

Post Graduate Department of Computer Sciences,
The University of Kashmir,
Srinagar - 190006



Choice Based Credit System Curriculum for

Master of Computer Applications
(MCA) Programme
2021 – 2023

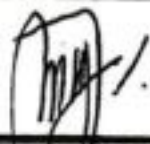
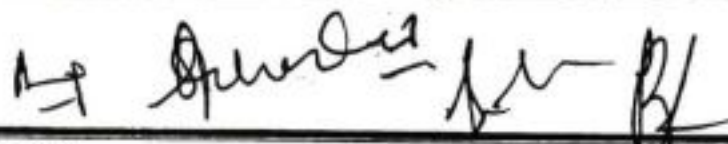
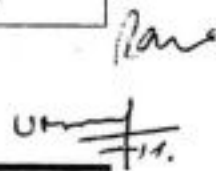
Eligibility for 2-year MCA degree Programme:

“Passed BCA/ Bachelor Degree in Computer Science Engineering or equivalent Degree.

OR

Passed B.Sc./ B.Com./ B.A with Mathematics at 10+2 Level or at Graduation Level(with additional bridge Courses as per the norms of the concerned University).Obtained at least 50% marks (45% marks in case of candidates belonging to reserved category) in the qualifying Examination”

Semester-II						
Subject Code	Subject name	Subject Category	Hours / Week			Credits Units
			L	T	P	
Core Courses (14 Credit Units)						
MCA21201CR	Data Structures using C++	Core	3	0	2	4
MCA21202CR	Python	Core	1	0	2	2
MCA21203CR	Artificial Intelligence	Core	3	0	2	4
MCA21204CR	Software Engineering	Core	3	1	0	4
Discipline Centric Elective Courses (8 Credit Units)						
MCA21205DCE	Web Programming	DCE	3	0	2	4
MCA21206DCE	Cryptography and Network Security	DCE	3	0	2	4
MCA21207DCE	Computer Graphics and Multimedia	DCE	3	0	2	4
OE (2 Credit Units) For Students of Other Departments						
MCA21201OE	Web Designing	OE	2	0	0	2

Semester - II

Subject Code: MCA21201CR
Subject Name: Data Structures using C++

Unit I [10 L]

Data types/objects/structures, Data structures and its types, Representation and implementation. Linear Data Structures: Array representation, operations, applications and limitations of linear arrays, 2-dimensional arrays, matrices, common operations of matrices, special matrices, array representation of Sparse matrices[4L].

Linked Lists: Representation of Linear Linked List, Operations like creating , search an element inserting an element, deleting an element, reversing a list, merging two list, Deleting entire list. Linked list application, Polynomial Manipulation, Representing Sparse Matrices[6L]

Unit II [10 L]

Stack, Representation of stack in memory, Operations on Stacks, Implementation of Stack using arrays and linked list, Multiple Stacks: Representing two stacks and more than two stacks, Applications of stacks: Parenthesis Checker, Infix to postfix procedure, Evaluating expressions in postfix notation, Sparse Matrix Representation. Implementation of recursion using stack [5L] Queues, Representation of Queue in Memory, Operations on Queue, Implementation of Queue using arrays and linked list, Circular Queue and its operations, Representation and implementation, Multiple Queues, DEQUE, Priority Queue, ,Linked Queue, Multiple Priority queue, Heap Representation of a Priority Queue, Applications of Queues.[5L]

Unit III [10 L]

Trees, Definitions, terminologies and properties ,Binary tree representation ,traversals and applications, Threaded binary trees, Binary Search Trees, AVL Trees, M-way Search Trees, B-trees, B*-trees[6L]. Graphs, Terminology, Graph representations, Traversal Techniques, Operations on Graphs, Applications of Graphs[4L]

Unit IV [10 L]

Minimum spanning trees, Shortest Path Algorithms in Graphs, Eulerian Tour, Hamiltonian Tour Direct Address Tables, Hash Table, Different Hash functions, resolving collisions, rehashing, Heap Structures, Binomial Heaps, Leftist Heaps.[6L].

File Organizations: Sequential File Organization, Relative File Organization, Indexed Sequential File Organization, Multiple Key File Organizations: Inverted File and Multi-List Organizations[4L]

Text book:

1. SartajSahni, “Fundamentals of Data Structures in C++”, Galgotia Pub

References:

1 Heileman:data structure algorithms&Oop Tata McGraw Hill

2 Data Structures Using C – M.Radhakrishnan and V.Srinivasan, ISTE/EXCEL BOOKS

3 Weiss Mark Allen, “Algorithms, Data Structures, and Problem Solving with C++”, Addison Wesley.

4 Data Structures and Algorithms – O.G. Kakde& U.A. Deshpandey, ISTE/EXCEL BOOKS

5 Aho Alfred V., Hopperoft John E., UllmanJeffreyD., “Data Structures and Algorithms”, Addison Wesley

6 Drozdek- Data Structures and Algorithms,Vikas

7 Tancnbaum A. S. , “Data Structures using ‘C’ ”

Subject Name: Data Structures in C++ Lab

UNIT I

Lab Sheet 1:

- Q1. Write a program in C++ to insert, delete and update the contents of an array. Q2. Write a program in C++ to perform various operations on matrices.
Q3. Write a program to multiply two sparse matrices?
Q4. Write a program in C++ to implement different string manipulation operations?

Lab Sheet 2:

- Q1. Write a program to implement singly linked list?
Q2. Write a program to implement different operations like adding a node at beginning, end, center, after a certain element, after a certain count of nodes in a linkedlist.
Q3. Write a program to implement different operations like deleting a node at beginning, end, center, after a certain element, after a certain count of nodes in a linkedlist.
Q4. Write a program in C++ to reverse a linked list by changing the link in the nodes? Q5. Write a program to add two polynomials represented as linked list?

Lab Sheet 3:

- Q1. Write a program in C++ to multiply two polynomials represented as linked lists? Q2. Write a program in C++ to implement a doubly linked list?
Q3 Write a program to implement different operations like adding a node at beginning, end, center, after a certain element, after a certain count of nodes in a doubly linkedlist.
Q4. Write a program to implement different operations like deleting a node at beginning, end, center, after a certain element, after a certain count of nodes in a doubly linkedlist.
Q5 Write a program to implement different operations of a circular linked list

UNIT II

Lab Sheet 1:

- Q1. Write a program to implement various operations on an array based stack?
Q2. Write a program to implement various operations on an stack represented using linked list. Q3. Write a program to demonstrate the use of stack in checking whether the arithmetic expression is properly parenthesized?
Q4. Write a program to demonstrate the use of stack in converting an arithmetic expression from infix to postfix?
Q5. Write a program to demonstrate the use of stack in evaluating an arithmetic expression in postfix notation?

Lab Sheet 2:

- Q1. Write a program to demonstrate the use of stack in implementing quicksort algorithm to sort an array of integers in ascending order?
Q2. Write a program to demonstrate the implementation of various operations on a linear queue represented using a linear array.

Q3. Write a program to demonstrate the implementation of various operations on a Circular queue represented using a linear array.

Lab Sheet 3:

Q1. Write a program to demonstrate the implementation of various operations on a queue represented using a linked list?

Q2. Write a program to demonstrate the use of multiple stacks?

UNIT III

Lab Sheet 1:

Q1. Write a program in C++ to create a binary tree?

Q2. Write a program to implement the traversal techniques of a binary tree?

Lab Sheet 2:

Q1. Write a program to delete a node in a binary search tree?

Q2. Write a program to implement the different operations of an AVL tree?

Q3. Write a program to implement the different operations of a threaded binary tree. Q4.

Write a program to implement the different operations of a M-way search tree?

Lab Sheet 3:

Q1. Write a program to implement the different operations of a B- tree?

Q2. Write a program in C++ to implement the different operations of a B+tree? Q3.

Write a program in C++ to implement the different operations of a B* tree? Q4. Write a program in C++ to Multi-dimensional binary searchtrees.

Q5. Write a program in C++ to implement the graph using different representations?

Q6. Write a C++ program to illustrate the traversal of a graph using Breadth FirstSearch? Q7.

Write a C++ program to illustrate the traversal of a graph using Depth FirstSearch?

UNIT IV

Lab Sheet 1:

Q1. Write a program in C++ to find the edges of a spanning tree using Prims Algorithm?

Q2. Write a program in C++ to find the shortest path in a graph using Warshalls Algorithm.

Q3. Write a C++ program to in C++ to find the shortest path in a graph using Modified Warshalls Algorithm.

Q4. Write a C++ program to in C++ to find the shortest path in a graph using Dijkstra's Algorithm.

Q5. Write a C++ program in C++ to implement Euler Graphs?

Lab Sheet 2:

Q1. Write a program in C++ to implement Hamilton Graphs? Q2. Write a program in C++ to implement Planner Graphs?

Q3. Write a program to C++ to implement Kruskals Algorithm? Q4. Write a program to C++ to find the cycles in a graph?

Lab Sheet 3:

Q1. Write a C++ program to implement various hashing techniques? Q2. Write a C++ program to demonstrate the concept of rehashing? Q3. Write a C++ program to create Max and Min heaps?

Q4. Write a C++ program to create Binomial and Leftist heaps?

Subject Code: MCA21202CR
Subject Name: Python

Unit I

Understanding Python variables, Python basic Operators, python blocks , Data Types, Declaring and using Numeric data types: int, float, complex Using string data type and string operations[4L]

Defining list and list slicing Use of Tuple data type: Python Program Flow Control Conditional blocks using if, else and elif Simple for loops in python, For loop using ranges[4L]

String, list and dictionaries Use of while loops in python Loop manipulation using pass, continue, break and else Programming using Python conditional and loops block [4L]

Unit II

Python Functions, Modules And Packages, Organizing python codes using functions[4L]

Organizing python projects into modules, Importing own module as well as external modules[4L]

Understanding Packages Powerful Lamda function in python, Programming using functions, modules and external packages, Python String, List And Dictionary Manipulations. [4L]

Textbook

- Kenneth A. Lambert, The Fundamentals of Python: First Programs, Cengage Learning, ISBN: 978-1111822705.

Reference Books:

1. David Beazley , Brian K. Jones "Python Cookbook", 3rd Edition. O'Reilly Publications
2. Jake VanderPlas "Python Data Science Handbook" O'Reilly Publications
3. David Beazley, "Python Essential Reference (4th Edition)" Addison Wesley
4. Vernon L. Ceder," The Quick Python Book, Second Edition", Manning Publications
5. Brett Slatkin , "Effective Python"

Subject Code: MCA21203CR
Subject Name: Artificial Intelligence

Unit I [10L]

Introduction and historical perspective, Turing Test.
Expert Systems, Forward chaining, backward chaining, Conflict Resolution. [4L]
Agents: Intelligent agents, Agents and Environment, Structure of Agents [3L]
Knowledge Representation: Propositional Logic, First Order Logic, Inference in First Order Logic,
Propositional Versus First Order Logic [3L]

Unit II [10 L]

Fuzzy Logic, Fuzzification, Fuzzy Sets, Operations on Fuzzy Sets, Hedges, Reasoning in Fuzzy Logic-
Mamdani Inference [5L]
Search Algorithms – Local search algorithms: Gradient ascent, Simulated Annealing, Genetic
Algorithm [5L]

Unit III [10 L]

Inductive Learning: Inductive learning algorithms. Categories of inductive learning algorithms.
Rule extraction with inductive learning algorithms, Decision trees, ID3 algorithm. AQ algorithm,
SAFARI algorithm [5L]
Applications of Inductive Learning [3L]
Machine Learning: Supervised, Unsupervised and Reinforcement Learning [2L]

Unit IV [10 L]

Neural Networks: Neuron as a basic building element of an ANN. Activation functions, Perceptron.
Learning with a perceptron. Limitations of a perceptron. [3L]
Multilayer Neural Networks, Training by Error Back Propagation [3L]
Self Organising Nets, Kohonen Self-Organising Net [2L]
Convolutional Neural Networks [2L]

Text Book:

Artificial Intelligence – A Modern Approach, Stuart Russel, Peter Norvig, PHI/Pearson Education.

References:

Machine Learning by Tom M. Mitchel, McGraw-Hill publication
Introduction to Machine Learning by EthemAlpaydin, The MIT Press.
Artificial Intelligence and Expert Systems by Patterson PHI
Advances in Deep Learning by M. Arif Wani, Springer

Course Name: Artificial Intelligence Lab

Unit I

Lab Sheet 1

1. Build an expert system and demonstrate forward chaining inferencing.

Lab Sheet 2

1. Build an expert system and demonstrate backward chaining inferencing.

Lab Sheet 3

1. Build an expert system and demonstrate conflict resolution process.

Unit II

Lab Sheet 1

1. Build a Fuzzy inference system for the Tipping Problem

Lab Sheet 2

1. Using Fuzzy Logic solve the following Tipping problem:

Given two sets of numbers between 0 and 5 (where 0 is for very poor, and 5 for excellent) that respectively represent quality of service and quality of food at restaurant, what should tip be?

Lab Sheet 3

1. Solve 2-input 1-output project risk prediction problem using Mamdani Inference. Make necessary assumptions.

Unit III

Lab Sheet 1

1. Create a decision tree for a given dataset using ID3 algorithm

Lab Sheet 2

1. Implement Classification and Regression Tree (CART) algorithm for any relevant dataset.

Lab Sheet 3

1. Demonstrate inductive learning on any application of your choice.

Unit IV

Lab Sheet 1

1. Implement single layer perceptron.

Lab Sheet 2

- 1 Demonstrate Neural Networks using different activation functions

Lab Sheet 3

1. Implement Back-propagation Algorithm

Subject Code: MCA21204CR
Subject Name: Software Engineering

UNIT I

Concept and Nature of Software, Software Crisis, Software Engineering – Concept, Goals and Challenges, Software Engineering Approach; [2L]

Software Development Process, Process Models - Waterfall Model, Evolutionary and Throwaway Prototyping Model, Incremental and Iterative Models, Spiral Model, Agile Process Model, Component based and Aspect Oriented development. [4L]

Software Process and Project Measurement: Measures, Metrics and Indicators, Size -Oriented Metrics vs. Function - Oriented Metrics, Capability Maturity Model Integration (CMMI). COCOMO Model. [4L]

UNIT II

Introduction to Requirements Engineering - Why, What and Where. Requirements Types: functional and nonfunctional requirements. [3L]

Requirement Engineering Framework. Requirement Elicitation Process and Techniques. Requirement Analysis and Modelling, Requirements prioritization, verification, and validation. [7L]

UNIT III

Basics of Design Engineering - Abstraction, Architecture, Patterns, Separation of concerns, Modularity, Functional Independence, refinement, Refactoring. [2L]

Function oriented design, Design principles, Coupling and Cohesion, Design Notations & Specifications, Structured Design Methodology. [4L]

Object-Oriented Design - Design Concepts, Design Methodology, Object-oriented analysis and design modeling using Unified Modeling Language (UML), Dynamic & Functional Modeling, Design Verification. [4L]

UNIT IV

Software Testing – Concepts, Terminology, Testing & Debugging, Adequacy Criteria, Static vs. Dynamic Testing, Black Box vs. White Box Testing. Structural testing and its techniques. Functional Testing and its techniques, Mutation testing, Random Testing. Non-Functional Testing like Reliability, Usability, Performance and Security Testing. [6L]

Introduction to Software Reliability: Basic Concepts, Correctness Vs Reliability, Software Reliability metrics, Operational Profile, Reliability Estimation and Predication, Reliability and Testing. [3L]

Concept of Software reengineering, reverse engineering and change management. [1L]

Text Book:

1. Pfleeger and Atlee, Software Engineering: Theory and Practice, 4th Edition, Pearson, 2010.

Reference Books:

2. Sommerville, Ian - Software Engineering. Pearson , 9/e , 2011.
3. Pankaj Jalote - An Integrated approach to Software Engineering, Narosa Publication.
4. Software Engineering: Principles and practice, 3rd Edition, Hans Van Vliet, Wiley.
5. James F. Peters Software Engineering – An Engineering Approach, Wiley& Sons.
6. Roger Pressman, Software Engineering: A Practitioners Approach”, McGraw-Hill Publications.

Tutorials for MCA21204CR (Software Engineering)

UNIT I

Tutorial #1

- How is Software Engineering different from other Engineering fields?
- Study and compare different software process models
- Identify the suitable applications for the individual process model.

Tutorial #2

- Calculate the function points for the following data. The total CAV is 36.

Number of user inputs=15	- Simple:- 5, Average:- 7, Complex:- 3
Number of user outputs=14	- Simple:- 5, Average:- 5, Complex:-4
Number of user inquiries=8	- Simple:- 2, Average:- 3, Complex:- 3
Number of files =6	- Simple:- 3, Average:- 1, Complex:- 2
Number of external interfaces=13	- Simple:- 4, Average:- 7, Complex:- 2

- Based on the result calculate the various metrics like productivity, Quality, Cost, Documentation.

Tutorial #3

- Calculate the effort, duration and average persons required for basic CoCoMo model for 70000 LOC assuming project type is semi-detached.
- Calculate the effort, duration and average persons required for intermediate CoCoMo model for 50000 LOC assuming project type is organic and EAF is 2.92.
- Calculate the effort, duration and average persons required in basic CoCoMo model for organic project type given that total FP is 651 and the 1 FP=2500 LOC

UNIT II

Tutorial #1

- Identify the different requirements of the application for application like Library Management System.
- Identify the different requirements of the application for application like University System.

Tutorial #2

- Classify the requirements into functional and non-functional requirements for Library Mgmt. System.
- Classify the requirements into functional and non-functional requirements for University System.

Tutorial #3

- Prepare a requirement document (SRS) for the same as per the IEEE standard for Library Mgmt. System.
- Prepare a requirement document (SRS) for the same as per the IEEE standard for university System.

UNIT III

Tutorial #1

Which of the following design principle(s) have been violated in the following scenarios?

- Abstraction
- Decomposition and Modularization
- Coupling & Cohesion
- Encapsulation
- Sufficiency, Completeness and Primitiveness

f) All

- i. An algorithm documented as part of design is not understandable by the programmers
- ii. Important information of a module is directly accessible by other modules.
- iii. Too many global variables in the program after implementing design.
- iv. Unfulfilled requirements in the code after the design has been implemented.
- v. Code breaks in unexpected places.
- vi. All data of all classes in public.
- vii. Cyclic dependencies among classes
- viii. Huge class doing too many unrelated operations.
- ix. Several unrelated functionalities/tasks are carried out by a single module.

Tutorial #2

Design the system using structured design for Library Management System by using DFD, ER diagrams and structure chart whichever applicable.

- i. Identify various processes, data store, input, output etc. of the system.
- ii. Use processes at various levels to draw the DFDs.
- iii. Identify various modules, input, output etc. of the system
- iv. Use various modules to draw structured charts.

Tutorial #3

Design the system using Object-Oriented design for Library Management System using UML modeling technique appropriately and

- i. Identify various processes, use-cases, actors etc. of the system.
- ii. Identify various elements such as classes, member variables, member functions etc. of the class diagram. Draw the class diagram.
- iii. Identify various elements such as various objects of the object diagram. Draw the object diagram.
- iv. Identify various elements states and their different transition of the state-chart diagram. Draw the state-chart diagram.
- v. Identify various elements such as controller class, objects, boundaries, messages etc. of the sequence diagram. Draw the sequence diagram as per the norms.
- vi. Identify various elements such as for the sequence diagram of the collaboration diagram. Draw the collaboration diagram as per the norms
- vii. Identify various elements such as different activity their boundaries etc. of the activity diagram. Draw the activity diagram.
- viii. Identify various elements of the component diagram such as the various components like client, server, network elements etc. Draw the component diagram.
- ix. Identify various elements such as the hardware components of the deployment diagram. Draw the deployment diagram.

UNIT IV

Tutorial #1

- a. Write test cases for login page of your university admission system.
- b. Write test cases for simple calculator program.
- c. Write test cases for online examination module.

Tutorial #2

Due to surge in online examination requirements, a company is intending to test its software capable of examining 5000 students at a time for MCQs. Indicate the performance testing strategy required to ensure that it is capable of supporting 5000 simultaneous users.

Tutorial #3

- a. Calculate the reliability of the software product using sample data.
- b. Calculate various reliability metrics using sample data and discuss applicability of each metric.

Discipline Centric Elective Courses

Subject Code: MCA21205DCE
Subject Name: Web Programming

Unit I

Adobe Photoshop Environment, Interface tour of Photoshop and Palettes, Color Modes and Resolutions, Using different Photoshop tools. [3L]

Working with Layers Grouping and Smart objects, Image Adjustments, Layer Masking and Layer Clipping, Using Blending Options, Filters, Photoshop actions, Animation tools [3L]

Markup Language, Basic Structure of HTML, Meta Tags, Document Structure Tags, Formatting Tags, Text Level formatting, Block Level formatting, List Tags, Hyperlink tags, Image and Image maps, Table tags, Form Tags, Executable content tags, Tables as a design tool, Forms, Creating Forms.[4L]

Unit II

Style Sheets: Different approaches to style sheets, Using Multiple approaches, Linking to style information in a separate file, Setting up style information. [4L]

Java Script: JavaScript Objects, JavaScript Security, Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, Logical Operators, String Operators, Special Operators, ? (Conditional operator), ,(Comma operator), delete, new, this, void Statements : Break, comment, continue, delete, do ... while, export, for, for... in, function, if... else, import, labelled, return, switch, var, while, with, Core JavaScript (Properties and Methods of Each) : Array, Boolean, Date, Function, Math, Number, Object, String, RegExp Document Object Model, Events and Event Handlers.[6L]

Unit III

PHP, Server-side web scripting, Installing PHP, Adding PHP to How PHP scripts work, Basic PHP syntax PHP data types, PHP Variables, Operators in PHP, Conditional Statements, Loops (If, If else and Switch) [4L]

Strings, Arrays and Array Functions, Numbers, PHP Function: User-Defined Functions, Inbuilt functions, Basic PHP errors / problems, Working with Forms, designing a Form, \$_GET and \$_POST, HTML and PHP code, User Input, Form Validation, Cookies, File uploading, Sessions [6L]

Unit IV

Advanced PHP and MySQL: PHP MySQL Integration, Creating a database connection, Selecting the DB, Basics of SQL, SQL Syntax, CRUD Operations, Inserting data in database, Inserting data with a File [5]

Retrieving data from Database, Retrieving data with specific criteria, Updating records, Searching the records, Alter table structure, Deleting the records Dropping tables. Emailing with PHP. [5]

References:

1. Web Design The complete Reference, Thomas Powell, Tata McGrawHill
2. HTML and XHTML The complete Reference, Thomas Powell, Tata McGrawHill
3. JavaScript 2.0 : The Complete Reference, Second Edition by Thomas Powell and Fritz Schneider
4. PHP: The Complete Reference By Steven Holzner, Tata McGrawHill

Subject Name: Web Programming Lab

Unit I

Week 1:

1. Open any picture and make use of rectangular and elliptical selection tools to select portions of the image and paste it in another image. Also make use of move tools.
2. Make use of the Lasso- and Polygonal Lasso Selection Tools, Copy, Paste Into, Move Tool, Zoom Tool, Quick Select Tool (or Magic Wand Tool), Invert Selection, Copy, Paste Transform tools for editing an image.
3. Edit any image using the following tools, Paint Bucket Tool, Color Picker, Brush Tool.
4. Select an image and make use of Text Tool, Selection Tools, Copy, Paste, Transform, Move Tool, Opacity, Eraser Tool to perform different operations
5. Select any image of your choice and make use of the Brush Tool, Smudge Tool, Dodge Tool, Burn Tool, Layer Styles, Modes, The Shape Tools, the Styles palette.

Week 2

1. Applying different filters on an image and make use of different layers.
2. Create a page banner from scratch using browser-safe colors
3. Make the illusion of an image fitting inside your text using clipping mask.
4. Create an Animation for Rocket Launch and Moving Ball

Week 3

1. Create a html page with demonstrates the use of formatting tags image tags and other basic tags.
2. Create the different types of list, tables in html
3. Create a table with the relevant tags and attributes
4. Create a html form in the table layout covering major form elements

Unit II

Week 4

1. Link an external style sheet with styles for basic tags.
2. Create a CSS code for applying design on the webpage.
3. Using a DIV tag and CSS code design a web page.
4. Create a CSS code and use id and Class identifiers.

Week 5

1. Write a JavaScript program to sum the multiples of 3 and 5 under 1000?
2. Write a JavaScript Code for checking type of triangle where three sides are given.
3. Write a JavaScript code to convert a Decimal Number int Roman Number?
4. Write a JavaScript function to test whether a string ends with a specified string

Week 6

1. Write a JavaScript to check whether a given string is palindrome or not.
2. Write a program using Java Script that checks if two matrices have identical values in all the elements
3. Write a JavaScript program to check a credit card number and validate an email address using JavaScript Regular Expressions?
4. Write a JavaScript program to implement DOM?

Unit -III

Week 7

1. Create a simple HTML form and accept the user name and display the name through PHP echo statement
2. Write a PHP program to remove duplicates from a sorted list.
3. Write a PHP program to compute the sum of the prime numbers less than 100
4. Write a PHP program to print out the sum of pairs of numbers of a given sorted array of positive integers which is equal to a given number?

Week 8

1. Write a program to calculate and print the factorial of a number using a for loop.
2. Write a PHP script using nested for loop that creates a chess board?
3. Write a program that inputs a number from the user and display all armstrong numbers upto the number entered using loops?
4. Write a function to reverse a string.

Week 9

1. Write a PHP code to Validate a form and provide results on the other web page
2. Write a PHP code to implement various string functions used in PHP.
3. Write a PHP code for uploading a file in a specific folder on the server.
4. Write a PHP code to sort an array using any sorting technique?

Week 10

1. Write a PHP script to get time difference in days and years, months, days, hours, minutes, seconds between two dates
2. Write a PHP function to get start and end date of a week (by week number) of a particular year
3. Write a PHP script to generate random 11 characters string of letters and numbers
4. Write a PHP function to create a human-readable random string for a captcha.

Unit - IV

Week 11

1. Write the mysql code to create the database represented by following E-R diagram . Keep all the referential integrity constraints into consideration?
2. Insert the dummy data inside the tables making any assumptions as required if any ?
3. Write a SQL statement to insert records into the table countries to ensure that the country_id column will not contain any duplicate data and this will be automatically incremented and the column country_name will be filled up by 'N/A' if no value assigned for that column.
4. Write a SQL statement to insert rows in the job_history table in which one column job_id is containing those values which are exists in job_id column of jobs table.
5. Write a SQL statement to insert rows into the table employees in which a set of columns department_id and manager_id contains a unique value and that combined values must have exists into the table departments.
6. Write a SQL statement to insert rows into the table employees in which a set of columns department_id and job_id contains the values which must have exists into the table departments and jobs.

Week 12

1. Write a query to display the name (first_name, last_name) and salary for all employees whose salary is not in the range \$10,000 through \$15,000.
2. Write a query to display the name (first_name, last_name) and salary for all employees whose salary is not in the range \$10,000 through \$15,000 and are in department 30 or 100.
3. Write a query to display the first_name of all employees who have both "b" and "c" in their first name.
4. Write a query to get the total salaries payable to employees.
5. Write a query to get the minimum salary from employees table.
6. Write a query to get the maximum salary of an employee working as a Programmer.
7. Write a query to get the average salary and number of employees working the department 90.
8. Write a query to find the name (first_name, last_name) and hire date of the employees who was hired after 'Jones'.
9. Write a query to get the department name and number of employees in the department
10. Write a query to find the employee ID, job title, number of days between ending date and starting date for all jobs in department 90.
11. Write a query to display the department ID and name and first name of manager.
12. Write a query to display the department name, manager name, and city.
13. Write a query to display the job title and average salary of employees.
14. Write a query to display job title, employee name, and the difference between salary of the employee and minimum salary for the job
15. Write a query to get the DATE value from a given day (number in N).
16. Write a query to get the firstname, lastname who joined in the month of June.
17. Write a query to get the years in which more than 10 employees joined.
18. Write a query to get first name of employees who joined in 1987.
19. Write a query to get department name, manager name, and salary of the manager for all managers whose experience is more than 5 years.
20. Write a query to get employee ID, last name, and date of first salary of the employees.
21. Write a query to get first name, hire date and experience of the employees
22. Write a query to get the department ID, year, and number of employees joined.
23. Write a query to update the portion of the phone_number in the employees table, within the phone number the substring '124' will be replaced by '999'.
24. Write a query to get the details of the employees where the length of the first name greater than or equal to 8.
25. Write a query to display the first word from those job titles which contains more than one words
29. Write a query to display the first eight characters of the employees' first names and indicates the amounts of their salaries with '\$' sign. Each '\$' sign signifies a thousand dollars. Sort the data in descending order of salary.
26. Write a query to display the employees with their code, first name, last name and hire date who hired either on seventh day of any month or seventh month in any year

Week 13.

1. Create a PHP-MySQL connection which connects to the hr database using PHP objects ?
2. Create a form to add using sign in and sign out, update and delete employee to the hr database?
3. Create a login, logout for every employee and list all the employee in the database?
4. Write a php script which emails the login details to the new employee along with his salary details fetch from the hr database?
5. Write a php script which demonstrates the use of sessions and cookies which inserting in the database?

Subject Code: MCA21206DCE
Subject Name: Cryptography and Network Security

Unit 1:

Part 1: The OSI Security Architecture, Security Attack – Threats, Vulnerabilities, and Controls, Types of Threats (Attacks) [3L]

Part 2: Security Services – Confidentiality, Integrity, Availability, Authentication, Access Control and Non-repudiation; Security Mechanism. [3L]

Part 3: Introduction to Number Theory: Prime Number Generation and Testing for Primality, Fermat's and Euler's Theorems, Modular Arithmetic, Euclidean and Extended Euclidean Algorithm, Euler's Phi Function. [4L]

Unit 2:

Part 1: Introduction to Cryptology. Types of Encryption Systems – Based on Key, Based on Block; Confusion and Diffusion; One-time pad, Block Ciphers and Data Encryption Standard [4L]

Part 2: Block Cipher Modes of operation, Advanced Encryption Standard. Stream Ciphers, Random Number Generation. Shift Register based stream Ciphers, RC4 [4L]

Part 3: Public-Key Cryptography. RSA Cryptosystem [2L]

Unit 3:

Part 1: Double and Triple Encryption. Key Management, Diffie-Hellman Key Exchange [2L]

Part 2: Digital Signatures, The RSA signature scheme, Hash Functions, The Secure Hash Algorithm SHA-1 [4L]

Part 3: Message Authentication Codes, HMAC and CBC-MAC, Message Digest [4L]

Unit 4:

Part 1: IP Security, Authentication Header, Encapsulating Security Payload, Electronic Mail Security [4L]

Part 2: Network intrusion Detection system using machine learning: Supervised and Unsupervised. General IDS model and Taxonomy. IDS Signatures. [3L]

Part 3: DDoS Attacks. Specification and rate based DDoS. Defending against DoS attacks in scout: signature based solutions. [3L]

References

- Paar, Christof, and Jan Pelzl. *Understanding cryptography: a textbook for students and practitioners*. Springer Science & Business Media, 2009.
- William, S., and Cryptography Stalling. "Network Security, 4/E." Prentice Hall. (2006).
- Forouzan, Behrouz A., and Debdeep Mukhopadhyay. *Cryptography and network security (Sie)*. McGraw-Hill Education, 2011.
- Endorf, C., Schultz E and Mellander J, "Intrusion Detection and prevention". McGraw Hill. 2003

Cryptography and Network Security (LAB)

Unit I

Week 1: Network Troubleshooting commands

- a. Ipconfig, Ping, Traceroute, Netstat
- b. NSLookUp, ARP, Hostname

Week 2: Demonstrate Packet Sniffing and Analysis of Network Traffic

- a. Analyse Network Traffic using Wireshark
- b. Demonstrate the Analysis of Network traffic over HTTP protocol

Week 3: Demonstrate Network Penetration Testing

- a. Demonstrate use of various Network Penetration testing tools
- b. Use Hashcat to crack hashes on passwords.

Unit II

Week 4: Substitution Ciphers

- a. Discuss in detail working of Substitution based cryptographic Primitives
- b. Implement Caesar Cipher Encryption Decryption

Week 5: Polyalphabetic Substitution Ciphers

- a. Demonstrate Symmetric Digraph Substitution
- b. Implement Playfair Cipher and Vigenere Encryption Decryption

Week 6: Transposition Cipher

- a. Demonstrate Transposition ciphers.
- b. Implement Vigenere Cipher and Rail Fence (Row Column Transformation)

Unit III

Week 7: Asymmetric Key Cryptography

- a. Discuss the implementation of Public key Cryptography
- b. Implement RSA Algorithm

Week 8: Symmetric Key Cryptography with Stream Ciphers

- a. Demonstrate working of Stream Ciphers
- b. Implement RC4 Algorithm

Week 9: Symmetric Key Cryptography with Block Ciphers

- a. Discuss in detail the implementation details of Block Ciphers
- b. Implement DES Algorithm

Unit IV

Week 10: Intrusion Detection

- a. Demonstrate Anomaly Detection and its various types
- b. Perform Intrusion Detection System using SNORT

Week 11: IDS using Machine learning Algorithms

- a. Discuss Various classifiers for Intrusion Detection
- b. Implement IDS using Random Forest on NSL KDD DataSet.

Week 12: Network Testing

- a. Discuss Security Auditing and Network Discovery
- b. Implement Vulnerability Scanning using NMAP tool

Software's / Tools Required.

1. Wireshark
2. SNORT
3. Net Stumbler
4. NMAP
5. Python
6. Hashcat
7. Turbo C/ JAVA / Python

Subject Code: MCA21207DCE

Subject Name: Computer Graphics & Multimedia

Unit I: [10L]

Introduction to Computer Graphics, Applications of Computer Graphics, Graphic Display Devices: Refresh Cathode Ray Tubes, Raster-scan Displays, Random-Scan displays, Color CRT Monitors, Concept of Double Buffering, Lookup tables (4L)

2-D Graphics: Cartesian and Homogeneous Coordinate Systems, Line drawing algorithms (Bresenham's and DDA), Circle and Ellipse Drawing Algorithms (6L)

Unit II: [10L]

2-Dimensional Transformations, Concepts of Window & Viewport, Window to Viewport Transformations, Normalization transformation (3L)

Composite Transformations: General pivot point rotation, General fixed point scaling, reflection w.r.t line $y=x$, reflection w.r.t line $y=x$ (4L)

Transformation between coordinate systems, affine transformations, Raster methods for transformations (3L)

Unit III: [10L]

Filling, Boundary and Flood-fill algorithms (2L)

Clipping, Line Clipping Algorithms (Cohen-Sutherland Algorithm), 3-D Graphics, Projections: perspective and parallel projection transformations. (5L)

3-Dimensional Transformations, Hidden Surface Removal Techniques, Z-Buffer Algorithm, Back Face Detection (3L)

Unit IV: [10L]

Curves and Surfaces: Spline specification, Interpolated & Approximated Splines. Bezier Splines, Bezier Curves, Cubic Bezier Curves, Bezier Surfaces. (3L)

Introduction to Multimedia, Visual elements: BMP file format, PCX file format, WAV and MP3 file format; Sound elements; Multimedia Storage- Compact disk (CD) and Digital Versatile Disk(DVD) (7L)

Text Book:

1. Hearn and Baker "Computer Graphics" 2nd Edition, Pearson Education.

Reference Books

1. W M Newman and Sproull "Principles of interactive Computer Graphics" ,TMH
2. Steven Harrington." Computer Graphics a Programming Approach" McGraw Hill.
3. Plastock and Kelley. "Schaums outline of theory and problems of computer Graphics"
4. David F Rogers and J Alan Adams. "Procedural Elements of Computer Graphics" McGraw Hill
5. David F Rogers and J Alan Adams. "Mathematical Elements of Computer Graphics" McGraw Hill
6. James. D. Foley, A Van dam etal "Computer Graphics" Pearson.
7. Sinha and Udai , "Computer graphics", TMH

Subject Name: Computer Graphics & Multimedia Lab

Lab Sheet 1

Unit I:

- Q1. Write a C++ program to draw line.
- Q2. Write a C++ program to draw circle.
- Q3. Write a C++ program to draw pixel.

Lab Sheet 2

Unit I:

- Q1. Write a C++ program to draw line using DDA algorithm.
- Q2. Write a C++ program to implement Brenham's algorithm to draw line.

Lab Sheet 3

Unit I:

- Q1. Write a C++ program to implement Mid-Point Algorithm to draw Circle.
- Q2. Write a C++ program to implement Mid-Point Algorithm to draw Ellipse.

Lab Sheet 1

Unit II:

- Q1. Write a program to apply Translation to 2D shapes
- Q2. Write a program to apply Scaling to 2D shapes
- Q3. Write a program to apply reflection along X axis to 2D shapes
- Q4. Write a program to apply reflection along Y axis to 2D shapes
- Q5. Write a program to apply translation and reflection to 2D shapes

Lab Sheet 2

Unit II:

- Q1. Write a program to apply rotation to 2D shapes
- Q2. Write a program to apply X-shearing to 2D shapes
- Q3. Write a program to apply Y-shearing to 2D shapes
- Q4. Write a program to apply reflection along $y=x$ line to 2D shapes
- Q5. Write a program to apply translation and shearing to 2D shapes

Lab Sheet 3

Unit II:

- Q1. Write a program to apply reflection along $y=-x$ line to 2D shapes
- Q2. Write a program to apply translation and rotation to 2D shapes
- Q3. Write a program to apply scaling and shearing to 2D shapes
- Q4. Write a program to apply scaling and translation to 2D shapes
- Q5. Write a program to apply scaling and reflection to 2D shapes

Lab Sheet 1

Unit III:

- Q1. Write a program to apply composite scaling and rotation to 2-Dimensional shapes.
- Q2. Write a program to apply composite translation and rotation to 2-Dimensional shapes.
- Q3. Write a program to clip the lines fallen outside the window using Cohen Sutherland line clipping.

Lab Sheet 2

Unit III:

- Q1. Write a program to apply scaling and rotation to 3-Dimensional shapes.
- Q2. Write a program to apply scaling and translation to 3-Dimensional shapes.
- Q3. Write a program to apply translation and rotation to 3-Dimensional shapes.

Lab Sheet 3

Unit III:

- Q1. Write a program to apply composite scaling and rotation to 3-Dimensional shapes.
- Q2. Write a program to apply composite translation and rotation to 3-Dimensional shapes.
- Q3. Write a program to apply composite translation and scaling to 3-Dimensional shapes.

Lab Sheet 1

Unit IV:

- Q1. Write a program to implement line attributes.
- Q2. Write a program to implement circle attributes.
- Q3. Write a program to implement ellipse attributes.

Lab Sheet 2

Unit IV:

- Q1. Write a program to draw Bezier Curve.
- Q2. Write a program to draw Cubic Bezier Curve.

Lab Sheet 3

Unit IV:

- Q1. Write a program to draw Bezier surfaces.
- Q2. Write a program to generate fractal images.

MCA21201OE
Web Designing

Unit-I

HTML: Understanding HTML, create a Web Page, Linking to other Web Pages, Publishing HTML Pages, Text Alignment and Lists, Text Formatting Fonts Control, Hyper Links and link within a Page, Creating HTML Forms, Creating Web Page Graphics, Putting Graphics on a Web Page, Custom Backgrounds and Colors.

Unit-II

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), Creating page Layout and Site Designs.



Handwritten signatures and initials in black ink, including a large signature at the top center, a signature to its right, a signature below the top center, a signature to the right of the middle signature, a signature below the middle signature, and a signature to the left of the middle signature.