DEPARTMENT OF COMPUTER SCIENCE

SYLLABUS (NEP)

(With Effect from AY 2021-22)

I SEMESTER

Course Code	Course Name	Hrs/ Week	Credits	SA	IA	Total
AECC	Indian Languages	3	3	60	40	100
AECC2.2	English	3	3	60	40	100
DCCA101	Fundamentals of Computers	3	3	60	40	100
DCCA102	Programming in C	3	3	60	40	100
DCCA103	Mathematical Foundation/ Accountancy	3	3	60	40	100
DCCA101P	LAB: Information Technology	4	2	25	25	50
DCCA102P	LAB: C Programming	4	2	25	25	50
OEBB102/OEBC103/ OEEN101	Business Organisation/Entrepreneurship and Startups/Functional English Grammer and Study Skills	3	3	60	40	100
SEDF101/SEEV101	Digital Fluency/Environmental Science	2	2	30	20	50
SECV101	Sports/NCC/NSS/Cultural Activities	2	2	-	50	-

Course Title: **Fundamentals of Computers**

Course Code: **DCCA101**

Unit 1

Fundamentals of Computers: Introduction to Computers - Computer Definition, Characteristics of Computers, Evolution and History of Computers, Types of Computers, Basic Organisation of a Digital Computer; Number Systems – different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Boolean Algebra – Boolean Operators with Truth Tables; Types of Software – System Software and Utility Software; Computer Languages –

Machine Level, Assembly Level & High-Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Planning a Computer Program - Algorithm, Flowchart and Pseudo code with Examples.

Unit 2

Introduction to computers: Characteristics of computers, Classification of Digital Computer Systems: Microcomputers, Minicomputers, Mainframes, Super computers. Anatomy of Computer: Introduction, Functions & Components of a Computer, Central Processing Unit, Microprocessor, Storage units, Input and output Devices. How CPU and memory works. Program execution with illustrative examples. Introduction to microcontrollers.

Unit 3

Operating System Fundamentals: Operating Systems: Introduction, Functions of an operating System, Classification of Operating Systems, System programs, Application programs, Utilities, The Unix Operating System, Basic Unix commands, Microkernel Based Operating System, Booting.

Unit 4

Introduction to Database Management Systems: Database, DBMS, Why Database -File system vs DBMS, Database applications, Database users, Introduction to SQL, Data types, Classification of SQL-DDL with constraints, DML, DCL, TCL

Unit5

Internet Basics: Introduction, Features of Internet, Internet application, Services of Internet, Logical and physical addresses, Internet Service Providers, Domain Name System.
Web Basics: Introduction to web, web browsers, http/https, URL, HTML5, CSS.

Text Books:

1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication

2. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC,

Reference:

1. J. Glenn Brook shear," Computer Science: An Overview", Addision-Wesley, Twelfth Edition,

2. R.G. Dromey, "How to solve it by Computer", PHI.

Course Title: LAB: Information Technology

Course Code: DCCA101P

Part A: Hardware

1. Identification of the peripherals of a computer, components in a CPU and their functions.

2. Assembling and disassembling the system hardware components of personal computer.

3. Basic Computer Hardware Trouble shooting.

4. LAN and Wi-Fi Basics.

5. Operating System Installation – Windows OS, UNIX/LINUX, Dual Booting.

6. Installation and Uninstallation of Software – Office Tools, Utility Software (like Anti-Virus, System Maintenance tools); Application Software - Like Photo/Image Editors, Audio Recorders/Editors, Video Editors …); Freeware, Shareware, Payware and Trialware; Internet Browsers, Programming IDEs.

7. System Configuration – BIOS Settings, Registry Editor, MS Config, Task Manager, System Maintenance, Third-party System Maintenance Tools (Similar to CCleaner and Jv16 PowerTools …)

Part B: Software

1. Activities using Word Processor Software
2. Activities using Spreadsheets Software
3. Activities using Presentation Software
4. Activities involving Multimedia Editing (Images, Video, Audio …)
5. Tasks involving Internet Browsing
6. Flow charts: Installation and using of flowgarithms software for different arithmetic tasks like sum, average, product, difference, quotient and remainder of given numbers, calculate area of Shapes (Square, Rectangle, Circle and Triangle), arrays and recursion.

NOTE: In addition to the ones listed above, universities can include other activities so as for the student to become proficient in using personal computers for multiple purposes for which modern computers can be put to use.

Reference:

1. Computational Thinking for the Modern Problem Solver, By Riley DD, Hunt K.A CRC press, 2014
2. Ferragina P, Luccio F. Computational Thinking: First Algorithms, Then Code. Springer

 Web References:

http://www.flowgorithm.org/documentation/

Course Title: Programming in C

Course Code: DCCA102

Unit 1

Introduction to C Programming: Overview of C; History and Features of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C.

C Programming Basic Concepts: C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration & initialization of variables; Symbolic constants.

Input and output with C: Formatted I/O functions - printf and scanf, control stings and escape sequences, output specifications with printf functions; Unformatted I/O functions to read and display single character and a string - getchar, putchar, gets and puts functions.

Unit 2

C Operators & Expressions: Arithmetic operators; Relational operators; Logical operators; Assignment operators; Increment & Decrement operators; Bitwise operators; Conditional operator; Special operators; Operator Precedence and Associatively; Evaluation of arithmetic expressions; Type conversion.

Control Structures: Decision making Statements - Simple if, if_else, nested if_else, else_if ladder, Switch Case, goto, break & continue statements; Looping Statements - Entry controlled and exit controlled statements, while, do-while, for loops, Nested loops.

Unit 3

Derived data types in C: Arrays: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation.
Strings: Declaring & Initializing string variables; String handling functions - *strlen, strcmp, strcpy and strcat;* Character handling functions - *toascii, toupper, tolower, isalpha, isnumeric* etc.

Unit 4

Pointers in C: Understanding pointers - Declaring and initializing pointers, accessing address and value of variables using pointers; Pointers and Arrays; Pointer Arithmetic; Advantages and disadvantages of using pointers.

Unit 5

User Defined Functions: Need for user defined functions; Format of C user defined functions; Components of user defined functions - return type, name, parameter list, function body, return statement and function call; Categories of user defined functions - With and without parameters and return type.

User defined data types: Structures - Structure Definition, Advantages of Structure, declaring structure variables, accessing structure members, Structure members initialization, comparing structure variables, Array of Structures; Unions - Union definition; difference between Structures and Unions.

Text Books:

1. C: The Complete Reference, By Herbert Schildt.

2. C Programming Language, By Brain W. Kernighan

3. Kernighan & Ritchie: The C Programming Language (PHI)

Reference Books:

4. P. K. Sinha & Priti Sinha: Computer Fundamentals (BPB)

5. E. Balaguruswamy: Programming in ANSI C (TMH)

6. Kamthane: Programming with ANSI and TURBO C (Pearson Education)

7. V. Rajaraman: Programming in C (PHI – EEE)

8. S. Byron Gottfried: Programming with C (TMH)

9. Yashwant Kanitkar: Let us C

10. P.B. Kottur: Programming in C (Sapna Book House)

Course Title: LAB: C Programming

Course Code: DCCA102P

Part A:

1. Program to read radius of a circle and to find area and circumference

2. Program to read three numbers and find the biggest of three

3. Program to demonstrate library functions in math.h

4. Program to check for prime

5. Program to generate n primes

6. Program to read a number, find the sum of the digits, reverse the number andcheck it for palindrome

7. Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers

8. Program to read percentage of marks and to display appropriate message (Demonstration of else-if ladder)

9. Program to find the roots of quadratic equation (demonstration of switch Case statement)

10. Program to read marks scored by n students and find the average of marks (Demonstration of single dimensional array).

11. Program to remove Duplicate Element in a single dimensional Array

12. Program to perform addition and subtraction of Matrices.

Part B:

1. Program to find the length of a string without using built in function

2. Program to demonstrate string functions.

3. Program to demonstrate pointers in C

4. Program to check a number for prime by defining isprime( ) function

5. Program to read, display and to find the trace of a square matrix

6. Program to read, display and add two m x n matrices using functions

7. Program to read, display and multiply two m x n matrices using functions

Note: Student has to execute a minimum of 10 programs in each part to complete the Lab course

Course Title: Mathematical Foundation

Course Code: DCCA103

Unit 1

Basic concepts of set theory: Mathematical logic introduction-statements Connectives-negation, conjunction, disjunction- statement formulas and truth tables- conditional and bi Conditional statements- tautology contradiction- equivalence of formulas-duality law-Predicates and Quantifiers, Arguments.

Unit 2

Operations on sets: power set- Venn diagram Cartesian product-relations - functions- types of functions - composition of functions.

Unit 3

Matrix algebra: Introduction-Types of matrices-matrix operations- transpose of a matrix -determinant of matrix - inverse of a matrix- Cramer's rule

Unit 4

Matrix: finding rank of a matrix - normal form-echelon form cayley Hamilton theorem-Eigen values

Unit 5

Differential calculus: Functions and limits - Simple Differentiation of Algebraic Functions – Evaluation of First and Second Order Derivatives – Maxima and Minima.

Text Books:
1. P. R. Vittal-Business Mathematics and Statistics, Margham Publications, Chennai,
Reference Books:
2. B. S. Vatsa-Discrete Mathematics –New Age International Limited Publishers, New Delhi

Course Title: Accountancy

Course Code: DCCA103

Unit 1

Introduction: History and Development of Accounting, Meaning, Objectives and functions of Accounting, Book keeping V/s Accounting, Users of accounting data, systems of book keeping and accounting, branches of accounting, advantages and limitations of accounting

Unit 2

Accounting Concepts and Convention: Meaning, need and classification, accounting standards meaning, need and classification of Indian accounting standards. Accounting principles V/s accounting standard
Financial Accounting Process: Classification of accounting transactions and accounts, rules of debit and credit as per Double Entry System. Journalization and Ledger posting.

Unit 3

Preparation of Different Subsidiary Books: Purchase Day book Sales Day Book, Purchase Returns Day Book, Sales Returns Day Book, Cash Book.
Bank Reconciliation Statement: Meaning, Causes of Difference, Advantages, Preparation of Bank Reconciliation Statements.

Unit 4

Account Procedure: Honor of the Bill, Dishonor of the Dill, Endorsement, Discounting, Renewal, Bill for collection, Retirement of the Bill, Accommodation Bills, Bill Receivable Book and Payable Book.
Preparation of Trial Balance: Rectification of errors and Journal Proper

Unit 5

Preparation of Final Accounts: Meaning, need and classification, Preparation of Manufacturing, Trading, Profit and loss account and Balance – Sheet of sale- traders and partnership firms.

Text Books:
1. S. Ramesh, B.S. Chandrashekar, A Text Book of Accountancy.
2. V.A. Patil and J.S. Korihalli, Book – keeping and accounting, (R. Chand and Co. Delhi).
3. R. S. Singhal, Principles of Accountancy, (Nageen Prakash pvt. Lit. Meerut).
4. M. B. Kadkol, Book – Keeping and Accountancy, (Renuka Prakashan, Hubil) Vithal, Sharma: Accounting for Management, Macmillan Publishers, Mumbai.

Reference Books:
1. B.S. Raman, Accountancy, (United Publishers, Mangalore).
2. Tulsian, Accounting and Financial Management – I: Financial Accounting – Person Education.

Course Code	Course Name	Hrs/ Week	Credits	SA	IA	Total
AECC	Indian Languages	3	3	60	40	100
AECC202	English	3	3	60	40	100
DCCA201	Data Structures using C	3	3	60	40	100
DCCA202	Object Oriented Concepts using JAVA	3	3	60	40	100
DCCA203	Discrete Mathematical Structures	3	3	60	40	100
DCCA201P	Data Structure: Practical	4	2	25	25	50
DCCA202P	Java: Practical	4	2	25	25	50
OEBB201/OEBB202/ OEBC203/OEEN201	People Management/Retail Management/Event Management/Spoken English for Corporate Jobs	3	3	60	40	100
SEDF201/SEEV201	Digital Fluency/Environmental Science	2	2	30	20	50
SECV201/202/203/2 04/205	Sports/NCC/NSS/Cultural Activities	2	2	-	25	-

Course Title: Data Structures using C

Course Code: DCCA201

Unit 1

Introduction to data structures: Definition; Types of data structures - Primitive & Non-primitive, Linear and Non-linear; Operations on data structures.

Dynamic memory allocation: Static & Dynamic memory allocation; Memory allocation and de-allocation functions - *malloc*, *calloc*, *realloc* and *free.*

Algorithm Specification, Performance Analysis, Performance Measurement
Recursion: Definition; Types of recursions; Recursion Technique Examples - GCD, Binomial coefficient $^{n}C_r$, Towers of Hanoi; Comparison between iterative and recursive functions.

Unit 2

Arrays: Basic Concepts – Definition, Declaration, Initialisation, Operations on arrays; Types of arrays; Arrays as abstract data types (ADT); Representation of Linear Arrays in memory;
Traversing linear arrays; Inserting and deleting elements; Sorting – Selection sort, Bubble sort, Quick sort, Selection sort, Insertion sort; Searching - Sequential Search, Binary search; Iterative and Recursive searching; Multidimensional arrays; Representation of multidimensional arrays; Sparse matrices.

Unit 3

Linked list: Basic Concepts – Definition and Representation of linked list, Types of linked lists - Singly linked list, Doubly liked list, Header liked list, Circular linked list; Representation of Linked list in Memory;
Operations on Singly linked lists – Traversing, Searching, Insertion, Deletion; Memory allocation; Garbage collection

Unit 4

Stacks: Basic Concepts – Definition and Representation of stacks; Operations on stacks; Applications of stacks; Infix, postfix and prefix notations; Conversion from infix to postfix using stack; Evaluation of postfix expression using stack; Application of stack in function calls.

Queues: Basic Concepts – Definition and Representation of queues; Types of queues- Simple queues, Circular queues, Double ended queues, Priority queues; Operations on Simple queues;

Unit 5

Trees: Definition; Tree terminologies –node, root node, parent node, ancestors of a node, siblings, terminal & non-terminal nodes, degree of a node, level, edge, path, depth;
Binary tree: Type of binary trees - strict binary tree, complete binary tree, binary search tree and heap tree; Array representation of binary tree. Traversal of binary tree; preorder, inorder and postorder traversal;

Text Books
1. Ellis Horowitz and Sartaj Sahni: Fundamentals of Data Structures

References
1. Tanenbaum: Data structures using C (Pearson Education)
2. Kamathane: Introduction to Data structures (Pearson Education)
3. Y. Kanitkar: Data Structures Using C (BPB)
4. Kottur: Data Structure Using C
5. Padma Reddy: Data Structure Using C
6. Sudipa Mukherjee: Data Structures using C – 1000 Problems and Solutions (McGraw Hill Education, 2007))

Course Title: Object Oriented Programming with JAVA

Course Code: DCCA202

Unit 1

Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

Unit 2

Objects and Classes: Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, String Buffer, File, this reference

Unit 3

Inheritance and Polymorphism: Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

Unit 4

Event and GUI programming: Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism.

Unit 5

I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files.

Unit 6

Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

Text Books

1. Programming with Java, By E Balagurusamy – A Primer, Fourth Edition, Tata McGraw Hill Education Private Limited.
2. Core Java Volume I – Fundamentals, By Cay S. Horstmann, Prentice Hall
3. Object Oriented Programming with Java : Somashekara, M.T., Guru, D.S., Manjunatha, K.S

Reference Books:
1. Java 2 - The Complete Reference – McGraw Hill publication.
2. Java - The Complete Reference, 7th Edition, By Herbert Schildt– McGraw Hill publication.

Course Title: **Discrete Mathematical Structures**

Course Code: **DCCA203**

Unit 1

The Foundations: Logic and proofs: Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs, Proof Methods and Strategy.

Basic Structures: Sets, Functions, Sequences, Sums, and Matrices: Sets, set operations, Functions, Sequences and Summations, matrices.

Unit 2

Counting: Basics of counting, Pigeonhole principle, Permutation and combination, Binomial Coefficient and Combination, Generating Permutation and Combination**.**
Advanced Counting Techniques: Applications of Recurrence Relations, Solving Linear Recurrence, Relations, Divide and Conquer Algorithms and Recurrence Relations, Generating functions, Inclusion-Exclusion, Applications of Inclusion-exclusion.

Unit 3

Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Corrections.
Relation: Properties of relation, Composition of relation, Closer operation on relation, Equivalence relation and partition. Operation on relation, Representing relation.

Unit 4

Graphs: Graphs and Graph models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.

Text Book:

1. Discrete Mathematics and Its Applications, Kenneth H. Rosen: Seventh Edition, 2012.

References:

1. Discrete Mathematical Structure, Bernard Kolman, Robert C, Busby, Sharon Ross, 2003.
2. Graph Theory with Applications to Engg and Comp. Sci: Narsingh Deo-PHI 1986.
3. Discrete and Combinatorial Mathematics Ralph P. Grimaldi, B. V. Ramatta, Pearson, Education, 5 Edition.
4. Discrete Mathematical Structures, Trembley and Manobar.

Course Title: **Data Structure: Practical**

Course Code: **DCCA201P**

 Part A:

1. Program to find GCD using recursive function
2. Program to display Pascal Triangle using binomial function
3. Program to generate n Fibonacci numbers using recursive function.
4. Program to implement Towers of Hanoi.
5. Program to implement dynamic array, find smallest and largest element of the array.
6. Program to create two files to store even and odd numbers.
7. Program to create a file to store student records.

8. Program to read the names of cities and arrange them alphabetically.

9. Program to sort the given list using selection sort technique.

10. Program to sort the given list using bubble sort technique.

Part B:

1. Program to sort the given list using insertion sort technique.

2. Program to sort the given list using quick sort technique.

3. Program to sort the given list using merge sort technique.

4. Program to search an element using linear search technique.

5. Program to search an element using recursive binary search technique.

6. Program to implement Stack.

7. Program to convert an infix expression to postfix.

8. Program to implement simple queue.

9. Program to implement linear linked list.

10. Program to display traversal of a tree.

Course Title: Java: Practical

Course Code: DCCA202P

Practice Lab

1. Program to print the following triangle of numbers 1

    1 2

    1 2 3

    1 2 3 4

    1 2 3 4 5

2. Program to simple java application, to print the message, "Welcome to java"

3. Program to display the month of a year. Months of the year should be held in an array.

4. Program to find the area of rectangle.

5. program to demonstrate a division by zero exception

6. Program to create a user defined exception say Pay Out of Bounds.

Programming Lab

PART A: Java Fundamentals OOPs in Java

1. Program to assign two integer values to X and Y. Using the 'if' statement the output of the program should display a message whether X is greater than Y.

2. Program to list the factorial of the numbers 1 to 10. To calculate the factorial value, use while loop. (Hint Fact of 4 = 4*3*2*1)

3. Program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading.

4. Program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from AddSub class to use the member data of the super class. MulDiv should have methods to multiply and divide A main function should access the methods and perform the mathematical operations.

5. Program with class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occur in the object's member variable values.

6. Program

   a) To find the area and circumference of the circle by accepting the radius from the user.

   b) To accept a number and find whether the number is Prime or not Program to create a student class with following attributes;

7. Enrollment No: Name, Mark of sub1, Mark of sub2, mark of sub3, Total Marks. Total of the three marks must be calculated only when the student passes in all three subjects. The pass mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declared as zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main method create an array of three student objects and display the details.

8. In a college first year class are having the following attributes Name of the class (BCA, BCom, BSc), Name of the staff No of the students in the class, Array of students in the class

9. Define a class called first year with above attributes and define a suitable constructor. Also write a method called best Student () which process a first-year object and return the student with the highest total mark. In the main method define a first-year object and find the best student of this class

10. Program to define a class called employee with the name and date of appointment. Create ten employee objects as an array and sort them as per their date of appointment. ie, print them as per their seniority.

11. Create a package 'student. Fulltime. BCA 'in your current working directory

    c) Create a default class student in the above package with the following attributes: Name, age, sex.

    d) Have methods for storing as well as displaying

PART B: Exception Handling & GUI Programming

1. Program to catch Negative Array Size Exception. This exception is caused when thearray is initialized to negative values.

2. Program to handle Null Pointer Exception and use the "finally" method to display a message to the user.

3. Program which creates and displays a message on the window

4. Program to draw several shapes in the created window

5. Program to create an applet and draw grid lines

6. Program which creates a frame with two buttons father and mother. When we click the father button the name of the father, his age and designation must appear. When we click mother

similar details of mother also appear.

7. Create a frame which displays your personal details with respect to a button click.

8. Create a simple applet which reveals the personal information of yours.

9. Program to move different shapes according to the arrow key pressed.

10. Program to create a window when we press M or m the window displays Good Morning, A or a the window displays Good After Noon E or e the window displays Good Evening, N or n the window displays Good Night

11. Demonstrate the various mouse handling events using suitable example.

12. Program to create menu bar and pull-down menus.

Note: Student has to execute a minimum of 10 programs in each part to complete the Lab course

III SEMESTER

Course Code	Course Name	Hrs/ Week	Credits	SA	IA	Total
AECC	Indian Languages	3	3	60	40	100
AEEN302	English	3	3	60	40	100
DCCA301	Data Base Management Systems	4	3	60	40	100
DCCA302	C# and DOT NET Framework	4	3	60	40	100
DCCA303	Computer Communication and Networks	4	3	60	40	100
DCCA301P	LAB: DBMS	4	2	25	25	50
DCCA302P	LAB: C# and DOT NET Framework	4	2	25	25	50
IIC3001	India & Indian Constitution	4	2	25	25	50
OEBB301/OEEN301 / OEBC302	Social Media Marketing/Spoken English for Global Communication/Corporate Environment	3	3	60	40	100
SECV301	Sports/NCC/NSS/Cultural Activities	2	2	-	50	-

Course Title: Database Management System

Course code: DCCA301

Unit 1

Database Architecture: Introduction to Database system applications. Characteristics and Purpose of database approach. People associated with Database system. Data models. Database schema. Database architecture. Data independence. Database languages, interfaces, and classification of DBMS.

Unit 2

E-R Model: Entity-Relationship modeling: E – R Model Concepts: Entity, Entity types, Entity sets, Attributes, Types of attributes, key attribute, and domain of an attribute. Relationships between the entities. Relationship types, roles and structural constraints, degree and cardinality ratio of a relationship. Weak entity types, E -R diagram.

Unit 3

Relational Data Model: Relational model concepts. Characteristics of relations. Relational model constraints: Domain constrains, key constraints, primary & foreign key constraints, integrity constraints and null values. Relational Algebra: Basic Relational Algebra operations. Set theoretical operations on relations. JOIN operations Aggregate Functions and Grouping. Nested Sub Queries-Views. Introduction to PL/SQL & programming of above operations in PL/SQL.

Unit 4

Data Normalization: Anomalies in relational database design. Decomposition. Functional dependencies. Normalization. First normal form, Second normal form, Third normal form. Boyce-Codd normal form.

Unit 5

Query Processing Transaction Management: Introduction Transaction Processing. Single user & multiuser systems. Transactions: read & write operations. Need of concurrency control: The lost update problem, Dirty read problem. Types of failures. Transaction states. Desirable properties (ACID properties) of Transactions. Concurrency Control Techniques: Locks and Time stamp Ordering. Deadlock & Starvation.

References:

1. Fundamentals of Database Systems, Ramez Elamassri, Shankant B. Navathe, 7th Edition, Pearson, 2015
2. An Introduction to Database Systems, Bipin Desai, Galgotia Publications, 2010.
3. Introduction to Database System, C J Date, Pearson, 1999.
4. Database Systems Concepts, Abraham Silberschatz, Henry Korth, S.Sudarshan, 6th Edition, McGraw Hill, 2010.

5. Database Management Systems, Raghu Rama Krishnan and Johannes Gehrke, 3rd Edition, McGraw Hill, 2002

Course Title: C# and Dot Net Framework

Course code: DCCA302

Unit 1

Introduction to .Net Technologies: Introduction to Web Technologies. HTML Basics, Scripts. Sample Programs. Advantages and Disadvantages of Client-side and Server-side Scripts. Overview of Client-side Technologies and Server-side Technologies.

Unit 2

Introduction to C#: Overview of C#, Literals, Variables, Data Types, Operators, Expressions, Control Structures-Methods, Arrays, Strings, Structures, Enumerations.
OOPS with C#: Classes, Objects, Inheritance, Polymorphism, Interfaces, Operator Overloading Delegates, Events, Errors and Exceptions.

Unit 3

Introduction to VB.NET: Introduction VB.NET -IDE – Creating a shortcut to start VB.NET. Maneuverings the Toolbar Auto-hide, Docking and Undocking, Placing and Resizing the Windows, Forms, Properties Window and Solution Explorer. Writing and Event Procedure. Execution Basic Keywords. Data Types. VB.NET statements. Conditional statements: If Else, Select Case, Switch and Choose Loops: Do, For Next, For Each Next, While loop. Arrays.

Unit 4

Application Development on .NET: C#.NET: Building Windows Applications, VB.NET: Windows Forms. Working with Controls, Timer, Picture-box, Group-box, Combo-box, Horizontal and Vertical Scrollbar, Numeric-up-down, Track-bar, and Progress-bar. Subroutines and Functions in VB.NET. Database applications

Unit 5

ADO .NET Connectivity: Introduction to ADO.NET, ADO vs ADO.NET. Architecture: Data reader, Data adopter, Accessing Data with ADO.NET. Programming Web Applications with Web Forms. ASP .NET applications with ADO.NET

References:

1. "Programming in C#", E. Balagurusamy, 4th Edition, Tata McGraw-Hill, 2017.
2. "Visual Basic.NET", Shirish Chavan, 3rd Edition, Pearson Education, 2009.
3. "ASP.NET and VB.NET Web Programming", Matt J. Crouch, Edition 2012.
4. "Computing with C# and the .NET Framework", Arthur Gittleman, 2nd Edition, Jones & Bartlett Publishers, 2011

Course Title: **Computer Communication and Networks**

Course code: **DCCA303**

Unit 1

Introduction: Computer Networks and its applications, Network structure, network architecture, Topologies, LAN, WAN, MAN, The OSI reference model, The TCP/IP reference model.

Unit 2

The Physical Layer: Transmission Media – Twisted pair, coaxial cable, optical fiber, radio transmission, microwaves and infrared transmission, Switching – message switching, Multiplexing.

Unit 3

The Data Link Layer: Data Link Layer design issues, Error detection – Single parity checking, Checksum, polynomial codes – CRC, Error correction- Hamming code, Elementary data link protocols, sliding window protocols

Unit 4

The Network Layer: Network layer design issues, Routing algorithms – Flooding, Distance vector routing, Hierarchical routing, Link state routing, Congestion, control algorithms – Leaky bucket, token bucket algorithm, admission control, Hop by Hop choke packets.

Unit 5

The Transport Layer and Application Layer: Elements of Transport service, Elements of Transport, protocols, Internet transport protocols (TCP & UDP), DNS, Electronic Mailing, and World Wide Web.

References:

1. Computer Networks, Andrew S. Tanenbaum, 5th Edition, Pearson Education, 2010.
2. Data Communication & Networking, Behrouza A Forouzan, 3rd Edition, Tata McGraw Hill,2001.
3. Data and Computer Communications, William Stallings, 10th Edition, Peason Education, 2017
4. Data Communication and Computer Networks, Brijendra Singh, 3rd Edition, PHI, 2012.
5. Data Communication & Network, Dr. Prasad, Wiley Dreamtech.
6. http://highered.mheducation.com/sites/0072967757/index.htmls

Course Title: **India & Indian Constitution of India**

Course code: **IIC3001**

Unit 1

Chapter: 1 - Making of Indian Constitution, Constituent Assembly – Composition, Objectives,

Preamble and Salient features of Indian Constitution.

Chapter: 2
Fundamental Rights, Fundamental Duties, Directive Principles.

Unit 2

Chapter: 3 – Union Government
President, Prime Minister and Cabinet

Chapter: 4 – State Government
Governor, Chief Minister and Cabinet

Unit 3

Chapter: 5 – Judiciary
Supreme Court and High Court: Composition, Powers and Functions.

Chapter: 6 – Electoral Process
Election Commission: Composition, Powers and Functions, Electoral Reforms

Suggested Readings:

1. Durga DasBasu, IntroductiontotheConstitutionofIndia, Gurgaon; LexisNexis, (23rdedn.) 2018.

2. M.V.Pylee, India'sConstitution, New Delhi; S.Chand Pub., (16thedn.) 2017.

3. J.N.Pandey, The Constitutional LawofIndia, Allahabad; CentralLaw Agency, (55thedn.) 2018.

4. Constitution of India (Full Text), India.gov.in., National Portal of India, https://www.india.gov.in/sites/upload_files/npi/files/coi_part_full.pdf

5. KBMerunandan, BharatadaSamvidhana Ondu Parichaya, Bangalore, Meragu Publications, 2015.

6. ಪ್ರೊ.ಎಚ್.ಎಂ.ರಾಜಶೇಖರಭಾರತಸರ್ಕಾರಮತ್ತುರಾಜಕೀಯ, ಕಿರಣಪ್ರಕಾಶನ,ಮೈಸೂರು2020.

7. K. Sharma, IntroductiontotheConstitutionofIndia, Prentice HallofIndia, New Delhi, 2002.

8. P.MBakshi, ConstitutionofIndia, Universal Law Publishing House, New Delhi, 1999.

9. D.C.Gupta, Indian GovernmentandPolitics, Vikaspublishing House, New Delhi, 1975.

10. S.N.Jha, Indian Political System,: Historical Developments, GangaKaveri Publishing House, Varanasi, 2005.

11. Arora&Mukherji, FederalisminIndia, Origin and Developments, Vikas Publishing House, New Delhi, 1992.

Course Title: **LAB: DBMS**

Course code: **DCCA301P**

Student would be able to create tables, execute queries and PL/SQL programs.

1. Execute a single line query and group functions.

2. Execute DDL Commands.

3. Execute DML Commands

4. Execute DCL and TCL Commands.

5. Implement the Nested Queries.

6. Implement Join operations in SQL

7. Create views for a particular table

8. Implement Locks for a particular table

9. Write PL/SQL procedure for an application using exception handling.

10. Write PL/SQL procedure for an application using cursors.

11. Write a PL/SQL procedure for an application using functions

12. Write a PL/SQL procedure for an application using package

Course Title: **LAB: C# and DOT NET Framework**

Course code: **DCCA302P**

1. Develop a C# .NET console application to demonstrate the conditional statements.

2. Develop a C# .NET console application to demonstrate the control statements.

3. Develop an application in C#.NET that demonstrates the windows controls

4. Demonstrate Multithreaded Programming in C#.NET

5. Demonstrate subroutines and functions in C#.NET

6. Develop an application for deploying various built-in functions in VB.NET

7. Develop an MDI application for Employee Pay-roll transactions in VB.NET

8. Construct a console application to demonstrate the OOP Concepts

9. Develop a web application in VB.NET for dynamic Login Processing

10. Develop a Windows application with database connectivity for core-banking transactions

Course Code	Course Name	Hrs/ Week	Credits	SA	IA	Total
AECC	Indian Languages	3	3	60	40	100
AEEN402	English	3	3	60	40	100
DCCA401	Python Programming	4	3	60	40	100
DCCA402	Computer Multimedia and Animation	4	3	60	40	100
DCCA403	Operating Systems Concepts	4	3	60	40	100
DCCA401P	LAB: Python programming	4	2	25	25	50
DCCA402P	LAB: Multimedia and Animation	4	2	25	25	50
IIC3001	India & Indian Constitution	4	2	25	25	50
OEBB401	Business Leadership Skills	3	3	60	40	100
SEAI402	Open-Source Tools	3	2	30	20	50
SECV401	Sports/NCC/NSS/Cultural Activities	2	2	-	50	-

Course Title: **Python Programming**

Course code: **DCCA401**

Unit 1

Introduction to Features and Applications of Python; Python Versions; Installation of Python; Python Command Line mode and Python IDEs; Simple Python Program.
Python Basics: Identifiers; Keywords; Statements and Expressions; Variables; Operators; Precedence and Association; Data Types; Indentation; Comments; Built-in Functions- Console Input and Console Output, Type Conversions; Python Libraries; Importing Libraries with Examples.
Python Control Flow: Types of Control Flow; Control Flow Statements- if, else, elif, while loop, break, continue statements, for loop Statement; range () and exit () functions.

Unit 2

Exception Handling: Types of Errors; Exceptions; Exception Handling using try, except and finally.
Python Functions: Types of Functions; Function Definition- Syntax, Function Calling, Passing Parameters/arguments, the return statement; Default Parameters; Command line Arguments; Key Word Arguments; Recursive Functions; Scope and Lifetime of Variables in Functions.
Strings: Creating and Storing Strings; Accessing Sting Characters; the str() function; Operations on Strings- Concatenation, Comparison, Slicing and Joining, Traversing; Format Specifiers; Escape

Sequences; Raw and Unicode Strings; Python String Methods.

Unit 3

Lists: Creating Lists; Operations on Lists; Built-in Functions on Lists; Implementation of Stacks and Queues using Lists; Nested Lists. Dictionaries: Creating Dictionaries; Operations on Dictionaries; Built-in Functions on Dictionaries; Dictionary Methods; Populating and Traversing Dictionaries.

Tuples and Sets: Creating Tuples; Operations on Tuples; Built-in Functions on Tuples; Tuple Methods; Creating Sets; Operations on Sets; Built-in Functions on Sets; Set Methods.

Unit 4

File Handling: File Types; Operations on Files– Create, Open, Read, Write, Close Files; File Names and Paths; Format Operator.
Object Oriented Programming: Classes and Objects; Creating Classes and Objects; Constructor Method; Classes with Multiple Objects; Objects as Arguments; Objects as Return Values; Inheritance- Single and Multiple Inheritance, Multilevel and Multipath Inheritance; Encapsulation- Definition, Private Instance Variables; Polymorphism- Definition, Operator Overloading.

Unit 5

GU Interface: The tkinter Module; Window and Widgets; Layout Management- pack, grid and place.
Python SQLite: The SQLite3 module; SQLite Methods- connect, cursor, execute, close; Connect to Database; Create Table; Operations on Tables- Insert, Select, Update. Delete and Drop Records.
Data Analysis: NumPy- Introduction to NumPy, Array Creation using NumPy, Operations on Arrays; Pandas- Introduction to Pandas, Series and DataFrames, Creating DataFrames from Excel Sheet and .csv file, Dictionary and Tuples. Operations on DataFrames.
Data Visualisation: Introduction to Data Visualisation; Matplotlib Library; Different Types of Charts using Pyplot- Line chart, Bar chart and Histogram and Pie chart.

References:

1. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2n Edition, Green Tea Press. Freely available online @ ttps://www.greenteapress.com/thinkpython/thinkCSpy.pdf, 2015.
2. Introduction to Python Programming, Gowrishankar S et al., CRC Press, 2019.
3. Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Fabio Nelli, Apress®, 2015
4. Advance Core Python Programming, MeenuKohli, BPB Publications, 2021.
5. Core PYTHON Applications Programming, Wesley J. Chun, 3rd Edition, Prentice Hall 2012.
6. Automate the Boring Stuff, Al Sweigart, No Starch Press, Inc, 2015.
7. Data Structures and Program Design Using Python, D Malhotra et al., Mercury Learning and Information LLC, 2021.
8. http://www.ibiblio.org/g2swap/byteofpython/read/https://doc
9. s.python.org/3/tutorial/index.html

Course Title: Computer Multimedia & Animation

Course code: DCCA402

Unit 1

Web Design: Origins and evolution of HTML, Basic syntax, Basic text markup, Images, Lists, Tables, Forms, Frame, Overview and features of HTML5. CSS: Introduction, Levels of style sheets, Style

specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The <span> and <div> tags; Overview and features of CSS3. JavaScript: Object orientation and JavaScript; General syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input.

Unit 2

Animation: What is an Animation? The Start and End States, Interpolation, Animations in HTML. All About CSS Animations, Creating a Simple Animation, Detailed Look at the CSS Animation Property, Keyframes, Declaring Multiple Animations, Wrap-up. All About CSS Transitions, Adding a Transition, Looking at Transitions in Detail, The Longhand Properties, Longhand Properties vs. Shorthand Properties, Working with Multiple Transitions.

Unit 3

HTML5 – SVG: Viewing SVG Files, Embedding SVG in HTML5, HTML5– SVG Circle, HTML5 – SVG Rectangle, HTML5 – SVG Line, HTML5 – SVG Ellipse, HTML5 – SVG Polygon, HTML5 – SVG Polyline, HTML5 – SVG Gradients, HTML5 – SVG Star.

Unit 4

HTML5 – CANVAS: The Rendering Context, Browser Support, HTML5 Canvas Examples, Canvas - Drawing Rectangles, Canvas - Drawing Paths, Canvas - Drawing Lines, Canvas - Drawing Bezier Curves, Canvas - Drawing Quadratic Curves, Canvas - Using Images, Canvas - Create Gradients.

Unit 5

HTML5 - Styles and Colors, Canvas - Text and Fonts, Canvas - Pattern and Shadow, Canvas - Save and Restore States, Canvas - Translation, Canvas - Rotation, Canvas - Scaling, Canvas - Transforms, HTML5 Canvas - Composition, Canvas – Animations.

Course Title: Operating System Concepts

Course code: DCCA403

Unit 1

Introduction to Operating System: Definition, History and Examples of Operating System; Computer System organization; Types of Operating Systems; Functions of Operating System; Systems Calls; Operating System Structure.
Process Management: Process Concept- Process Definition, Process State, Process Control Block, Threads; Process scheduling- Multiprogramming, Scheduling Queues, CPU Scheduling, Context Switch; Operations on Processes- Creation and Termination of Processes; Inter process communication (IPC)- Definition and Need for Inter process Communication; IPC Implementation Methods- Shared Memory and Message Passing;

Unit 2

Multithreaded Programming: Introduction to Threads; Types of Threads; Multithreading- Definition, Advantages; Multithreading Models; Thread Libraries; Threading Issues.
CPU Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; Thread scheduling; Multiprocessor Scheduling; Real-Time CPU Scheduling.

Unit 3

Process Synchronization: Introduction; Race Condition; Critical Section Problem and Peterson's Solution; Synchronization Hardware, Semaphores; Classic Problems of Synchronization- Readers and Writers Problem, Dining Philosophers Problem; Monitors.

Deadlocks: System Model; Deadlocks Characterization; Methods for Handling Deadlocks; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection; and Recovery from Deadlock.

Unit 4

Memory Management: Logical and Physical Address Space; Swapping; Contiguous Allocation; Paging; Segmentation; Segmentation with Paging.

Virtual Memory: Introduction to Virtual Memory; Demand Paging; Page Replacement; Page Replacement Algorithms; Allocation of frames, Thrashing.

Unit 5

File System: File Concepts- Attributes, Operations and Types of Files; File System; File Access methods; Directory Structure; Protection; File System Implementation- File System Structure, Allocation Methods, Free Space Management

References:

1. Operating System Concepts, Silberschatz' et al., 10thEdition, Wiley, 2018.
2. Operating System Concepts - Engineering Handbook, Ghosh PK, 2019.
3. Understanding Operating Systems, McHoes A et al., 7th Edition, Cengage Learning, 2014.
4. Operating Systems - Internals and Design Principles, William Stallings, 9th Edition, Pearson.
5. Operating Systems – A Concept Based Approach, Dhamdhere, 3rd Edition, McGraw Hill Education India.
6. Modern Operating Systems, Andrew S Tanenbaum, 4th Edition, Pearson.

Course Title: Open-Source Tools

Course code: SEAI402

Unit 1: Open Source Softwares

   i.   Introduction to Open sources, Need of Open Sources, Open Source –Principles, Standard Requirements, Advantages of Open Sources –
   ii. Free Software – FOSS
   iii. Licenses – GPL, LGPL, Copyrights, Patents, Contracts & Licenses and Related Issues
   iv. Application of Open Sources. Open Source Operating Systems : FEDORA, UBUNTU

Unit 2: Programming   Tools and Techniques

   i.   Usage of design Tools like Argo UML or equivalent
   ii. Version Control Systems like Git or equivalent
   iii. Bug Tracking Systems (Trac, BugZilla)
   iv. BootStrap

Unit 3: Case Studies

   i.   Apache
   ii. Berkeley Software Distribution

iii. Mozilla (Firefox)
iv. Wikipedia
v. Joomla
vi. GNU Compiler Collection
vii. Libre Office
7.

Text Book:

1. KailashVadera, Bhavyesh Gandhi, "Open Source Technology", Laxmi Publications Pvt. Ltd 2012, 1st Edition.

Reference Book:

1. Fadi P. Deek and James A. M. McHugh, "Open Source: Technology and Policy", Cambridge Universities Press 2007.

Course Title: **LAB: Python Programming**

Course code: **DCCA401P**

Part-A

1. Check if a number belongs to the Fibonacci Sequence

2. Solve Quadratic Equations

3. Find the sum of n natural numbers

4. Display Multiplication Tables

5. Check if a given number is a Prime Number or not

6. Implement a sequential search

7. Create a calculator program

8. Explore string functions

9. Implement Selection Sort

10. Implement Stack

11. Read and write into a file

Part-B

1. Demonstrate usage of basic regular expression

2. Demonstrate use of advanced regular expressions for data validation.

3. Demonstrate use of List

4. Demonstrate use of Dictionaries

5. Create SQLite Database and Perform Operations on Tables

6. Create a GUI using Tkinter module

7. Demonstrate Exceptions in Python

8. Drawing Line chart and Bar chart using Matplotlib

9. Drawing Histogram and Pie chart using Matplotlib

10. Create Array using NumPy and Perform Operations on Array

11. Create DataFramefrom Excel sheet using Pandas and Perform Operations on DataFrames

Note: A minimum of 10 Programs should be done in each Part.

Course Title: **Computer Multimedia & Animation**

Course code: **DCCA402P**

Part A:

1. Write a HTML/5 program to demonstrate the use of Font family, font variant, font style, and font size.

2. Write a HTML/5 program to display random contents using list properties:

3. a) Ordered list b) Unordered list

4. Write a HTML/5 program to create gradient using CSS.

5. Write a HTML/5 code to demonstrate following CSS animation properties:

6. a) Delayb) Direction   c) Duration

7. Write a HTML/5 program to demonstrate key frames

8. Write a HTML/5 code to demonstrate CSS transition and transformation.

9. Write a HTML/5 program to turn on/off a light bulb using JavaScript. Make use of .gif image and buttons.

Part B:

1. Write a HTML/5 program to draw rectangle, line, polygon, polyline using SVG.

2. Write a HTML/5 program to draw linear and radial gradient ellipse using SVG.

3. Write a HTML/5 program to draw a star using SVG.

4. Write a HTML/5 program to draw line, circle, rectangle, gradient, text using canvas.

5. Write a HTML/5 program to demonstrate translation, rotation, scaling, and transform using

canvas.

6. Write a HTML/5 program to demonstrate Bezier Curves and Quadratic Curves.

7. Write a HTML/5 program to create canvas and add a red square onto the game area with up/down/left/right controller buttons.

8. Write a HTML/5 canvas program to add random size obstacles with red square controller button.

V SEMESTER

Course Code	Course Name	Hrs/Week	Credits	SA	IA	Total
DCCA 501	Design & Analysis of Algorithms	3	3	60	40	100
DCCA 501P	Design & Analysis of Algorithms Lab	4	3	60	40	100
DCCA 502	Statistical Computing and R Programming	4	3	60	40	100
DCCA 502 P	R Programming Lab	4	2	25	25	50
DCCA 503	Software Engineering	4	2	25	25	50
DSECA503	Cloud Computing/ Business Intelligence	4	3	60	40	100
CAVOC501	Digital Marketing	4	3	60	40	100
SECSB501	Cyber Security	4	3	60	40	100

Course Title: **Design & Analysis of Algorithms**

Course code: **DCCA501**

Unit 1

Introduction: What is an Algorithm? Fundamentals of Algorithmic problem solving, Fundamentals of the Analysis of Algorithm Efficiency, Analysis Framework, Measuring the input size, Units for measuring Running time, Orders of Growth, Worst-case, Best-case and Average-case efficiencies.

Unit 2

Asymptotic Notations and Basic Efficiency classes, Informal Introduction, O-notation, Ω-notation, θ-notation, mathematical analysis of non-recursive algorithms, mathematical analysis of recursive algorithms.

Unit 3

Brute Force & Exhaustive Search: Introduction to Brute Force approach, Selection Sort

and Bubble Sort, Sequential search, Exhaustive Search- Travelling Salesman Problem and Knapsack Problem, Depth First Search, Breadth First Search

Unit 4

Decrease-and-Conquer: Introduction, Insertion Sort, Topological Sorting
Divide-and-Conquer: Introduction, Merge Sort, Quick Sort, Binary Search, Binary Tree traversals and related properties.

Unit 5

Greedy Technique: Introduction, Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Lower-Bound Arguments, Decision Trees, P Problems, NP Problems, NP- Complete Problems, Challenges of Numerical Algorithms.

References:

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin: 2nd Edition, 2009, Pearson.
2. Computer Algorithms/C++, Ellis Horowitz, SatrajSahni and Rajasekaran, 2nd Edition, 2014,
3. Universities Press.
4. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest,
5. Clifford Stein, 3rd Edition, PHI.
6. Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education)

Weblinks and Video Lectures(e-Resources):

1. http://elearning.vtu.ac.in/econtent/courses/video/CSE/06CS43.html
2. https://nptel.ac.in/courses/106/101/106101060/
3. http://elearning.vtu.ac.in/econtent/courses/video/FEP/ADA.html
4. http://cse01-iiith.vlabs.ac.in/
5. http://openclassroom.stanford.edu/MainFolder/CoursePage.php?course=IntroToAlgorithms

Course Title: Statistical Computing and R Programming

Course code: DCCA502

Unit 1

Introduction of the language, numeric, arithmetic, assignment, and vectors, Matrices and Arrays, Non-numeric Values, Lists and Data Frames, Special Values, Classes, and Coercion, Basic Plotting.

Unit 2

Reading and writing files, Programming, Calling Functions, Conditions and Loops: stand- alone statement with illustrations in exercise 10.1,stacking statements, coding loops, Writing Functions, Exceptions, Timings, and Visibility.

Unit 3

Statistics And Probability, basic data visualisation, probability, common probability distributions: common probability mass functions, bernoulli, binomial, poisson distributions, common probability density functions, uniform, normal, student's t-distribution.

Unit 4

Statistical testing and modelling, sampling distributions, hypothesis testing, components of hypothesis test, testing means, testing proportions, testing categorical variables, errors and power, Analysis of variance.

Unit 5

Simple linear regression, multiple linear regression, linear model selection and diagnostics. Advanced graphics: plot customization, plotting regions and margins, point and click coordinate interaction, customizing traditional R plots, specialized text and label notation. Defining colors and plotting in higher dimensions, representing and using color, 3D scatter plots.

Course Title: Software Engineering

Course code: DCCA503

Unit 1

Overview: Introduction; Software engineering ethics; Software process models; Process activities; Coping with change; Agile software development:Agile methods; Plan- driven and agile development.

Unit 2

Requirements Engineering: Functional and non-functional requirements; Software requirements document; Requirement's specification; Requirements engineering processes; Requirement's elicitationand analysis; Requirement's validation; Requirements management.

Unit 3

System Modeling: Context models; Interaction models- Use case modeling, Sequence diagrams; Structural models- Class diagrams, Generalization,Aggregation; Behavioral models- Data-driven modeling, Event-driven modeling; Model-driven engineering.

Unit 4

Architectural Design: Architectural design decisions; Architectural views; Architectural patterns-Layered architecture, Repository architecture, Client–server architecture Pipe and filter architecture.

Design And Implementation: Object-oriented design using the UML- System context and interactions, Architectural design, Object class identification, Design models, Interface specification; Design patterns; Implementation issues.

Unit 5

Software Testing: Development testing- Unit testing, Choosing unit test cases, Component testing, System testing. Test-driven development; Release testing; User testing- Alpha, Beta, Acceptance testing.

Text Books:

1. Ian Somerville, "Software Engineering" 8th Edition, Pearson Education, 2009.

References Books:

1. Waman S Jawadekar, "Software Engineering Principles and Practice", Tata McGrawHill, 2004.

2. Roger S. Pressman, "A Practitioners Approach",7th Edition, McGraw-Hill, 2007.

3. P Jalote, "An Integrated Approach to software Engineering", Narosa Publication.

Course Title: Cloud Computing

Course code: DSECA503

Unit 1

Introduction: Different Computing Paradigms- Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing etc., Comparison of various Computing Technologies; Cloud Computing Basics- What is Cloud Computing? History, Characteristic Features, Advantagesand Disadvantages, and Applications ofCloud Computing; Trends in Cloud Computing; Leading Cloud Platform Service Providers.

Unit 2

Cloud Architecture: Cloud Service Models- Infrastructure as a Service (IaaS), Platform as a Service (PaaS) and Software as a Service (SaaS), Comparison of different Service Models; Cloud Deployment Models- Public Cloud; Private Cloud, Hybrid Cloud, Community Cloud; Cloud Computing Architecture- Layered Architecture of Cloud. Virtualization- Definition, Features of Virtualization; Types of Virtualizations- Hardware Virtualization, Server Virtualization, Application Virtualization, Storage Virtualization, Operating System Virtualization; Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples- Xen: Paravirtualization, VMware: Full Virtualization, Microsoft Hyper-V.

Unit 3

Cloud Application Programming and the Aneka Platform: Aneka Cloud Application Platform-Framework Overview, Anatomy of the Aneka Container; Building Aneka Clouds (Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode); Cloud Programming and Management- Aneka SDK (Application Model and Service Model); Management Tools (Infrastructure, Platform and Application management).

Unit 4

Cloud Platforms in Industry: Amazon Web Services- Compute Services, Storage Services, Communication Services, Additional Services; Google AppEngine- Architecture and Core Concepts, Application Life-Cycle, Cost Model, Observations; Microsoft Azure- Azure Core Concepts (Compute, Storage, Core Infrastructure and Other Services), SQL Azure, Windows Azure Platform Appliance.

Unit 5

Cloud Applications: Scientific Applications- Healthcare (ECG Analysis in the Cloud) Biology (Protein Structure Prediction and Gene Expression Data Analysis for Cancer Diagnosis), Geoscience (Satellite Image Processing); Business and Consumer Applications- CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming.

Text Books:

1. Rajkumar Buyya, Christian Vecchiola, S. ThamaraiSelvi: "Mastering CloudComputing-Foundations and Applications Programming", Elsevier, 2013

2. Barrie Sosinsky: "Cloud Computing Bible", Wiley-India, 2010

3. K Chandrashekaran: "Essentials of Cloud Computing", CRC Press, 2015

4. Derrick Rountree, Ileana Castrillo: "The Basics of Cloud Computing", Elsevier, 2014

Course Title: Digital Marketing

Course code: CAVOC501

Unit 1

Introduction to Digital Marketing: Overview of digital marketing, Evolution of digital marketing, Importance and benefits of digital marketing, Digital marketing channels and platforms

Digital Marketing Strategy and Planning: Developing a digital marketing strategy, Setting goals and objectives, Budgeting and resource allocation.

Unit 2

Campaign planning and execution, Monitoring and adjusting digital marketing campaigns

Social Media Marketing: Overview of social media marketing, Social media platforms and their features, Creating and optimizing social media profiles, Social media content strategy, Social media advertising and analytics

Unit 3

Email Marketing: Introduction to email marketing, Building an email list, Creating effective email campaigns, Email automation and segmentation, Email marketing metrics and analytics **Content Marketing:** Understanding content marketing, Content strategy and planning.

Unit 4

Content creation and distribution, Content promotion and amplification, Content marketing metrics and analytics.

Mobile Marketing: Mobile marketing overview, Mobile advertising strategies, Mobile app marketing, Location-based marketing, Mobile marketing analytics

Unit 5

Analytics and Reporting: Importance of analytics in digital marketing, Setting up web analytics tools (e.g., Google Analytics), Tracking and measuring key performance indicators (KPIs), Conversion tracking and optimization, Reporting and data visualization.

Text Books:

1. "Digital Marketing Strategy: An Integrated Approach to Online Marketing" by Simon Kingsnorth.

2. "Email Marketing Rules: How to Wear a White Hat, Shoot Straight, and Win Hearts" by Chad S. White

3. "Content Inc.: How Entrepreneurs Use Content to Build Massive Audiences and Create Radically Successful Businesses" by Joe Pulizzi

4. "Mobile Marketing: How Mobile Technology is Revolutionizing Marketing, Communications and Advertising" by Daniel Rowles

5. "Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity" by Avinash Kaushik

Course Title: **Cyber Security**

Course code: **SECSB501**

Unit 1

Introduction to Cyber security: Defining Cyberspace and Overview of Computer and Web-technology, Architecture of cyberspace, Communication and web technology, Internet, World wide web, Advent of internet, Internet infrastructure for data transfer and governance, Internet society, Regulation of cyberspace, Concept of cyber security, Issues and challenges of cyber security.

Unit 2

Cyber-crime and Cyber law: Classification of cybercrimes, Common cyber- crimes- cyber-crime targeting computers and mobiles, cyber crime against women and children, financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus-operandi, Reporting of cyber crimes, Remedial and mitigation measures, Legal perspective of cyber crime, IT Act 2000 and its amendments, Cyber-crime and offences, Organisations dealing with Cyber- crime and Cyber security in India, Case studies.

Unit 3

Social Media Overview and Security: Introduction to Social networks. Types of Social media, Social media platforms, Social media monitoring, Hashtag, Viral content, Social media marketing, Social media privacy, Challenges, opportunities and pitfalls in online social network, Security issues related to social media, Flagging and reporting of inappropriate content, Laws regarding posting of inappropriate content, Best practices for the use of Social media, Case studies.

Unit 4

Definition of E- Commerce, Main components of E-Commerce, Elements of E-Commerce security, E-Commerce threats, E-Commerce security best practices, Advantage of e-commerce, Survey of popular e-commerce sites.

Introduction to digital payments, Components of digital payment and stake holders, Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures. RBI guidelines on digital payments and customer protection in unauthorized banking transactions. Relevant provisions of Payment Settlement Act,2007.

Unit 5

End Point device and Mobile phone security, Password policy, Security patch management, Data backup, Downloading and management of third-party software, Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus, Wi-Fi security, Configuration of basic security policy and permissions.

Text/ References:

1. Cyber Crime Impact in the New Millennium, by R. C Mishra, Auther Press. Edition 2010

2. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)

3. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson, 13th November, 2001)

4. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.

5. Fundamentals of Network Security by E. Maiwald, McGraw Hill.

6. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.

Semester: VI

Subject Code	Subjects	Hrs/Week	Credits	SA	IA	Total

DSC16	Artificial Intelligence and Applications	4	4	60	40	100
DSC17	PHP and MySQL	4	4	60	40	100
DSC17-Lab	PHP and MySQL Lab	4	2	25	25	50
	Project Work	4	4			
DSE-E2	A. Fundamentals of Data Science	4	3	60	40	100
	B. Mobile Application Development	4	3	60	40	100
Voc-2	Web Content Management System	4	3	60	40	100
SEC-5	Logical Reasoning	4	2	30	20	50

Course Title: Artificial Intelligence and Applications

Course code: DSC16

Unit 1

Introduction- What is Artificial Intelligence, Foundations of AI, History, AI - Past, Present and Future. Intelligent Agents- Environments- Specifying the task environment, Properties of task environments, Agent based programs-Structure of Agents , Types of agents- Simple reflex agents, Model-based reflex agents, Goal-based agents; and Utility-based agents.

Unit 2

Problem Solving by Searching-Problem-Solving Agents, Well-defined problems and solutions, examples Problems, Searching for Solutions, Uninformed Search Strategies-Breadth-first search, Uniform-cost search, Depth-first search, Depth-limited search, Iterative deepening depth-first search, Bidirectional search, Greedy best-first search, A* Search, AO* search Informed (Heuristic) Search Strategies, Heuristic Functions

Unit 3

Knowledge Representation - Knowledge-Based Agents, The Wumpus World , Logic, Propositional Logic, Propositional Theorem Proving, Effective Propositional Model Checking, Agents Based on Propositional Logic, First-Order Logic-Syntax and Semantics of First-Order
Logic, Using First-Order Logic, Unification and Lifting Forward Chaining, Backward Chaining

Unit 4

Learning– Forms of Learning, Supervised Learning, Machine Learning - Decision Trees, Regression and Classification with Linear Models, Artificial Neural Networks, Support Vector Machines

Unit 5

Applications of AI - Natural Language Processing, Text Classification and Information Retrieval, Speech Recognition , Image processing and computer vision, Robotics

Text Books:

1.   Stuart Russel, Peter Norvig: Artificial Intelligence A Modern Approach, 2nd Edition, Pearson

Education, 2003

2. Tom Mitchell, "Machine Learning", 1st Edition, McGraw-Hill,2017

3. Elaine Rich, Kevin Knight, Shivashankar B Nair: Artificial Intelligence, Tata McGraw Hill 3rd edition,2013

Course Title: PHP and MySQL

Course code: DSC17

Unit 1

Introduction to PHP: Introduction to PHP, History and Features of PHP, Installation & Configuration of PHP, Embedding PHP code in Your Web Pages, Understanding PHP, HTML and White Space, Writing Comments in PHP, Sending Data to the Web Browser, Data types in PHP, Keywords in PHP, Using Variables, Constants in PHP, Expressions in PHP, Operators in PHP.

Unit 2

Arrays in PHP: Introduction- What is Array?, Creating Arrays, Accessing Array elements, Types of Arrays: Indexed v/s Associative arrays, Multidimensional arrays, Creating Array, Accessing Array, Manipulating Arrays, Displaying array, Using Array Functions, Including and Requiring Files- use of Include() and Require(), Implicit and Explicit Casting in PHP.

Unit 3

Functions, Class- Objects, Forms in PHP: Functions in PHP, Function definition, Creating and invoking user-defined functions, Formal parameters versus actual parameters, Function and variable scope, Recursion, Library functions, Date and Time Functions **Strings in PHP:** What is String?, Creating and Declaring String, String Functions

Unit 4

Class &Objects in PHP: What is Class & Object, Creating and accessing a Class &Object, Object properties, object methods, Overloading, inheritance, Constructor and Destructor
Form Handling: Creating HTML Form, Handling HTML Form data in PHP
Database Handling Using PHP with MySQL: Introduction to MySQL: Database terms, Data Types.

Unit 5

Accessing MySQL –Using MySQL Client and Using php MyAdmin, MySQL Commands, Using **PHP with MySQL:** PHP MySQL Functions, Connecting to MySQL and Selecting the Database, Executing Simple Queries, Retrieving Query Results, Counting Returned Records, Updating Records with PHP.

References

1. PHP & MySQL for Dynamic Web Sites- Fourth Edition By Larry Ullman.

2. Learning PHP, MySQL and JavaScript By Robin Nixon –O"REILLY Publications

3. Programming PHP By Rasmus Lerdorf, Kevin Tatroe, Peter MacIntyre

4. SAMS Teach Yourself PHP in 24 hours, Author: Matt Zandstra, Sams Publishing

Course Title: **Fundamentals of Data Science**

Course code: **DSE-E2**

Unit 1

Unit I: Data Mining: Introduction, Data Mining Definitions, Knowledge Discovery in Databases (KDD) Vs Data Mining, DBMS Vs Data Mining, DM techniques, Problems, Issues and Challenges in DM, DM applications.

Unit 2

Data Warehouse: Introduction, Definition, Multidimensional Data Model, Data Cleaning, Data Integration and transformation, Data reduction, Discretization

Unit 3

Mining Frequent Patterns: Basic Concept – Frequent Item Set Mining Methods -Apriori and Frequent Pattern Growth (FPGrowth) algorithms -Mining Association Rules

Unit 4

Classification: Basic Concepts, Issues, Algorithms: Decision Tree Induction. Bayes Classification Methods, Rule-Based Classification, Lazy Learners (or Learning from your Neighbours), k Nearest Neighbour. Prediction - Accuracy- Precision and Recall.

Unit 5

Clustering: Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering.

Text Books:

1. Jiawei Han and Micheline Kambar – "Data Mining Concepts and Techniques" Second Edition Elsevier Publications

2. Arun K Pujari – "Data Mining Techniques" 4th Edition, Universities Press

3. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Pearson Education, 2012.

4. K.P.Soman, Shyam Diwakar, V.Ajay: Insight into Data Mining – Theory and Practice, PHI

5. Pang-Ning Tan, Michael Steinbach, Vipin Kumar - "Introduction to Data Mining", Pearson Education

Course Title: Web Content Management System

Course code: Voc-1

Unit 1

Web Content Development and Management, Content Types and Formats, Norms and Guidelines of Content Development, Creating Digital Graphics, Audio Production and Editing,

Unit 2

Web Hosting and Managing Multimedia Content, Creating and Maintaining a Wiki Site. Presentation Software Part I, Presentation Software Part II, Screen casting Tools and Techniques, Multilingual Content Development.

Unit 3

Planning and Developing Dynamic Web Content Sites, Website Design Using CSS. Creating and Maintaining a WIKI Site, Creating and Managing a Blog Site,

Unit 4

E- Publication Concept, E- Pub Tools, Simulation and Virtual Reality Applications, Creating 2D and 3 D Animations. Introduction to Moodle, creating a New Course and Uploading.

Unit 5

Create and Add Assessment, Add and Enroll User and Discussion Forum, Content Management System: Joomla, Content Management System: Drupal.

Text Books:

1. Web Content Management: Systems, Features, and Best Practices 1st Edition by Deane

2. Barker.

3. Content Management Bible (2nd Edition) 2nd Edition by Bob Boiko.

4. Moodle for Learning Management System (LMS): A Practical and Visual Guidebook of Administrator and Instructor for Distance Education Paperback – October 12, 2020 by James Koo

5. Using Joomla!: Efficiently Build and Manage Custom Websites 2nd Edition by Ron Severdia

Additional Reading:

1. https://onlinecourses.swayam2.ac.in/cec20_lb09/preview

Course Title: Logical Reasoning

Course code: SEC-5

Unit 1

Arithmetic Reasoning: Analytical Thinking, Syllogistic Logic, Problem solving; Number System; LCM &HCF; Divisibility Test; Surds and Indices; Logarithms; Ratio, Proportions and Variations; Partnership; Time speed and distance; work time problems;

Unit 2

Data Interpretation: Numerical Data Tables; Line Graphs; Bar Charts and Pie charts; Mix Diagrams; Geometrical Diagrams, and other forms of Data Representation

Unit 3

Lateral Thinking, Reasoning & Logic: Verbal and Non-verbal Logic, Family Tree; Linear Arrangements; Circular and Complex Arrangement; Conditionality and Grouping; Sequencing and Scheduling; Selections; Networks; Venn Diagram in Logical Reasoning.

References

1. R.S.Aggarwal- "A Modern Approach to Verbal and Non–Verbal Reasoning" Sultan Chand and Sons, New Delhi

2. R.S.Aggarwal–"Quantitative Aptitude", Sultan Chand and Sons, New Delhi

3. Dr.Ravi Chopra – "Verbal and Non–Verbal Reasoning", MacMillan India

4. Dr.Edward DeBono – "Lateral Thinking", Penguin Books, New Delhi

Course Title: **LAB: PHP and MySQL**

Course code: **DSC17- Lab**

1. Write a PHPscript to print "hello world".

2. Write a PHPscript to find odd or even number from given number.

3. Write a PHPscript to find maximum of three numbers.

4. Write a PHPscript to swap two numbers.

5. Write a PHPscript to find the factorial of a number.

6. Write a PHPscript to check whether given number is palindrome or not.

7. Write a PHP script to reverse a given number and calculate its sum

8. Write a PHP script to to generate a Fibonacci series using Recursive function

9. Write a PHP script to implement atleast seven string functions.

10. Write a PHP program to insert new item in array on any position in PHP.

11. Write a PHP script to implement constructor and destructor

12. Write a PHP script to implement form handling using get method

13. Write a PHP script to implement form handling using post method.

14. Write a PHP script that receive form input by the method post to check the number is prime or not

15. Write a PHP script that receive string as a form input

16. Write a PHP script to compute addition of two matrices as a form input.

17. Write a PHP script to show the functionality of date and time function.

18. Write a PHP program to upload a file

19. Write a PHP script to implement database creation

20. Write a PHP script to create table

21. Develop a PHP program to design a college admission form using MYSQL database.

DEPARTMENT OF COMPUTER SCIENCE

SYLLABUS (SEP)

(With Effect from AY 2024-25)

I SEMESTER

Course Code	Course Name	Hrs/Week	Credits	SA	IA	Total
	Language-I	3+0	4	80	20	100
	English-I	3+0	4	80	20	100
CA1T1	Fundamentals of Computers	4+0	4	80	20	100
CA1T2	Programming in C	4+0	4	80	20	100
CA1T3	Computational Discrete Mathematics	4+0	4	80	20	100
CA1P1	Office Automation Lab	0+2	4	40	10	50
CA1P2	C Programming Lab	0+2	4	40	10	50
	Environmental Studies	2+0	2	40	10	50

Course Title: Fundamentals of Computers

Course Code: CA1T1

Unit 1

Fundamentals of Computers: Introduction to Computers - Computer Definition, Characteristics of Computers, Evolution and History of Computers, Types of Computers, Basic Organisation of a Digital Computer. Computer Language and Software: Machine Language, Assembly Language, High Level Language, Assembler, Compiler, Interpreter.

Software – System and Application Software. Algorithm, Flowchart and Pseudo code with Examples. Introduction to Flowgorithm, Flowgorithm Features.

Unit 2

Input/Output Devices: Input Device – keyboard, mouse, scanner, MICR, OMR. Output Devices – VDU, Printers – Dot Matrix, line printers and page printers. Computer Memory: Memory Concept, Memory Cell, Memory Organisation, Semiconductor Memory – RAM, ROM, PROM, EPROM, Secondary Storage Devices – Magnetic Tape, Magnetic Disk-Floppy Disk, Hard Disk, Compact Disk. Logic Gates: The Inverter, The AND gate, The OR gate, The NAND gate, NOR gate, The Exclusive–OR gate and Exclusive-NOR gate.

Unit 3

Number Systems – Different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Introduction of Internet and email: Features of Internet, Internet applications, web browser, search engine, e-mail, How to create e-mail, E-mail operations, E-mail-attaching a document,

Unit 4

MS Office: Introduction to MS Office, Components and Features.

MS Word: Creating Letter, Table, Fonts, Page Layout Document, Formatting, Spell Check, Print Preview, Template, Color, Mail Merge, Auto Text, Inserting Picture, Word Art.

MS Excel: Introduction to Excel, Sorting, Graphs, Scientific Functions.

PowerPoint: Introduction to PowerPoint, Creation of Slides, Inserting Pictures, Preparing Slide Show with Animation.

References:

1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication

2. Floyd, Thomas L, "Digital Computer Fundamentals", 10 th Edition, University Book Stall,

3. Bartee, Thomas C, "Digital Computer Fundamentals", 6th Edition, TMH.

4. Introduction to Computer Science, ITL Education Solutions, Pearson Education

Course Title: Programming in C

Course Code: CA1T2

Unit 1

Overview of C Language: History of C, Character set, C tokens, Identifiers, Keywords, Data types, Variables, Constants, Symbolic Constants , Operators in C, Hierarchy of Operators, Expressions, Type Conversions and Library Functions. Managing Input and Output Operation: Formatted and Unformatted I/O Functions.

Unit 2

Decision making, branching and looping: Decision Making Statements - if Statement, if–else statement, nested if statement, else–if ladder, switch statement, Looping - while, do-while, for loop, Nested loop, break, continue, and goto statements. Functions: Function Definition, prototyping, types of functions, passing arguments to functions, Nested Functions, Recursive functions.

Unit 3

Arrays: Declaring and Initializing, One Dimensional Arrays, Two Dimensional Arrays, Multi Dimensional Arrays - Passing arrays to functions. Strings: Declaring and Initializing strings, Operations on strings, Arrays of strings, passing strings to functions. Storage Classes - Automatic, External, Static and Register Variables. Structures-Declaring and Initializing, Nested structure, Array of Structure, Passing Structures to functions, Unions, typedef, enum, Bit fields.

Unit 4

Pointers – Declarations, Pointer arithmetic, Pointers and functions, Call by value, Call by reference, Pointers and Arrays, Arrays of Pointers, Pointers and Structures. Meaning of static and dynamic memory allocation, Memory allocation functions. Files - File modes, File functions, and File operations, Text and Binary files, Command Line arguments. C Preprocessor directives, Macros – Definition, types of Macros, Creating and implementing user defined header files.

References:

1. C: The Complete Reference, By Herbert Schildt.

2. C Programming Language, By Brain W. Kernighan

3. Kernighan & Ritchie: The C Programming Language (PHI)

4. P. K. Sinha & Priti Sinha: Computer Fundamentals (BPB)

5. E. Balaguruswamy: Programming in ANSI C (TMH)

Course Title: Computational Discrete Mathematics

Course Code: CA1T3

Unit 1

The Foundations: Basic Concepts, Propositions, Truth Table, Connectives and Compound Propositions, Implication, Biconditional of Connectives, Converse, Inverse and Contra positive of an Implication, Tautology, Contradiction, Logical Equivalence, Applications of Propositional Logic, Propositional Equivalences. Basic Structures: Definition, Types of sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set. Determinants: Definition, Minors, Cofactors, Properties of Determinants.

Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramer's Rule.

Unit 2

Counting: Basics of counting, Pigeonhole principle, Permutation and combination, Binomial Coefficient and Combination, Generating Permutation and Combination. Advanced Counting Techniques: Applications of Recurrence Relations, Solving Linear Recurrence Relations, Generating functions, Inclusion-Exclusion, Applications of Inclusion-exclusion.

Unit 3

Induction and Recursion: Mathematical Induction, Strong Induction and Well-Ordering, Recursive Definitions and Structural Induction, Recursive Algorithms, Program Corrections. Relations and Functions: Properties of Relations, Equivalence Relation, Partial Order Relation Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions.

Unit 4

Graphs: Graphs and Graph models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring.

References:

1. Discrete Mathematics and Its Applications, Kenneth H. Rosen: Seventh Edition.

2. Discrete Mathematical Structure, Bernard Kolman, Robert C, Busby, Sharon Ross.

3. Graph Theory with Applications to Engg and Comp. Sci: Narsingh Deo-PHI.

4. Discrete and Combinatorial Mathematics Ralph P. Grimaldi, B. V. Ramatta, Pearson, Education, 5 Edition.

5. Discrete Mathematical Structures, Trembley and Manohar.

Course Title: Office Automation Lab

Course Code: CA1P1

Section - A

1. Write a leave letter to the principal by using different alignments using MS-Word.
2. Create a bio-data using different alignments and use the page border using MS-Word.
3. Create a time table of your class using MS-Word.
4. Create documents of your own and write the steps using MS-Word:
   a)   Insert Pictures
   b)   Insert Shapes
5. Create a document using MS-Word.
   a)   The word "MS-Word" as the watermark of the document.
   b)   Set the background color of the document.
   c)   Choose the indent tab.
   d)   Change the space between paragraphs by adding space.
6. To prepare students mark sheet with the fields of Name, Register_Number, Mark1, Mark2, Mark3, Total, Average, Result and Class using MS-Excel.
7. To prepare employees payroll data with the fields of Sl.No. Name, Basic_pay, HRA, DA, PF, Gross_salary and Net_salary.
   a)   Calculate HRA (10 % of Basic Pay), DA (25% of Basic Pay), DA (12% of Basic Pay).
   b)   Calculate Gross_salary=Basic_pay+HRA+DA.
   c)   Calcualte Net_salary=Gross_salary-PF
8. Prepare a bar chart and pie chart for analysis of five year results of your college using MS- Excel.
9. Create a line chart and bar chart using its data series using MS-Excel.

10. To prepare worksheet contains Name and Sales of 10 salesmen. Calculate

commission as per the following:

Sales	Commission
First 30,000	5%
Next 40,000	10%
Excess	15%

Section - B

1. Create a power-point presentation with minimum 5 slides.

    a.   The first slide must contain the topic of the presentation and name of the presentation.

    b.   Second slide must contain at least 5 bullets, 5 numbers.

    c.   The heading must be, font size:32, font-face: Arial Rounded MT Bold, font-color: blue.

    d.   Last slide must contain "Thank you".

2. Create a power-point presentation with minimum 5 slides.

    a.   Use custom animation option to animate the text; the text must move left to right one line at a time.

    b.   Use proper transition for the slides.

3. Create a PowerPoint presentation with different animation format.

4. Create a PowerPoint presentation for company product by using different features.

5. Create a presentation about Computer Generations. The presentation should contain 5 slides, one for each generation. Apply transaction effect and slide advances in every two seconds automatically.

6. Using flowgorithm software, Execute different arithmetic tasks for sum, average, product, difference, quotient and remainder of given numbers.

7. Using flowgorithm software to calculate the area of shapes for square, rectangle, circle and triangle.

8. Using flowgorithm software,

a. Calculate the Fahrenheit to Celsius. F=(celsius*1.8)+32.

b. Calculate the Celsius to Fahrenheit. C=(Fahrenheit-32)/1.8.

9. Using flowgorithm software to check the given year is leap year or not.

10. Using flowgorithm software to find the largest of three integer numbers.

Course Title: C Programming lab

Course Code: CA1P2

Section - A

1. Program to read radius of a circle and to find area and circumference.

2. Program to read three numbers and find the biggest of three.

3. Program to generate N primes.

4. Program to read a number, find the sum of the digits, reverse the number and check it for palindrome.

5. Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers.

6. Program to read percentage of marks and to display appropriate message (Demonstration of else-if ladder).

7. Program to find the roots of quadratic equation (demonstration of switch case statement).

8. Program to read marks scored by N students and find the average of marks (Demonstration of single dimensional array).

9. Program to remove duplicate element in a single dimensional array.

10. Program to perform addition and subtraction of matrices

Section - B

1. Program to find the length of a string without using built in function

2. Program to demonstrate string functions.

3. Program to demonstrate pointers in C.

4. Program to check a number for prime by defining isprime( ) function.

5. Program to read, display and add two m x n matrices using functions.

6. Program to read, display and multiply two m x n matrices using functions.

7. Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.

8. Program to reverse a string using pointer

9. Program to swap two numbers using pointers

10. Program to demonstrate student structure to read and display records of N students.

Course Code	Course Name	Hrs/Week	Credits	SA	IA	Total
	Language-II	3+0	4	80	20	100
	English-II	3+0	4	80	20	100
CA2T1	Data Structures Using C	4+0	4	80	20	100
CA2T2	Statistical Methods using R Programming	4+0	4	80	20	100
CA2T3	Operating System Concepts	4+0	4	80	20	100
CA2P1	Data Structures Lab	0+2	4	40	10	50
CA2P2	R Programming Lab	0+2	4	40	10	50
	Constitutional Values-II	2+0	2	40	10	50

Course Title: Data Structures using C

Course Code: CA2T1

Unit 1

Introduction and Overview: Definition, Elementary data organization, Data Structures, data structures operations, Abstract data types, Complexity of algorithms, asymptotic notations for complexity of algorithms. Arrays: Definition, Linear arrays, arrays as ADT, Representation of Linear Arrays in Memory, Traversing Linear arrays, Inserting and deleting elements, Multidimensional arrays, Representation of multidimensional Arrays and Sparse matrices.

Unit 2

Sorting: Bubble sort, Insertion sort, Selection sort, Searching: Linear Search, Binary search. Linked list: Definition, Representation of Singly linked list in memory, Traversing a Singly linked list, Searching a Singly linked list, Memory allocation, Garbage collection, Insertion into a singly linked list, Deletion from a singly linked list; Doubly linked list, Header linked list, Circular linked list.

Unit 3

Stacks – Definition, Array representation of stacks, Linked representation of stacks, Stack as ADT, Arithmetic Expressions: Polish Notation, Application of Stacks, Recursion, Towers of Hanoi,

Implementation of recursive procedures by stack. Queues – Definition, Array representation of queue,

Linked list representation of queues Types of queue: Simple queue, Circular queue, Double ended queue, Priority queue, Operations on Queues, Applications of queues

Unit 4

Tree – Definitions, Binary trees, Representing binary trees in memory, Traversal of binary tree; preorder, inorder and postorder traversal; Binary Search Trees, Searching, Inserting and Deleting in a Binary Search Tree. Graphs: Graph terminology, Sequential representation of Graphs: Adjacency matrix, Graph Traversals: Breadth First Search and Depth First Search.

References

1. Ellis Horowitz and Sartaj Sahni: Fundamentals of Data Structures

2. Tanenbaum: Data structures using C (Pearson Education)

3. Kamathane: Introduction to Data structures (Pearson Education)

4. Y. Kanitkar: Data Structures Using C (BPB)

Course Title: **Statistical Computing and R Programming**

Course Code: **CA2T2**

Unit 1

The Language: Introduction – Advantages of R over Other Programming Languages, R Studio: R script file, Handling Packages in R: Installing R Package, Syntax, Comments, Operators, R Keywords, R Data Types - numeric, Integer, logical, complex, character and raw, Variables, Input and Output statement, Data Structures – Strings, Vectors, Matrices, Arrays, Non-numeric Values, Lists and Data Frames, Special Values, Classes, and Coercion, Reading and Writing Files.

Unit 2

Programming: Conditions and Loops - If statements - Stand-Alone Statement, Using If Else, Nesting and Stacking Statements, The Switch Function. Coding Loops - For Loops, While Loops, Repeat Loop, Other Control Flow Mechanisms - Declaring Break, Next and goto statement, R-Function: function definition, Built-in functions: Basic Math function - min(), max(), sum(), sqrt(),abs(),ceiling(),floor(), trunc(), round(), cos(), sin(), tan(), String function -

grep(), nchar() , paste(), sprintf(), substr(), strsplit(), regex() gregexpr(), toupper(), tolower(), paste(), User Defined Function, Exception Handling, Progress and Timing, Visibility.

 Unit 3

Statistics and Probability: Elementary Statistics, Basic data visualisation, probability, common probability distributions: common probability mass functions - Bernoulli, Binomial, Poisson distributions, common probability density functions - Uniform, Normal, Student's t- distribution.

Unit 4

Statistical Testing and Modelling: Sampling distributions, hypothesis testing, Analysis of variance, Simple linear regression, multiple linear regressions. Advanced graphics: Basic Plotting, plot customization, plotting regions and margins, point and click coordinate interaction, customizing

traditional R plots, specialized text and label notation, defining colors and plotting in higher dimensions.

References:

1. Tilman M. Davies, "The book of R: A first course in programming and statistics", San Francisco, 2016.

2. Vishwas R. Pawgi, "Statistical computing using R software", Nirali prakashan publisher, e1 edition, 2022.

3. https://www.geeksforgeeks.org/r-tutorial/

4. https://www.tutorialspoint.com/r/index.htm

Course Title: Operating System Concepts

Course code: CA2T3

Unit 1

Introduction to Operating System: Definition, History and Examples of Operating System; Computer System organization; Types of Operating Systems; Functions of Operating System; Systems Calls; Operating System Structure. Process Management: Process Concept- Process Definition, Process State, Process Control Block, Threads; Process scheduling- Multiprogramming, Scheduling Queues, CPU Scheduling, Operations on Processes- Creation and Termination of Processes; Inter process communication (IPC)- Definition and Need for Inter process Communication, CPU Scheduling Criteria, Scheduling algorithm, Multiple Processor Scheduling, Real time Scheduling.

Unit 2

Process Synchronization: Introduction; Race Condition; Critical Section Problem and Peterson's Solution; Synchronization Hardware, Semaphores; Classic Problems of Synchronization- Readers and Writers Problem, Dining Philosophers Problem; Monitors. Deadlocks: System Model; Deadlocks Characterization; Methods for Handling Deadlocks; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection; and Recovery from Deadlock

Unit 3

Memory Management: Logical and Physical Address Space; Swapping; Contiguous Allocation; Paging; Segmentation; Segmentation with Paging. Virtual Memory: Introduction to Virtual Memory; Demand Paging; Page Replacement; Page Replacement Algorithms; Allocation of frames, Thrashing.

Unit 4

File System: File Concepts- Attributes, Operations and Types of Files; File System; File Access methods; Directory Structure; Protection; File System Implementation- File System Structure, Allocation Methods, Free Space Management. Disk Structure & Scheduling methods, Disk management, Swap – Space management.

References:

1. Operating System Concepts, Silberschatz' et al., 10thEdition, Wiley.

2. Operating System Concepts - Engineering Handbook, Ghosh PK.

3. Operating Systems - Internals and Design Principles, William Stallings, 9th Edition, Pearson.

4. Operating Systems – A Concept Based Approach, Dhamdhere, 3rd Edition, McGraw Hill Education India.

5. Modern Operating Systems, Andrew S Tanenbaum, 4th Edition, Pearson.

Course Title: **Data Structures Lab**

Course Code: **CA2P1**

Section A

1. Program to find GCD using recursive function
2. Program to display Pascal Triangle using binomial function
3. Program to generate n Fibonacci numbers using recursive function.
4. Program to implement Towers of Hanoi.
5. Program to implement dynamic array, find smallest and largest element of the array.
6. Program to create two files to store even and odd numbers.
7. Program to create a file to store student records.
8. Program to read the names of cities and arrange them alphabetically.
9. Program to sort the given list using selection sort technique.
10. Program to sort the given list using bubble sort technique.

Section B

1. Program to sort the given list using insertion sort technique.
2. Program to sort the given list using quick sort technique.
3. Program to sort the given list using merge sort technique.
4. Program to search an element using linear search technique.
5. Program to search an element using recursive binary search technique.
6. Program to implement Stack.
7. Program to convert an infix expression to postfix.
8. Program to implement simple queue.
9. Program to implement linear linked list.
10. Program to display traversal of a tree.

Course Title: **R Programming Lab**

Course Code: **CA2P2**

Section-A

1. Write a R program that includes various data types in R.
2. Write a R program for different types of data structures in R
3. Write a R program that includes linear algebra operations on vectors and matrices.

4. Write a R program that includes various looping statements.

5. Write a R program for quick sort implementation, binary search tree.

6. Write a R program for calculating cumulative sums, products, minima, maxima and calculus.

7. Write a R program for finding stationary distribution of Markanov chains.

8. Write a R program for any visual representation of an object with creating graphs using graphic functions: Plot(),Hist(), Linechart(),Pie(),Boxplot(),Scatterplots().

9. Write a R program with any dataset containing data frame objects, indexing, and subsetting data frames, and employ manipulating and analyzing data.

10. Write a program to create any application of Linear Regression in a multivariate context for predictive purposes.

Section-B

1. Write a R program to take input from the user (name, age, address, city, state) and display the values. Also, print the version of the R installation.

2. Write a R program that includes different operators.

3. Write a R program to default values for arguments, returning complex objects.

4. Write a R program to create and store an array of 4 × 4 matrix and calculate its sum

5. Write a R program that includes various if statements.

6. Write a R program to calculate both simple interest and compound interest using functions.

7. Write a R program to implement various statistical functions in R.

8. Write a R program to find Correlation and Covariance.

9. Write a R program to import the data set and perform an ANOVA test.

10. Write a R program to define colors in various ways. (Use of named colors, RGB colors, hexadecimal color codes, and the colors()).