.com/binary-tree-traversal-in-data-structure*
- *https://www.tutorialspoint.com/data_structures_algorithms/hash_data_structure.htm*

Course Title: Artificial Intelligence (USING LISP)
Course Code: MCA212

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Differentiate the various searching techniques, constraint satisfaction problem.
2. Classify the role of agents and the way of evaluating it.
3. Analyze and design a real world problem for implementation and understand the dynamic behavior of a system.
4. Compare different machine learning techniques to design AI machines and enveloping applications for real world problems.

Course Content

UNIT I **15 Hours**

Introduction to Artificial Intelligence (AI) and Problem Space: Introduction AI technique, Turing test, History and developments in AI, applications of AI, State space representation, production systems, systematic control strategies: Breadth first search and Depth first search, problem characteristics, product system characteristics, issues in the design of search programs.

Heuristic Search Technologies: Introduction to heuristic search, Generate and test, Hill Climbing, Best First search, A*, Problem reduction, AO*, constraint satisfaction and Means-ends-analysis techniques.

UNIT II **16 Hours**

Knowledge representation: Information and knowledge, Knowledge acquisition and manipulation, Issues in knowledge representation, Knowledge representation methods - Propositional logic and first order predicate logic, Resolution principle, Horn's clauses, features of language PROLOG, Semantic networks, Partitioned semantic nets, Frames, Scripts and conceptual dependencies.

Game playing: Minimax search procedure, reducing alternatives using Alpha-Beta pruning method examples.

UNIT III **14 Hours**

Expert systems: Introduction, examples, characteristics architecture, people involved and their role in building an expert system, case studies of expert systems, MYCIN and DENDRAL; features of knowledge acquisition systems: MOLE and SALT.

Natural Language understanding and processing: Introduction, Complexity of the problem, Chompsky hierarchy of grammars, Techniques for Syntactic processing, Semantic Analysis, Discourse and pragmatic processing

UNIT IV **15 Hours**

Tools and Technologies for AI: Introduction to AI language

LISP: Symbolic expression, creating, appending and modifying lists, defining functions, Predicates, Conditionals, Recursion, Iteration, Printing and reading, Lambda expressions and higher order function, List storage.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Khemani, D. (2013). A first course in artificial intelligence. McGraw-Hill Education.*
- *Fu, L. M. (2003). Neural networks in computer intelligence. Tata McGraw-Hill Education.*
- *Kamruzzaman, A. M. Artificial Intelligence & Applications.*
- *Russell, S. J. (2010). Artificial intelligence is a modern approach. Pearson Education, Inc.*

Web Sources

- *https://www.javatpoint.com/artificial-intelligence-ai*
- *https://www.edureka.co/blog/top-12-artificial-intelligence-tools/*
- *https://www.techtarget.com/searchenterpriseai/definition/natural-language-understanding-NLU*

  https://www.techtarget.com/searchenterpriseai/definition/expert-system

Course Title: Programming using Python

Course Code: MCA202

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Understand computer architecture and data representations (variables, representation of numbers and character strings).
2. Learn basic algorithmic problem-solving techniques (decision structures, loops, functions).
3. Know the basics of Strings and Dictionaries.
4. Identify and repair coding errors in a program.

Course Content

UNIT I **15 Hours**

Introduction to python Getting Started: Introduction to Python- an interpreted high level language, interactive mode and script mode.

Variables, Expressions and Statements: Values, Variables and keywords; Operators and Operands in Python: (Arithmetic, relational and logical operators), operator precedence, Expressions and Statements (Assignment statement); Taking input (using raw input () and input () and displaying output (print statement); Putting Comments.

UNIT II **16 Hours**

Conditional constructs and looping: if else statement While, for (range function), break, continue, else, pass, Nested loops, use of compound expression in conditional constructs and looping

Functions: Importing Modules (entire module or selected objects), invoking built in functions, functions from math module, using random () and randint () functions of random module to generate random numbers, composition.

Defining functions, invoking functions, passing parameters, scope of variables, void functions and functions returning values, flow of execution

UNIT III **14 Hours**

Strings: Creating, initializing and accessing the elements; String operators: +, *, in, not in, range slice [n:m]; Comparing strings using relational operators; String functions & methods: len, capitalize, find, isalnum, isalpha, isdigit, lower, islower, isupper, upper, lstrip, rstrip, isspace, istitile, partition, replace, join, split, count, decode, encode, swapcase, Pattern Matching

Lists: Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements;List operations (joining, list slices);

List functions & methods: len, insert, append, extend, sort, remove, reverse, pop.

UNIT IV **15 Hours**

Dictionaries: Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, traversing, appending, updating and deleting elements. Dictionary functions & Methods: cmp, len, clear (), get (), has key (), items (), keys (), update (), values ()

Tuples: Immutable concept, creating, initializing and accessing the elements in a tuple; Tuple functions: cmp(), len(), max(), min(), tuple()

Input and Output: Output Formatting, Reading and Writing Files

Errors and Exceptions: Syntax Errors, Exceptions, Handling Exceptions, Raising Exceptions, User-defined Exceptions, Defining Clean-up Actions, Predefined Clean-up Actions

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Dawson, M. (2008). Programming with Python.*
- *Harbour, J. S. (2012). More python programming for the absolute beginner. Course Technology, Cengage Learning.*
- *Beazley, D. M. (2009). Python essential reference. Addison-Wesley Professional.*
- *Van Rossum, G. (2007, June). Python Programming Language. In USENIX annual technical conference (Vol. 41, No. 1, pp. 1-36).*

Web Sources

- *https://www.w3schools.com/python/python_intro.asp*
- *https://www.tutorialspoint.com/python/python_basic_operators.htm*
- *https://www.programiz.com/python-programming/function*
- *https://www.geeksforgeeks.org/python-lists/*

Course Title: Data Structures Lab
Course Code: MCA213

L	T	P	Credits
0	0	4	2

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Understand the representation and use of primitive data types, built in data structure and allocation, use in memory.
2. Apply and implement the learned algorithms for problem solving.
3. Identify the appropriate data structure to develop real time applications.
4. Implement various sorting and searching algorithms.

List of Experiments

1. Implementation of Stack Using Array.
2. Implementation of Queue Using Array.
3. Evaluation of Postfix Expression using Stack.
4. Implementation of Singly Linked List.
5. Implementation of Doubly Linked List.
6. Implementation of Stack Using Linked List.
7. Implementation of Queue Using Linked List.
8. Implementation of Infix to Postfix Conversion using Stack.
9. Implementation of Binary Tree Traversal: Preorder, In order and Post order.
10. Implementation of Binary Search Tree.
11. Implementation of sorting algorithms: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort and Heap sort.
12. Implementation of Searching Algorithms: Linear Search and Binary Search
13. Implementation of Breadth First Search (BFS) in a Graph.
14. Implementation of Depth First Search (DFS) in a Graph.
15. Implementation of Hashing using hash functions.

Course Title: Programming using Python Lab
Course Code: MCA214

L	T	P	Credits
0	0	4	2

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Develop solutions for a range of problems using a functional/object oriented approach.
2. Implement the basic conditional and looping constructs.
3. Understand the basic concepts of scripting and the contributions of scripting language.
4. Develop solutions to real time problems.

List of Experiments

1. Write a Program to Install Python.
2. Write a Program to print Hello Your Name in Python.
3. Write a Program to Add numbers and Concatenate strings
4. Write a Program to take Input from user
5. Write a Program to making a sum of first 10 natural number through Loops in python
6. Write a Program to making a Student Result through nested IF-Else Conditional Statements
7. Write a Program to make Calculator through Functions
8. Write a Program to show working of Math library
9. Write a Program to implement the String Operations
10. Write a Program to Illustrate the Exceptional Handling
11. Write a Program to Random Numbers/String Generation in Python
12. Write a Program to show working on List
13. Write a Program to show working of Dictionary
14. Write a Program to show working of Tuple
15. Write a Program to show working of file Handling
16. Write a Program to delete the file from the system through File Handling

Course Title: Analysis & Design of Algorithms
Course Code: MCA215

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1. Analyze the performance of algorithms and choose appropriate algorithm design techniques for solving problems.
2. Compare between different data structures. Pick an appropriate data structure for a design situation.
3. Clear up troubles the usage of set of rules design methods including the grasping approach, divide and Conquer, dynamic programming, backtracking and department and certain.
4. Analyze worst-case running times of algorithms using asymptotic analysis.

Course Content

UNIT I **12 hours**

Introduction to Analysis of Algorithm: Algorithm, analysis, Characteristics of an Algorithm, time complexity and space complexity, Well Known Asymptotic Functions & Notations, Big O-notation, Omega notation and theta notation, Sets and disjoint set, union and find algorithms, Heaps. Sorting in linear time.

UNIT II **10 hours**

Divide and Conquer: General Strategy, Exponentiation, Strassen's matrix multiplication. Convex hull, closest pair finding. Divide and conquer binary search, heap sort, and quick sort and merge sort, finding the median.

Greedy Method: General Strategy, Formalization of Greedy Technique, Knapsack problem, Job sequencing with Deadlines, Optimal merge patterns, Minimal Spanning Trees Prim's and Kruskal Algorithm and Dijkstra's algorithm.

UNIT III **10 hours**

Dynamic Programming: General Strategy, The Principle of Optimality, Multistage graphs, OBST, 0/1 Knapsack, Traveling Salesperson Problem, Make change Problem. Flow Shop Scheduling, Chained Matrix Multiplication.

UNIT IV **13 hours**

Backtracking and Branch and Bound: Backtracking: General Strategy, 8 Queens problem, Graph Coloring, Hamiltonian Cycles, 0/1 Knapsack, sum of subset.

Branch and Bound: General Strategy, 0/1 Knapsack, Traveling Salesperson Problem, resource allocation problem.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Horowitz/Sahni.Fundamentals of Computer Algorithms, Galgotia Publication. 2006.
- Sanjay Dasgupta, Chirostos Papadimitriou, Umesh Vazirani. Algorithms, Tata Mcgraw Hill, 2006.
- Bressard. Fundamentals of Algorithms, PHI.
- Thomas H Cormen and Charles E Leiserson, Introduction to Algorithms, PHI.
- Aho *and J.D. Ullman, Design and Analysis of Algorithms, Addison Wesley*.

Web Sources

- https://vssut.ac.in/lecture_notes/lecture1428551222.pdf
- https*://mrcet.com/downloads/digital_notes/IT/Design%20and%20Analysis%20Algorithms.pdf*

Course Title: Data Warehousing And Data Mining Techniques
Course Code: MCA216

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1. Identify the scope and necessity of Data Mining & Warehousing for the society
2. Describe the designing of Data Warehousing so that it can be able to solve the root problems.
3. Remove redundancy and incomplete data from the dataset using data preprocessing methods.
4. Develop a data mining application for data analysis using various tools.

Course Content

UNIT I **11 Hours**

Introduction: Data Warehousing: Definition, Characteristics of a Data Warehouse, Data warehouse Usage, DBMS vs. Data warehouse

Developing Data Warehouse: Data warehousing components, Steps and Crucial decisions for the design and construction of Data Warehouses, Three-tier Data warehouse architecture, Data Warehouse Implementation, Design, performance and technological considerations, Metadata.

UNIT II **12 Hours**

Developing Data Mart based Data Warehouse Types of data marts, Metadata for a data mart, Data model for a data mart, Maintenance of a data mart, Software components for a data mart, Performance issues, Security in data mart.

OLAP Systems Types of OLAP, Relational vs. Multidimensional OLAP, Data modeling: Star schema, Snowflake schema, OLAP tools.

UNIT III **10 Hours**

Data Mining: Introduction to data mining, Data mining process, Major issues and Application of Data mining, Data preprocessing: Data cleaning, Data integration and transformation and Data reduction; Tools for data mining.

Data Mining Techniques: Association rules: Introduction, Market basket analysis, Frequent Pattern Mining algorithms: Apriori algorithm, Partition algorithm.

UNIT IV **12 Hours**

Classification and Prediction: Definition, Issues regarding Classification and Prediction, Classification by Decision Tree Induction, Support Vector Machines, k-Nearest-Neighbor, Prediction: Linear and Non-Linear Regression

Clustering: Definition, Types of data in cluster analysis, clustering

paradigms: K-Means and K-Medoids, Mining Sequence patterns: Generalized Sequential Patterns(GSP) mining algorithm, Hidden Markov Model, Social Network Analysis.

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- Dunham Margaret H, Sridhar S. (2008). *Data mining: Introductory and Advanced Topics*, Pearson Education.
- HumphiresH.D.(2009). *Data Warehousing: Architecture and Implementation* Pearson Education.
- Anahory.(2008*). Data Warehousing in the Real World.* Pearson Education.

Web Sources

- *https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing*
- *https://www.investopedia.com/terms/d/data-warehousing.asp*

Course Title: Information and Network Security
Course Code: MCA217

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1. Understand various types of attacks and their characteristics.
2. Analyze and compare different security mechanisms and services and Digital signature and authentication Protocols.
3. Describe network security services and mechanisms. Security Services for Email attacks, establishing keys privacy, authentication of the source, Message Integrity.
4. Illustrate various network security applications, IPSec, Firewall, IDS, Web security, Email security, and malicious software etc.

Course Content

UNIT I **12 Hours**

Introduction: Services, Mechanisms and attacks, the OSI security Architecture, Network security model, Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).

Finite Fields and Number Theory: Groups, Rings, Fields Modular arithmetic, Euclid's algorithm, Finite fields, Polynomial Arithmetic, Prime numbers, Fermat's and Euler's theorem, The Chinese remainder theorem- Discrete logarithms.

UNIT II **11 Hours**

Block Ciphers: Data Encryption Standard, Block cipher principles, block cipher modes of operation, Advanced Encryption Standard (AES) 50 Public key cryptography: Principles of public key cryptosystems, The RSA algorithm, Key management, Hash Function and Digital Signatures: Authentication requirement, Authentication function, MAC, Hash function, Security of hash function and MAC, MD5, SHA, HMAC, CMAC, Digital signature and authentication Protocols.

UNIT III **11 Hours**

Security Practice and System Security: Authentication applications, Kerberos, Internet Firewalls, Roles of Firewalls, Firewall related terminology, Firewall designs, Intruder, Intrusion detection system, Virus and related threats, Countermeasures, Firewalls design principles.

Email Security: Security Services for Email attacks, establishing keys privacy, authentication of the source, Message Integrity

UNIT IV **12 Hours**

IP Security: Overview of IPSec, IP and IPv6, Authentication Header, Encapsulation Security Payload (ESP) Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: SSL/TLS Basic Protocol, computing the keys- client authentication, PKI as deployed by SSL Attacks fixed in v3, Exportability, Encoding, Secure Electronic Transaction (SET).

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *W. Mao, Modern Cryptography – Theory and Practice, Pearson Education.*
- *Charles P. Pfleeger, Shari Lawrence Pfleeger Security in computing Prentice Hall of India.*
- *William Stallings, Cryptography and Network security - Principles and Practices, Pearson Publishing.*

Web Sources

- *https://www.brainkart.com/article/Basic-Concepts-in-Number-Theory-and-Finite-Fields_8398/*
- *https://www.geeksforgeeks.org/ipsec-architecture/*
- *https://www.geeksforgeeks.org/network-security/*

Course Title: Software Project Management
Course Code: MCA218

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1. Identify the different project contexts and suggest an appropriate project management strategy.
2. Practice the role of project planning, risks associated in successful software development.
3. Identify and describe the key phases of project monitoring and contracts in management.
4. Learn to apply the concept of project management and planning on organizing a team and people's behavior.

Course Content

UNIT I **10 Hours**

Introduction to Software Project Management: Project Definition, Contract Management, Activities Covered by Software Project Management, Overview of Project Planning, plan methods, methodology.

Project Evaluation: Strategic Assessment, Technical Assessment, Cost Benefit Analysis, Cash Flow Forecasting, Cost Benefit Evaluation Techniques, Risk Evaluation, selection of project approach: discussion on models, choice of process models.

UNIT II **12 Hours**

Activity Planning: Objectives, Project Schedule, Sequencing and Scheduling Activities, Network Planning Models, Forward Pass, Backward Pass, Activity Float, Shortening Project Duration, Activity on Arrow Networks,

Risk Management: Nature of Risk, Types of Risk, Managing Risk, Hazard Identification, Hazard Analysis, Risk Planning and Control.

UNIT III **11 Hours**

Monitoring and Control: Creating Framework, Collecting the Data, Visualizing Progress, Cost Monitoring, Earned Value analysis, Prioritizing Monitoring, Getting Project Back to Target, and Change Control.

Managing Contracts: Introduction, Types of Contract, Stages in Contract Placement, Typical Terms of a Contract, Contract Management, Acceptance.

Resource allocation: introduction and nature of resources, identification of resource requirements, scheduling, creating critical path, cost schedule, counting cost.

UNIT IV **12 Hours**

Effort estimation: basics of software estimation, techniques, COCOMO-II, cost, staffing pattern.

Managing People and Organizing Teams: Introduction, Understanding Behavior, Organizational Behavior: Background, Selecting The Right Person For The Job, Instruction In The Best Methods, Motivation , The Oldman, Hackman Job Characteristics Model, Working In Groups, Becoming A Team, Decision Making, Leadership, Organizational Structures, Stress, Health And Safety

Transactional modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning.

Suggested Readings

- *Bob Hughes, Mike Cotterell, Software Project Management, Tata McGraw Hill Publishing*
- *Ramesh, Gopalaswamy, Managing Global Projects, Tata McGraw Hill Publishing*
- *Royce, Software Project Management, Pearson Education Publishing*
- *Jalote, Software Project Management in Practice, Pearson Education Publishing*

Web Sources

- *https://www.tutorialspoint.com/software_engineering/software_project_management.htm*
- *https://www.wrike.com/project-management-guide/faq/what-is-effort-estimation/*
- *https://www.javatpoint.com/software-project-management-activities*

Course Title: Mobile Application Development
Course Code: MCA219

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1. Identify the various concepts of mobile programming that make it unique from programming for other platforms.
2. Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces.
3. Program mobile applications for the Android operating system that use basic and advanced phone features.
4. Deploy applications to the Android marketplace for distribution.

Course Contents

UNIT I **10 Hours**

Mobile Application Development - Mobile Applications and Device Platforms - Alternatives for Building Mobile Apps -Comparing Native vs. Hybrid Applications -The Mobile Application Development Lifecycle-The Mobile Application Front-End-The Mobile Application Back-End Key Mobile Application Services-What is Android-Android version history-Obtaining the Required Tools- Launching Your First Android Application-Exploring the IDE-Debugging Your Application-Publishing Your Application

UNIT II **13 Hours**

Understanding Activities-Linking Activities Using Intents-Fragments-Displaying Notifications Understanding the Components of a Screen-Adapting to Display Orientation-Managing Changes to Screen Orientation-Utilizing the Action Bar-Creating the User Interface Programmatically Listening for UI Notifications

UNIT III **12 Hours**

Using Basic Views-Using Picker Views -Using List Views to Display Long Lists-Understanding Specialized Fragments - Using Image Views to Display Pictures -Using Menus with Views Using Web View- Saving and Loading User Preferences-Persisting Data to Files-Creating and Using Databases.

UNIT IV **10 Hours**

Sharing Data in Android-Creating Your Own Content Providers -Using the Content Provider SMS Messaging -Sending Email-Displaying Maps- Getting Location Data- Monitoring a Location.

Consuming Web Services Using HTTP-Consuming JSON Services- Creating Your Own Services - Binding Activities to Services -Understanding Threading.

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Steele, J., To, N., & Conder, S. (2011). The Android Developer's Collection (Collection). Addison-Wesley Professional.*
- *Meier, R. (2012). Professional Android 4 application development. John Wiley & Sons.*
- *Burd, B. (2015). Android application development all-in-one for dummies. John Wiley & Sons.*
- *Charland, A., &Leroux, B. (2011). Mobile application development: web vs. native. Communications of the ACM, 54(5), 49-53.*

Web Sources

- *https://www.tutorialspoint.com/android/index.htm*
- *https://developer.android.com/guide*
- *https://www.solutionanalysts.com/blog/5-essential-material-design-guidelines-for-android-app-development/*
- *https://developer.android.com/reference*

Course Title: Advanced Web Technologies
Course Code: MCA220

L	T	P	Credits
3	0	0	3

Total Hours: 45

Learning Outcomes After completion of this course, the learner will be able to:

1. Understand the concepts of WWW, HTTP protocol and client-server architecture.
2. Analyze the usage of HTML, CSS, JAVA and ASP.NET for web portals.
3. Ability to enhance SQL Data Control.
4. Design a web portal by using HTML, CSS, JAVA,ASP.NET and JavaScript.

Course Contents

UNIT I **10 Hours**

Fundamentals of Web Development: Introduction to HTML, CSS, JAVA SCRIPT (Client side scripting), Server Site Development using PHP and ASP.NET.

Standard Controls: Display information, accepting user input, submitting form data, displaying images, using the panel control, using the hyperlink control.

UNIT II **12 Hours**

Validation Controls: Using the required field validator control, using the range validator control, using the compare validator control, using the regular expression validator control, using the custom validator control, using the validation summary controls.

Rich Controls: Accepting file uploads, displaying a calendar, displaying advertisement, displaying different page views, displaying a wizard. Designing Website with Master Pages: Creating master pages, Modifying master page content, and Loading master page dynamically.

UNIT III **12 Hours**

SQL Data Source Control: Creating database connections, executing database commands, Using ASP.NET parameters with the SQL data source controls, programmatically executing SQL data source commands, Caching database data with the SQL data Source controls. List Controls: Dropdown list control, Radio button list controls, list box controls, bulleted list controls, custom list controls.

Grid View Controls: Grid view control fundamentals, using field with the grid view control, working with grid view control events extending the grid view control

UNIT IV **11 Hours**

Building Data Access Components with ADO.NET: Connected the data access, disconnected data access, executing synchronous database commands, Building database objects with the .NET framework. Maintaining Application State: Using browser cookies, using session state,

using profiles. Caching Application Pages and Data: page output caching, partial page caching, data source caching, data caching, SQL cache dependencies.

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Duckett, J. (2014). Web design with HTML, CSS, JavaScript and jQuery set (Vol. 1). IN: Wiley.*
- *Flanagan, D., & Novak, G. M. (1998). Java-Script: The Definitive Guide.*
- *Nixon, R. (2014). Learning PHP, MySQL & JavaScript: with jQuery, CSS & HTML5. "O'Reilly Media, Inc.".*

Web Sources

- *https://www.geeksforgeeks.org/web-technology/*
- *https://learn.microsoft.com/en-us/previous versions/aspnet/vms227679(v=vs.100)*
- *https://www.tutorialspoint.com/asp.net/asp.net_data_sources.htm*
- *https://www.tutorialspoint.com/asp.net/asp.net_ado_net.htm*

Course Title: Communication Skills
Course Code: MCA221

L	T	P	Credits
2	0	0	2

Total Hours: 30

Learning Outcomes After completion of this course, the learner will be able to:

1. Understand the basic grammar, sentence construction and vocabulary.
2. apply comprehension and writing skills.
3. Improve vocabulary sought through mind and word games.
4. develop a consulting dictionary for usage of words, correct spellings and pronunciation.
5. To enhance confidence in public speaking

Course Contents

UNIT I **8 Hours**

Communication: Concepts and definition - Importance - Process-communication - Model - Types - Mode of communication - Objectives - Inter, Intra personal Communication - Barriers - Commandments of communication.

Developing Communication Skills: a) Reading: Preparation - Reading Styles -Linear reading - Faster Reading - Reading Techniques b) Writing: Effective writing – Report writing - Speech Writing - Minutes - Communication aids - Agenda Writing - Letters – Article writing - Improving English language Writing - When to write and when not to write.

Listening and Speaking: a) Listening: Listening - Importance - Art of Listening -Advantages - Mode of expression - Listening tests b) Speaking: Art of conversation – Using telephone - Methods of asking questions - Brainstorming - Presenting reports –Improving speech delivery - Expressing Techniques

UNIT II

7 Hours

Interview Techniques: What and Why? - Types of Interviews – Understanding the intricacies - Planning for interviews - Answering skills – Effective Communication during interviews - TIPS - Mock Interview.

Group Discussion: Group Discussion - Purpose - Process of Group Discussion -Preparation - Getting Started - Art of guiding and controlling discussion - Personality test through group discussion - Lateral thinking - Participation techniques - mock G.D.

UNIT III

7 Hours

Body Language: Origin and development of body language - Tool for personality identification - Analysis of body language - Types - Desirable body language - Attitude and body language - Body language as a powerful communication.

Negotiation Techniques: Meaning - Importance - Fundamentals - Preparation -Techniques of Negotiation - Managing process of negotiation.

UNIT IV

8 Hours

Presentation: Meaning and types of presentation - Understanding the audience -Planning - Designing - Written and oral - Making use of notes and outlines _ Techniques for delivering presentation - personal style - A postscript - model presentation.

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Simon Sweeney, "English for Communication", 2nd Edition, CUP, 2003.*
- *Leo Jones and Richard Alexander, "New International Business English", CUP, 2000.*
- *Essentials of Business Communication, Rajendra Pal. JS Korlahalli.*

Web Sources

- *https://haiilo.com/blog/top-5-communication-skills-and-how-to-improve-them/*
  https://corporatefinanceinstitute.com/resources/management/communication/
- *https://www.thebalancemoney.com/communication-skills-list-2063779*
- *https://www.skillsyouneed.com/ips/communication-skills.html*

Semester-III

Course Title: Research Methodology
Course Code: MCA312

L	T	P	Credits
4	0	0	4

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Understand key research methodology concepts and issues
2. Identify the role and importance of research in the Computer Applications
3. Identify the concepts and procedures of sampling, data collection, analysis and reporting.
4. Analyze appropriate research problem and parameters
5. Implement the basic concepts of research and its methodologies

Course Contents

UNIT I **15 Hours**

Research: its concept, nature, scope, need and Objectives of Research, Research types, Research methodology, Research process – Flow chart, description of various steps, Selection of research problem.

UNIT II **15 Hours**

Research Design: Meaning, Objectives and Strategies of research, different research designs, important experimental designs,

Methods of Data Collection and Presentation: Types of data collection and classification, Observation method, Interview Method, Collection of data through Questionnaires, Schedules, data analysis and interpretation, editing, coding, content analysis and tabulation

UNIT III **15 Hours**

Sampling Methods:

Different methods of Sampling: Probability Sampling methods, Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling and Multistage Sampling. Non probability Sampling methods, Sample size.

UNIT IV **15 Hours**

Report writing and Presentation: Types of reports, Report Format – Cover page, Introductory page, Text, Bibliography, Appendices, Typing instructions, Oral Presentation

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Panneerselvam, R, Research Methodology, PHI, New Delhi.*
- *Cooper, D.R.,Schindler,P.S., Business Research Methods, Tata McGraw Hill*
- *Gupta S P,Statistical Methods, Sultan Chand & Sons, Delhi*
- *Ronald E Walpole, Probability and Statistics for Engineers and Scientists (International Edition), Pearson Education.*
- *Geode, Millian J. & Paul K. Hatl, Methods in Research, McGraw Hills, New Delhi*
- *Kothari C.R., Research Methodology, New Age Publisher*
- *Sekran, Uma, Business Research Method, Miley Education, Singapore*

Web Sources

- *https://www.academia.edu/*
- *https://www.studeersnel.nl*
- *https://www.scribd.com*

Course Title: Research Proposal

Course Code: MCA398

L	T	P	Credits
0	0	8	4

Learning Outcomes

After completion of the course, the learner willbe able to

1. Get deep insights to collect, review and analyze the related literature.
2. To apply the knowledge to formulate hypothesis & design research process.
3. Find the research titles which are significant, applicable and researchable.
4. Interpret the findings to design statistical strategies & write references, bibliography and webliography.

Course Content

A research proposal contains all the key elements involved in the research process and proposes a detailed information to conduct the research.
The students are supposed to prepare the research proposal of any research area of their choice following these steps:

1. Selection of topic
2. Significance of the research area
3. Formulation of hypothesis/Research questions
4. Review of related literature
5. Method & Procedure (Includes sampling & design)
6. Data collection and proposed statistical analysis
7. Delimitations
8. Reference/Bibliography

Evaluation

The students will have to complete the writing process of each topic given above within one week, which will be evaluated at the end of every week. It will consist of 8 marks each. The final proposal shall be of 15 marks, Viva 16 marks and attendance 5 marks.

Transaction Mode

Collaborative learning, Group Discussion, E team Teaching, Activities, Assessments, Collaborative teaching, Peer Teaching, Video Based Teaching, Quiz, Open talk, E team Teaching, Case analysis, Flipped Teaching

Course Title: Ethics & IPR
Course Code: MCA314

L	T	P	Credits
2	0	0	2

Total Hours: 30

Learning Outcomes After completion of this course, the learner will be able to:

1. Understand the ethics in research, scientific conduct and Plagiarism.
2. Implement the Best Practices and Publication Ethics in Computer Science.
3. Apply various Open Access Publications Initiatives and Identify the Predatory Journals using various Software tools.
4. Understand Citation Databases, Impact Factors, Research Metrics.
5. identify the Conflicts of interest and file Complaints and appeals against plagiarized contents.

Course Contents

UNIT I **15 Hours**

Ethics: definition, moral philosophy, nature of moral judgements and reactions, scope, Ethics with respect to science and research, Intellectual honesty and research integrity Scientific.

Misconducts: Falsification, Fabrication, and Plagiarism (FFP) Redundant publications: duplicate and overlapping publications, salami slicing, Selective reporting and misrepresentation of data,

Publication ethics: definition, introduction and importance

UNIT II **15 Hours**

Introduction to Intellectual Property rights: Concept & theories, Kinds of intellectual Property Rights, Advantages & Disadvantages of IPR, Development of IPR in India, Role & Liabilities of IPRs in India. Rights of trademark-kind of signs used as trademark-types, purpose & functions of a trademark, trademark protection, trademark registration, selecting and evaluating trade mark, trade mark registration process.

Transactional Modes

Lecture Method, E-Team Teaching, Video based learning, Demonstration, Peer Discussion, Open talk, Cooperative Teaching, Flipped Teaching, Collaborative Learning**.**

Suggested Readings

- *Muralidhar Kambadur, Ghosh Amit, Singhvi Ashok Kumar. (2019). ETHICS in Science Education Research and Governance, Indian National Science Academy New Delhi, India*
- *Gupta Sudhir, Kamboj Sushil.(2020). Research and Publication Ethics. Alexis Press LLC.*
- *Paul Oliver.(2010). The Student's Guide to Research Ethics, Open University Press.*

Web Sources

- *https://en.wikipedia.org/wiki/Ethics*
- *https://psychologydictionary.org/publication-ethics/*
- *https://blog.ipleaders.in/ipr-description/*

Course Title: PROFICENCY IN TEACHING

Course Code: MCA397

L	T	P	Credits
2	0	0	2

Total Hours: 30

Learning Outcomes

After completion of this course, the learner will be able to:

1. Design the learner-centered instructional plans and learning outcomes.
2. Apply innovative teaching strategies and technologies to engage learners.
3. Analyze the different assessment methods to evaluate student learning.
4. Reflect on teaching experiences and continuously improve teaching practices.
5. Develop effective communication and classroom management skills.

Course content

UNIT I **10 Hours**

Overview of the course and its objectives – Specify 1-2 theories or give overview of theories of learning for teaching - Understanding the role of the teacher and student in the learning process - Writing clear and measurable learning outcomes -

Meaning Nature, definition, scope, and importance Pedagogy, Andragogy, and Heutagogy – Skills-based approach to teaching (Teaching skills), Micro-teaching, Macro teaching. Methods and approaches of teaching - CAM, Structure-function approach, Synthetic and Analytic approach, Jurisprudential inquiry model

UNIT II **6 Hours**

Understanding the diverse needs and backgrounds of learners - Creating an inclusive and supportive learning environment - Facilitating active learning and student engagement strategies

Lectures, discussions, and demonstrations - Group work, collaborative learning, and cooperative learning - Problem-based learning, case studies, and simulations

UNIT III **7 Hours**

Integrating technology tools into instruction – Online, blended learning, flipped learning, and M-learning approaches - Using educational software and platforms effectively

Formative and summative assessment methods – Difference between Assessment, Evaluation and Measurement, E-assessment tools,

UNIT IV **7 Hours**

The importance of reflective practice in teaching - Self-assessment and evaluation of teaching effectiveness –Need for Professional development - Teaching in multicultural and international classrooms - Culturally responsive teaching practices

Meaning, Definition of teaching model - Assumptions, Importance, Role, and type of teaching models. Historical teaching model, Philosophical model of teaching

Transaction Mode

Discussions, Case Studies, Microteaching, Classroom Observations, Peer Teaching: Video Analysis, Role-Playing, Lecture-cum-demonstration, Classroom Simulations, Reflective Journals/Blogs, Teaching Portfolios and Technology Integration, Flipped Teaching

Suggested Readings

- *Ali, L. (2012). Teacher education. New Delhi: APH Publishing Corporation.*
- *Anandan, K. (2010). Instructional technology in teacher education. New Delhi: APH Publishing Corporation.*
- *Bruce R Joyce and Marsha Weil, Models of Teaching, Prentice Hall of India Pvt Ltd, 1985.*
- *Chalan, K. S. (2007). Introduction to educational planning and management. New Delhi: Anmol Publications Pvt. Ltd.*
- *Chand, T. (2008). Principles of teaching. New Delhi: Anmol Publications Pvt. Ltd.*
- *Chiniwar, P. S. (2014). The technology of teaching. New Delhi: Anmol Publications Pvt. Ltd.*
- *Curzon, L. B., & Tummons, J. (2004). Teaching in future education. U.S.A: Bloomsbury Academic Publications.*
- *Das, R.C. (1993): Educational Technology – A Basic Text, Sterling Publishers Pvt. Ltd.*
- *Evaut, M. The International Encyclopedia of Educational Technology.*
- *Gage N L, Handbook of Research on Teaching, Rand Mc Nally and Co., Chicago, 1968.*
- *Graeme, K. (1969): Blackboard to Computers: A Guide to Educational Aids, London, Ward Lock.*
- *Haas, K.B. and Packer, H.Q. (1990): Preparation and Use of Audio Visual Aids, 3rd Edition, Prentice Hall, Inc.*
- *Haseen Taj (2006):modern Educational Technology, Agra: H.P Bhargava Book House.*
- *Jarvis, M. (2015). Brilliant ideas for ICT in the classroom. New York: Routledge Publications.*

Course Title: Computer Lab
Course Code: MCA316

L	T	P	Credits
0	0	4	2

Total Hours: 60

Learning Outcomes After completion of this course, the learner will be able to:

1. Understand generating charts and graphs in Microsoft Excel.
2. Understand the need and use of using Excel templates.
3. Utilize the MS PowerPoint with custom animation and slide orientation.
4. Demonstrate the mechanics and uses of Word tables to organize and present data.

Course Contents

UNIT I

Generating Charts/Graphs in Microsoft Excel, PowerPoint Presentation, creating a new document with templates & Wizard, Word basics, Thesis Writing Formats & Scientific editing tools. Style Formats (MLA & APA)

UNIT II

Using Words Drawing Features, Inserting Tables – (Adding, deleting, modifying rows and columns - merging & splitting cells), Using formulas in tables, Converting text to table and vice-versa, Mail Merge tool. Managing Workbooks, Working with Worksheets

Suggested Readings

- *Leon & Leon, "Introduction to Computers", Vikas Publishing House, New Delhi*
- *Saxena S., "MS Office Xp for Everyone", Vikas Publishing House, New Delhi, 2007*
- *June Jamrich Parsons, "Computer Concepts", Thomson Learning, 7th Edition, Bombay*
- *Reference Books:*
- *White, "Data Communications & Computer Network", Thomson Learning, Bombay*
- *Comer, "Computer networks and Internet", Pearson Education, 4e*

Web Sources

- *https://www.researchgate.net*
- *https://www.youtube.com/playlist?list=PLWPirh4EWFpF_2T13UeEgZWZHc8nHBuXp*

Course Title: Service Learning
Course Code: MCA396

L	T	P	Cr.
0	0	4	2

Learning Outcomes

On the completion of the course, the students will be able to

1. Participate in community activities to establish connections and build relationships.
2. Evaluate community needs through conversations with community members.
3. Develop and implement initiatives that address community needs.
4. Reflect on personal growth, community impact and ethical considerations related to service activities.

Course Content

This course aims to engross students in meaningful service-learning activities that foster community linking. Students will actively participate in community-based projects, collaborate with community members and organizations and reflect on the impact of their service activities. Through this experiential learning approach, students will develop a deep understanding of community needs, build relationships with diverse stakeholders and contribute to community development.

In this course, students are expected to be present in the community throughout the semester and reflect on their experiences regularly after working with them. The students will use experiential learning for providing service learning. They will be able to analyse and have understanding of the key theoretical, methodological and applied issues.

Select 10 community related activities which are to be performed in nearby villages. Students in groups of 8-10 shall work on one activity.

Evaluation Criteria

1. Every activity shall be evaluated on the same day out of 10 marks.
2. Total 10 activities out of 100 shall be evaluated and submitted to Examination branch.

Activity Evaluation

1. Type of activity- 2 marks
2. Participation of student- 2 marks
3. Engagement in the activity- 2 marks
4. Outcome of the activities- 2 marks
5. Attendance- 2 marks

Transaction Mode

Problem-solving learning, Blended learning, Gamification, Cooperative learning, Inquiry-based learning, Visualization, Group discussion, Experiential learning, Active participation.

Course Title: Internship Training
Course Code: MCA318