ST ALOYSIUS COLLEGE(AUTONOMOUS)

NATIONAL EDUCATION POLICY - 2020 (NEP-2020)

Curriculum Structures

for

Bachelor of Science

Basic and Honours Programmes

with

Computer Science as Major Course

and

Open Elective Courses in Computer Science

Index

The objectives of the Programme are:

1. The primary objective of this program is to provide a foundation of computing principles and business practices for effectively using/managing information systems and enterprise software
2. It helps students analyze the requirements for system development and exposes students to business software and information systems
3. This course provides students with options to specialize in legacy application software, system software or mobile applications
4. To produce outstanding IT professionals who can apply the theoretical knowledge into practice in the real world and develop standalone live projects themselves
5. To provide opportunity for the study of modern methods of information processing and its applications.
6. To develop among students the programming techniques and the problem- solving skills through programming
7. To prepare students who wish to go on to further studies in computer science and related subjects.
8. To acquaint students to Work effectively with a range of current, standard, Office Productivity software applications.

Program Outcomes:

1. **Discipline knowledge:** Acquiring knowledge on basics of Computer Science and ability to apply to design principles in the development of solutions for problems of varying complexity
2. **Problem Solving:** Improved reasoning with strong mathematical ability to Identify, formulate and analyze problems related to computer science and exhibiting a sound knowledge on data structures and algorithms.
3. **Design and Development of Solutions:** Ability to design and development of algorithmic solutions to real world problems and acquiring a minimum knowledge on statistics and optimization problems. Establishing excellent skills in applying various design strategies for solving complex problems.
4. **Programming a computer:** Exhibiting strong skills required to program a computer for various issues and problems of day-to-day applications with thorough knowledge on programming languages of various levels.

5. **Application Systems Knowledge**: Possessing a sound knowledge on computer application software and ability to design and develop app for applicative problems.
6. **Modern Tool Usage:** Identify, select and use a modern scientific and IT tool or technique for modeling, prediction, data analysis and solving problems in the area of Computer Science and making them mobile based application software.
7. **Communication:** Must have a reasonably good communication knowledge both in oraland writing.
8. **Project Management:** Practicing of existing projects and becoming independent to launch own project by identifying a gap in solutions.
9. **Ethics on Profession, Environment and Society:** Exhibiting professional ethics to maintain the integrality in a working environment and also have concern on societal impacts due to computer-based solutions for problems.
10. **Lifelong Learning:** Should become an independent learner. So, learn to learn ability.
11. **Motivation to take up Higher Studies:** Inspiration to continue educations towards advanced studies on Computer Science.

Syllabus Structure of Computer Science Paper as one of the major papers and open elective papers for BSc (Computer Science).

Subject Code	sem	subject	Theory hours/week	Practical hours/week	Duration of exams	Marks and credits			
						IA	Exam	Total	Credits
G505DC1.1	I	Computer Fundamentals and Programming in C	4		03	40	60	100	4
G505DC1.1P	I	C Programming Lab		4	02	25	25	50	2
G505OE1.1	I	Office Automation	3		03	40	60	100	3
G505DC2.2	II	Data Structures using C	4		03	40	60	100	4
G505DC2.2P	II	Data Structures Lab		4	03	25	25	50	2
G505OE2.2	II	Web Designing	3		03	40	60	100	3
G505DC3.3	III	object oriented Programming concepts and programming JAVA	4		03	40	60	100	4
G505DC3.3P	III	java lab		4	02	25	25	50	2
G505OE3.3	III	Internet of things	3		03	40	60	100	3
G505DC4.4	IV	Data Base Management System	4		03	40	60	100	4
G505DC4.4P	IV	DBMS lab		4	02	25	25	50	2
G505DC5.5	V	Programming in Python	4		03	40	60	100	4
G505DC5.5P	V	Python Programming Lab		4	02	25	25	50	2
G505DC6.5	V	Computer Networks	4		03	40	60	100	4
G505DC6.5P	V	Computer Networks Lab		4	02	25	25	50	2
G505DC7.6	VI	Web Technologies	4		03	40	60	100	4
G505DC7.6P	VI	Web Technologies Lab – Java Script, HTMS, CSS Lab		4	02	25	25	50	2
G505DC8.6	VI	Statistical Computing & R Programming	4		03	40	60	100	4
G505DC8.6P	VI	R Programming Lab		4	02	25	25	50	2

Curriculum Structure

Program: B.Sc. (Basic and Honors) Subject: Computer Science

Sem	Discipline Specific Core Courses (DSC)	Hours/Week		Discipline Specific Elective Courses (DSE)/ Vocational Courses (VC)	Hours/ Week
		Theory	Lab		
1	DSC-1: Computer Fundamentals and Programming in C DSC-1Lab: C Programming Lab	4	 4		
2	DSC-2: Data Structures using C DSC-2Lab: Data structures Lab	4	 4		
3	DSC-3: Object Oriented Programming Concepts and Programming in JAVA DSC-3Lab: JAVA Lab	4	 4		
4	DSC-4: Database Management Systems DSC-4Lab: DBMS Lab	4	 4		
5	DSC-5: Programming in PYTHON DSC-6: Operating System Concepts DSC-5Lab: PYTHON Programming lab DSC-6Lab: Operating System lab	3 3	 4 4	VC-1: Any one from Vocational Courses, Group – 1*	3
6	DSC-7: Internet Technologies DSC-8: Computer Networks DSC-7Lab: JAVA Script, HTML, CSS Lab DSC-8Lab: Computer Networks Lab	3 3	 4 4	VC-2: Any one from Vocational Courses, Group – 2* Internship:	3
7	DSC-9: Computer Graphics and Visualization DSC-10: Design and Analysis of Algorithms DSC-11: Software Engineering DSC-9Lab: Computer Graphics and Visualization Lab DSC-10Lab: Algorithms Lab	3 3 3	 4 4	DSE-1: Any one from Discipline Specific Elective Courses, Group – 1** DSE-2: Any one from Discipline Specific Elective Courses, Group – 2** Research Methodology:	3 3 3
8	DSC-12: Artificial Intelligence and Applications DSC-13: Computer Organization and Architecture DSC-14: Data Warehousing and Data Mining	3 3 3		DSE-3: DSE-4: Any two from Discipline Specific Elective Courses, Group – 3 Research Project:	3 3 6

* Vocational Courses

Group-1
• DTP, CAD and Multimedia • Hardware and Server Maintenance • Web Content Management Systems • E-Commerce • Web Designing
Group-2
• Health Care Technologies • Digital Marketing • Office Automation • Multimedia Processing • Accounting Package

** Discipline Specific Elective Courses

Group-1
• IoT • Cyber Law and Cyber Security • Web Programming - PHP and MySQL • Clouds, Grids, and Clusters • Software Testing
Group-2
• Information and Network Security • Data Compression • Discrete Structures • Open source Programming • Multimedia Computing • Big Data
Group-3
• Data Analytics • Storage Area Networks • Pattern Recognition • Digital Image Processing • Parallel Programming • Digital Signal Processing

First Semester

Course Code: G505DC1.1	**Course Title: Computer Fundamentals and Programming in C**
Course Credits: 4	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Outcomes (COs)

After completing this course satisfactorily, a student will be able to:

- Operate desktop computers to carry out computational tasks
- Understand working of hardware and software and the importance of operating systems
- Understand programming languages, number systems, peripheral devices, networking, multimedia and internet concepts
- Read, understand and trace the execution of programs written in C language
- Write the C code for a given problem
- Perform input and output operations using programs in C
- Write programs that perform operations on arrays

Course Content

Content	Hours
Unit - 1	
Fundamentals of Computers: Introduction to Computers –Definition of a computer, Characteristics of computers, Evolution of computers, Generations of computers, Classification of computers. Computer system, applications of computers. **Number Systems** – different types, conversion from one number system to another; Coding schemes –ASCII and Unicode. **Computer Software** – Categories of software. **Computer Programming and Languages**–Machine Level, Assembly level and Highlevel languages; Translator Programs – Assembler, Interpreter and Compiler. Developing a computer program, Program Development Cycle - Algorithm, Flowchart and Pseudocode with examples. **Introduction to C Programming:** Overview of C; History and Importance of C; Structure of a C Program with Examples; Creating and Executing a C Program; Compilation process in C.	13
Unit - 2	
C Programming Basic Concepts: C Character Set; C tokens - keywords, identifiers, constants, and variables; Data types; Declaration and initialization of variables; Symbolic constants. **C Operators and 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. **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.	13

Unit - 3	
Control Structures: Branching: if, if-else, nested if, else-if ladder, switch. Looping**:** while, do-while and for loop, nested loops, exit, break, jumps in loops. **Arrays**: One Dimensional arrays - Declaration, Initialization and Memory representation; Two Dimensional arrays - Declaration, Initialization and Memory representation. **Strings**: Declaring and Initializing string variables; String handling functions - *strlen, strcmp, strcpy and strcat;* Character handling functions - *toascii, toupper, tolower, isalpha, isnumeric* etc.	13
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. **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.	13

Text Books:

1. Pradeep K. Sinha and Priti Sinha: **Computer Fundamentals** (Sixth Edition), BPB Publication.
2. ITL Education Solution Limited, **Introduction to Information Technology**, Second Edition 2018, Pearson Education.
3. E. Balagurusamy: **Programming in ANSI C** (TMH),7th Edition.

Reference Books :

1. Kamthane: Programming with ANSI and TURBO C (Pearson Education)
2. V. Rajaraman: Programming in C (PHI – EEE)
3. S. Byron Gottfried: Programming with C (TMH)
4. Kernighan &Ritche: The C Programming Language (PHI)
5. Yashwant Kanitkar: Let us C
6. P.B. Kottur: Programming in C (Sapna Book House)

Course Code: G505DC1.1P	**Course Title: C Programming Lab**
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 2 Hours

Practice Lab

The following activities be carried out in the lab during the initial period of the semester.

1. Basic Computer Proficiency
   a) Familiarization of Computer Hardware.
   b) Basic Computer Operations and Maintenance.
   c) Do's and Don'ts, Safety Guidelines in Computer Lab.
2. Familiarization of Basic Software – Operating System, Word Processors, Internet Browsers, Integrated Development Environment (IDE) with Examples.
3. Type Program Code, Debug and Compile basic programs covering C Programming fundamentals discussed during theory classes.

Programming Lab

Part A

1. Program to read three numbers and find the biggest of three.
2. Program to find the area of a triangle using three sides of triangle.
3. Program to check for prime number.
4. Program to generate n Fibonacci numbers.
5. Program to read a multi - digit number find the sum of the digits, reverse the number and check it for palindrome.
6. Program to read numbers from keyboard continuously till the user presses 999 and to find the sum of only positive numbers.
7. Program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks).
8. Program to find the roots of quadratic equation(Demonstration of switch Statement).
9. Program to find largest and smallest element in a list of 'n' elements (Demonstration of one-dimensional array).
10. Program to multiply two matrices.

Part B

1. Program to accept 'n' and find the sum of the series 1! + 3! + 5! …… + n!
2. Write user-defined functions to (a) find the length of a string (b) concatenate two strings. Call these functions in the main program.
3. Program to find whether a given string is palindrome or not (Use a function to reverse a string using pointers).
4. Program to transpose a matrix of order N x M and check whether it is symmetric or not.
5. Program to add two matrices using pointers.
6. Program to read a string and to find the number of alphabets, digits, vowels, consonants, spaces and special characters.

7. Program to display the first 'n' Fibonacci numbers using a function to generate the n^{th} Fibonacci number.
8. Program to find the GCD of 'n' integers using a function to compute the GCD of two integers.
9. Program to enter the information of n students (name, register number, marks in three subjects) into an array of structures. Compute and print the result of all students. For passing, student should get at least 35 in each subject, otherwise result is "FAIL".
   If the student passes and if percentage >= 70, result is DISTINCTION; If percentage is < 70 and >= 60, result is FIRST CLASS; if percentage is < 60 and >=50, result is SECOND CLASS; otherwise result is PASS CLASS. Get the outputof all students in a tabular form with proper column headings.
10. Program to prepare the pay slip of 'n' employees using an array of structures. Input the employee name, employee number and basic pay. Calculate the DA,HRA, PF, PT, Gross Pay and Net Pay as follows:
    If Basic < 40000, DA = 50% of Basic, HRA = 12% of Basic, PF = 12% of Gross Pay,PT = 250.Otherwise DA = 40% of Basic, HRA = 10% of Basic, PF = 13% of Gross, PT= 300.
    Gross Pay = Basic + DA + HRA and Net Pay = Gross Pay – PF – PT.

Evaluation Scheme for Practical Examination

Assessment Criteria		**Marks**
Program-1 from Part A	Writing the Program	7
	Execution and Formatting	8
Program-2 from Part B	Writing the Program	8
	Execution and Formatting	12
Practical Records		10
Viva		5
Total (converted to 25)		**50**

Course Code: G505OE1.1	**Course Title: Office Automation**
Course Credits: 3	Hours of Teaching/Week: 3
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Outcomes (COs):

After completing this course satisfactorily, a student will be able to:

- Compare and contrast various types of operating systems
- Explain the purpose of office automation
- Describe how information is stored and retried in/from computer memory
- Know about various types of office automation software and their applications
- Create document using word processing software
- Design presentation using presentation software
- Create worksheets using spreadsheet software
- Store and retrieve data in/from database management application

Course Content

Content	Hours
Unit - 1	
Computer software: Introduction, Software definition, Software categories, Installing and uninstalling software, Software piracy, Software terminologies **Introduction to windows Operating System**, operating with windows, GUI, use of help features, starting an application, essential accessories, creating shortcuts, windows explorer, control panel, finding folders and files, System utilities, memory,network basics(LAN,WAN,Man). **MS-Office**: Introduction, Office user interface, Microsoft office Components. **MS-Word:** Introduction, Starting MS-Word, Microsoft word Environment working with word documents, working with text, working with tables checking spelling and grammar, adding graphs to the document, mail merge, header and footers, page numbers, protect the document, working with formatting tools.	12
Unit - 2	
MS-Excel: Introduction, starting MS Excel, Microsoft Excel environment, Working with Excel workbook, Working with worksheet – Entering data, Excel formatting tips and Techniques, Generating graphs, Formulas and Functions, Inserting charts, Sorting, Pivot Tables, data extraction, adding clip art, add an image from a file, Printing in Excel.	10
Unit - 3	
MS-PowerPoint: Starting MS PowerPoint, Working with PowerPoint, Creating, Saving and Printing a presentation, Working with Animation, adding a slide to presentation, navigating through a presentation, Slide-sorter, Slide-show, editing slides, Working with Graphics and Multimedia in PowerPoint (Inserting Photo, Video, and Audio). **The Internet:** Basic internet terms, Internet applications, Internet tools, Web browser, Web browser features, Internet Explorer environment, Electronic mail, Email address structure, Advantages and disadvantages of email.	10

Unit - 4	
Database Fundamentals - Basic database terms, Database Management System. **MS-Access:** Introduction to Access, Creating Tables and Database, Data Type and Properties, Adding & Deleting Field in Table, Primary Key Fields, Queries, Forms: The Forms wizard saving forms, Modifying forms, Pages, Macro, Module, Reports, Printing Report, Forms.	10

Text Book:

1. ITL Education Solution Limited, Introduction to Information Technology, Second Edition., Pearson

Reference Books:

1. Peter Norton, Introduction to Computers, 7th edition, Tata McGraw Hill Publication, 2011)
2. Anita Goel, Computer Fundamentals, Pearson Education, 2011.
3. Linda Foulkes, Learn Microsoft Office 2019: A comprehensive guide to getting started with Word, PowerPoint, Excel, Access, and Outlook, Packet Publishing Limited, 2020.
4. Bittu Kumar, Mastering MS Office: Concise Handbook with Screenshots, V&S Publishers, 2017.

II Semester

Course Code: G505DC2.2	**Course Title: Data Structures using C**
Course Credits: 4	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Outcomes (COs)

After completing this course satisfactorily, a student will be able to:

- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms
- Describe common applications for arrays, records, linked structures, stacks, queues, trees, and graphs
- Write programs that use arrays, records, linked structures, stacks, queues, trees, and graphs
- Demonstrate different methods for traversing trees
- Compare alternative implementations of data structures with respect to performance
- Describe the concept of recursion, give examples of its use
- Discuss the computational efficiency of the principal algorithms for sorting and searching

Course Content

Content	Hours
Unit - 1	
Introduction to Data Structures: Definition, Need for Data Structures, Types of Data Structures. **Linear Data Structures:** Arrays - Definition, Declaration and storage of one- and two-dimensional arrays. Sparse matrices. **Recursion**: Definition; Types of recursion; Recursion Technique Examples - Fibonacci numbers, GCD, Binomial coefficient ${}^{n}C_{r}$, Comparison between iterative and recursive functions. **Sorting**: Sorting – Selection sort, Bubble sort, Quick sort, Insertion sort; Comparison of different sorting techniques.	13
Unit - 2	
Searching: Introduction, Linear search, Binary Search, Comparison of different searching techniques. **Dynamic memory allocation:** Static and Dynamic memory allocation; Memory allocation and deallocation functions - *malloc*, *calloc*, *realloc* and *free*. **Linked List**: Introduction, characteristics, types of linked lists, Representation of singly linked list in memory, Singly linked list – Operations, algorithms, Representation of polynomials using linked lists. Circular linked list – Operations, Doubly linked list - operations. Memory allocations.	13
Unit - 3	
Stacks – Array representation of stacks, Linked representation of stacks, operations, Applications of stacks Recursion, Implementation of recursive procedure by stack (factorial function and Fibonacci sequence).	13

Arithmetic Expressions: Prefix, infix and postfix notation, infix to postfix conversion, evaluation of postfix expression. **Queues**: Array representation of queue, Linked representation of queue, Types of queues- Simple queue, circular queue, double-ended queue, priority queue, operations on queues.	
Unit - 4	
Trees: Definition; Tree terminologies – node, root node, parent node, ancestors of a node, siblings, terminal and non-terminal nodes, degree of a node, level, edge, path, depth; Binary tree: Types of binary trees - strict binary tree, complete binary tree, binary search tree. Array representation of binary tree. Traversal of binary tree; *preorder, inorder* and *postorder* traversal; Construction of a binary tree when inorder and pre/postorder traversals are given. **Graphs:** Terminologies, Matrix representation of graphs, Traversals: Breadth First Search and Depth first search.	13

Text Books

1. Sartaj Sahni: Fundamentals of Data Structures.
2. YedidyahLang sam, Moshe J. Augenstein and Aaron M. Tenenbaum, **Data Structures Using C and C++**, 2nd Edition, PHI Publication
3. Seymour Lipschutz, Schaum's Outlines Series, **Data Structures with C**, Tata McGraw Hill 2011

References

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

Course Code: G505DC2.2P	**Course Title: Data Structures Lab**
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 3 Hours

Programming Lab

Part A

1. Program to compute power of a number using a recursive function.
2. Program to compute the value of ${}^{n}C_{r}$ using a recursive function to find factorial function.
3. Program to implement dynamic array, find smallest and largest element of the array.
4. Program to read the names of cities and arrange them alphabetically.
5. Program to sort the given list using selection sort technique.
6. Program to sort the given list using bubble sort technique.
7. Program to sort the given list using quick sort technique.
8. Program to sort the given list using insertion sort technique.
9. Program to search an element using linear search technique.
10. Program to search an element using recursive binary search technique.

Part B

1. Program to implement queue using arrays.
2. Program to implement stack using arrays.
3. Program to implement stack using linked list.
4. Write a Program for converting an Infix Expression to Postfix Expression. Program should support both parenthesized and free parenthesized expressions with the following operators: +, -, *, /, % (Remainder), ^ (Power) and alphanumeric operands.
5. Program to evaluate a postfix expression.
6. Program to implement all operations on a sorted singly linked list.
7. Program to implement queue using linked list.
8. Program to implement circular queue using array.
9. Write a menu driven program for the following operations on Binary Search Tree (BST) of integers:
   (a) Create a BST of 'n' Integers
   (b) Traverse the BST in Inorder, Preorder and Postorder
   (c) Search the BST for a given element and report the appropriate message
10. Program for the following operations on a graph (G) of cities:
    (a) Create a graph of N cities using Adjacency Matrix.
    (b) Print all the nodes reachable from a given starting node in a digraph using BFS method.

Evaluation Scheme for Practical Examination:

Assessment Criteria	Marks
Writing the Program	7
Execution and Formatting	8
Writing the Program	8
Execution and Formatting	12
Practical Records	10
Viva	5
Total (converted to 25)	**50**

Course Code: G505OE2.2	**Course Title: Web Designing**
Course Credits: 3	Hours of Teaching/Week:3
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Outcomes (COs)

After completing this course satisfactorily, a student will be able to:

- Understand various Internet related terminologies
- Explain features and evolution of Internet
- Explain the use of search engines
- Know the use of different tags available in HTML
- Design web pages using HTML5, CSS3, XML and XHTML
- Implement websites using linked web pages.

Course Content

Content	Hours
Unit - 1	
The Internet: Introduction, Evolution, basic internet terms, Getting connect to internet, Internet applications, Data over the internet. **Internet tools:** Web browser, Web browser features, Internet Explorer environment, Electronic mail, Email address structure, checking email, sending email, email attachment, How email works, advantages and disadvantages of email. **Search Engines:** Searching an internet, refining the search, Instant messaging, Features of messengers.	12
Unit - 2	
Overview of HTML5 -Exploring new features of HTML5, Structuring an HTML Document, Creating and saving HTML document, Viewing an HTML document. **Fundamentals of HTML-**Understanding Elements, Root elements, Metadata elements, Style element, Section element, Header and Footer element, Address element, Basic HTML data types, Data types defined by RFC and IANA Documentation. **Working with Text:** Formatting Text with HTML Elements, Defining MARK element, Defining STRONG element, Defining CODE element, Defining SMALL element. **Organizing Text in HTML:** Arranging text, Displaying Lists.	10
Unit - 3	
Working with Links and URLs- Exploring the Hyperlinks, Exploring the URL, Exploring Link Relations. **Creating Tables-**Understanding Tables, Describing the table element. **Working with Images, Colors and Canvas -** Inserting images in a web page, Exploring Colors, Introducing Canvas **Working with Forms:** Exploring Form element, Exploring types of the INPUT element, Exploring the BUTTON element, Exploring the Multiple-Choice elements, Exploring TEXTAREA and LABEL elements.	10

Working with Frames:<FRAMESET>, <FRAME> tag with attributes.	
Unit - 4	
Overview of CSS3- Understanding the syntax of CSS, Exploring CSS Selectors, Inserting CSS in an HTML document. **Background and Color Gradients in CSS:** Exploring Background of a Web Page, Exploring Color Properties, Exploring Gradient Properties, Exploring Font properties. **Working with Basics of XML-**Exploring XML, Comparing XML with HTML, Describing the Structure of an XML document.	10

Text Books:

1. ITL Education Solution Limited, Introduction to Information Technology, Pearson Education, 2012
2. DT Editorial Services, HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery), Second Edition, Dreamtech Publisher, 2016

References:

1. Laura Lemay & Rafe Colburn, Mastering Html, CSS & JavaScript, Web Publishing, 2016
2. Firuza Aibara, HTML 5 for Beginners, 2012
3. Glenn Johnson, Training Guide – Programming in HTML5 with JavaScript and CSS3 (Microsoft Press Training Guide), 2013

III Semester

Course Code: G505DC3.3	**Course Title:** Object Oriented Programming Concepts and Programming in JAVA
Course Credits: 4	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Objectives

•To learn the concepts of Object-Oriented Programming.

•To learn the Object-oriented programming using Java.

Course outcomes:

Upon successful completion of the course the student will be able to:

•Understand the concepts of OOP and Java fundamentals.

•Write the Java programs using the concepts of inheritance, interfaces, packages, multithreading and applets.

Content	Hours	
Unit - 1		
Fundamentals of Object-Oriented Programming: Introduction, Object-oriented paradigm, Basic concepts of OOP, Benefits of OOP, Applications of OOP. **Java Fundamentals:** Java Evolution, Overview of Java language. Comparison of C and Java. Data Types and Operators: Java's Primitive Types, Literals, Variables, The Scope and Lifetime of variables, Type Conversion in Assignments, Casting Incompatible Types. **Control Statements:** Additional features of for loop, labelled loops.	13	
Unit - 2		
classes, objects and methods: defining a class, fields and method declaration, creating objects, accessing class members, constructors, method overloading, static members, nesting of methods. **Inheritance**: extending a class overriding methods, final variables and methods, final classes, finalizer methods, abstract methods and classes, visibility control. **Arrays strings and Vectors**: one dimensional array, creating Arrays, Two dimensional arrays, Strings, vectors, wrapper classes	13	
Unit-3		
Packages and Interfaces: Packages, Packages and Member Access, Understanding Protected members, Importing packages, Java's standard packages, Interfaces, Implementing and extending Interfaces. **Multithreaded Programming:** creating a thread, extending a thread class, life cycle of a thread, thread priority, using thread methods, synchronization, implementing runnable interfaces. **Managing Errors and Exception:** types of error, syntax of exception handling, multiple catch statements, using finally statement, throwing our own exceptions.	13	
Unit-4		
Applets Programming: Building Applet Code, Applet lifecycle, creating an executable Applet, applet tag, passing parameters to Applet, event handling **graphics programming:** graphics class, lines and rectangles, circle, ellipse, arcs, polygons, introduction to AWT packages.	13	

Text Books:

1. E Balagurusamy, **Programming With Java: A Primer, 5th edition** Tata McGraw Hill Education Private Limited, 2010.

Reference books:

1. Herbert Schildt, **Java: A Beginner's Guide, 5th Edition** Tata McGraw Hill Education Private Limited,
2. Junaid Khateeb and Dr. G T Thampi, Computer Programming in Java, Dreamtech, 2011
3. Herbert Schildt, The Complete reference Java, Seventh edition, Tata McGraw Hill Publishing

Course Code: G505DC3.3P	**Course Title:** JAVA lab
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 2 Hours

PART-A

1. Program to accept student name and marks in three subjects. Find the total marks, average and grade (depending on the average marks).
2. A menu driven program to input two integers & an operator to perform basic arithmetic operations (+ ,-,* and /) using switch case structure.
3. Program, which reads two numbers having same number of digits. The program outputs the sum of product of corresponding digits.(Hint Input 327 and 539 output 3x5+2x3+7x9=84)
4. Program to input Start and End limits and print all Fibonacci numbers between the ranges.(Use for loop)
5. Define a class named Pay with data members String name, double salary, double da, double hra,double pf, double grossSal, double netSal and methods: Pay(String n, double s) - Parameterized constructor to initialize the data members, void calculate() - to calculate the following salary components, and void display() - to display the employee name, salary and all salary components.

   Dearness Allowance = 15% of salary

   House Rent Allowance = 10% of salaryProvident Fund = 12% of salary

   Gross Salary = Salary + Dearness Allowance + House Rent AllowanceNet Salary = Gross Salary - Provident Fund

   Write a main method to create object of the class and call the methods to compute and display the salary details.
6. Program to create a class DISTANCE with the data members feet and inches. Use a constructor to read the data and a member function Sum ( ) to add two distances by using objects as method arguments and show theresult. (Input and output of inches should be less than 12.)
7. Program to check whether the given array is Mirror Inverse or not.
8. Program to create a class “Matrix” that would contain integer values having varied numbers of columns foreach row. Print row-wise sum.
9. Program to extract portion of character string and print extracted string. Assume that ‘n’ characters extractedstarting from mth character position.
10. Program to add, remove and display elements of a Vector.

PART B

11. Create a class named 'Member' having data members: Name, Age, PhoneNumber, Place and Salary. It also has a method named 'printSalary' which prints the salary of the members. Two classes 'Employee' and 'Manager' inheritthe 'Member' class. The 'Employee' and 'Manager' classes have data members 'specialization' and 'department' respectively. Now, assign name, age, phone number, address and salary to an employee and a manager by makingan object of both of these classes and print the same.
12. Program to implement the following class hierarchy:Student: id, name StudentExam (derived from Student): Marks of 3subjects, total marksStudentResult (derived from StudentExam) : percentage, grade
    Define appropriate methods to accept and calculate grade based on existing criteria and display details of Nstudents
13. Program to calculate marks of a student using multiple inheritance implemented through interface. Class Studentwith data members rollNo, name, String cls and methods to set and put data. Create another class test extended by class Student with data members mark1, mark2, mark3 and methods to set and put data. Create interface sports with members sportsWt = 5 and putWt(). Now let the class results extends class test and implements interface sports. Write a Java program to read required data and display details in a neat format.
14. Program to create an abstract class named shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Ellipse such that each one of the classes extends theclass shape. Each one of the class contains only the method print Area() that print the area of the given shape.

Evaluation Scheme for Practical Examination:

Assessment Criteria		**Marks**
Program-1 from Part A	Writing the Program	7
	Execution and Formatting	8
Program-2 from Part B	Writing the Program	8
	Execution and Formatting	12
Practical Records		10
Viva		5
Total (converted to 25)		**50**

III Semester

Course Code: CSOE2/CAOE2	Course Title: IoT
Course Credits: 3	Hours of Teaching/Week:3
Total Contact Hours: 42	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Objectives

OBJECTIVES:

1. To introduce the concept of "Internet of Things "to the students.
2. To understand the basic ecosystems and landscape in IoT.
3. To understand the Realtime use cases in IoT
4. To know the different domains, where IoT plays a crucial role.

Course outcomes

- To become familiar with the basic concepts of IoT.
- To become familiar with IoT access techniques

Content	Hours
Unit - 1	
Unit1 **Introduction to IoT:** What is IoT, IoT architecture, Characteristics of IOT systems, Prevalent IoT architectures applications, Overview of different technologies involved for IoT realization	13
Unit - 2	
History of IoT: The transition from mainframes and personal computing, Planet lab and origins of distributed computing; Robotics, AI and Cyber Computing Infrastructure; M2Mcommunications; P2P networks; Universal identification and RFID; Autonomic computing, Pervasivecomputing , Ubiquitouscomputing; WirelessSensorNetworks, TheemergenceofIoT.	13
Unit-3	
IOT state of the art: The IoT ecosystem and landscape; IOT business models and its usage invarious domains; Technology Enablers for IOT – Mobility, Analytics, Cloud and Social Media;IOTplatforms; Security;Testmethodologies; Regulations andRisks.	13
Unit-4	
IoT Characteristics and use cases: Consumer and enterprise use cases **IoT DOMAINS:** Smart Home, Smart Buildings, smart cities, IoT in telecommunications, Smart manufacturing, IoT in environment monitoring, smart vehicles, IoT in healthcare, smart farming, IoTin enterprises, smart transportation,smart energy,smart retail and logistics	13

1. VijayMadisetti,ArshdeepBahga "Internet of things, A hands-onapproach"2014
2. Jean-Philippe Vasseur&Adam Dunkels"Interconnecting smart objects withIP",Morgan KaufmannPublishers,2010
3. CunoPfister, "Getting Started with the Internet of Things" , Maker MediaInc,2011
4. Adrian Mcewen and Hakim, "Designing the Internet of Things", Wileypublication,2013

TEXT BOOK :

1. Arshadeep Bhaga and Vijaya Madisetti, Internet of Things, A Hands an Approach, Universities Press, 2014.
2. Raj Kamal*, Internet of Things:* Architecture and Design Principles, Mc Graw Hill Education .

Reference Books:

1. Rob Barton, Gonzalo Salgueiro, David Hanes, IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, Cisco Press,2017.

IV Semester

Course Code: DSC-4	**Course Title: Data Base Management System**
Course Credits: 4	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Objectives

- To Understand the basic concepts and the applications of database systems
- To Master the basics of SQL and construct queries using SQL
- To understand the relational database design principles

Course outcomes

- To become familiar with the basic issues of transaction processing and concurrency control
- To become familiar with database storage structures and access techniques

Content	Hours
Unit - 1	
Database System Concepts and Architecture History of Database Systems, Characteristics of the Database Approach, Actors on the Scene, Workers behind the Scene, Advantages of Using the DBMS Approach, Database Systems versus File Systems, Data Abstraction, Three-Schema Architecture Data independence, Schemas and Instances, Data models, Database Languages, Database Users, DBA, Structure of Database Systems. The database system environment, Centralized and Client/Server Architecture for DBMS, Classification of DBMS, Entity types, attributes, keys, relationships, relationship types, roles and structural constraints, Weak entity sets, Database Abstractions-Generalization, Aggregation, Data Modeling using E-R Models.	13
Unit - 2	
Relational model: Basic Concepts of relational data model, Relational model constraints and relational database schemas-Domain Constraints, Key Constraints, Relational Database Schema, Basic Relational algebra operations-SELECT, PROJECT, Set Operations, Cartesian Product, Renaming, Join Operations, Division. Design theory of Relational Database: Introduction to Relational database design, Semantics of Attributes, Problems caused by Redundancy-Anomalies, Functional dependency- Uses of Functional Dependency, Diagrammatic way of showing FDs, Closure Set Properties, Normal forms (INF, 2NF,3NF and BCNF)	13
Unit-3	
MySQL Introduction to Transaction Control Language (TCL) – Commit, Rollback, Savepoint. Creating and Using New Users, Granting, Revoking, and viewing User Privileges. Creating Database, adding tables, adding records - Single row or multiple rows at a time, Executing queries. MySQL Datatypes, The ENUM type, MySQL Operators – Arithmetic, Comparison, Logical operators, Aggregate functions, String manipulation, Date and time manipulation functions, Selecting databases for use, deleting databases, LIKE clause, The NULL and NOT NULL Modifiers, The DEFAULT Modifiers, The AUTO_INCRMENT Modifier, The UNIQUE Modifier, Primary Keys, Foreign Keys, Modifying tables – Alter, Deleting tables, Inserting, Updating, Deleting Records, Retrieving records, Aliasing table and column names, Limiting query results-limit, Sorting Query Results-Order by, Grouping Query results- Group By, Having, Joins- Inner Join ,Left Join, Right Join, Self-Join, Cross Join, Nested Queries, The IN, NOT IN,	13

and BETWEEN Clause, sub queries, On DELETE CASCADE.		
Unit-4		
Views in MySQL What are Views in MySQL. Advantages of Views, Disadvantages of VIEWS, Creating Views, MYSQL Updatable Views, MySQL Views with CHECK OPTION. **MySQL Stored Procedures** Stored Program, three major types of MySQL stored programs, Drawbacks of using stored procedures. Language Fundamentals- Variables, Assigning Values to Variables, Parameters, Conditional Statements, And Looping statements (Iterative Programming), Using SELECT Statements with an INTO Clause, Creating and Using Cursors, fetching a Single Row from a Cursor, Fetching an Entire Result Set, Creating Stored Functions, MySQL Error handling in stored procedure.	13	

Text Book:

1. Elmasri and Navathe, Fundamentals of Database Systems, Pearson Education Asia Publication, 4lh edition. (Unit 1)
2. S.Nanda Gopalan, Data base Management Systems with oracle 9i and VB 6.0, 4th Edition, Sapna Book House Bangalore. (Unit 2)
3. Vikram Vaswani "The complete Reference MySQL "Tata McGraw-Hill Edition 2004, Eleventh reprint 2009. (Unit 3)
4. Guy Harrison with Steven Feuerstein "MySQL Stored Procedure Programming". O'REILLY (Unit 4)

Reference Book :

1. Seyed M.M. "Saied" Tahaghoghi and Hugh E. Williams "Learning MySQL" O'REILLY
2. Silberschatz and Korth , Database System Concepts, McGrawHill Publication
3. Ivan Bayross, Commercial Application Development using Oracle D2k, BPB Publications.

Course Code: G505DSC4.4	**Course Title:** RDBMS LAB
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 2 Hours

LIST OF PROGRAMS - PART A (MYSQL Queries)

PART-A

1. Create a database **Movie_Industry** under which Create a table **Movie** with the following columns:

Table name: Movie

COLUMN	DATA TYPE	CONSTRAINTS
ID	Int	Auto_Increment
Movie_name	Text	UNIQUE
Description	ENUM	Must be Great 3D,Fiction, Boring, Fantasy, Interesting
Rating	INT	NOT NULL

Insert multiple records at once to the table

Alter the table to add the columns Director Name and Production

Display all the details of the movies.

QUERIES:

1. Display all the movie names in alphabetical order belong toFiction.
2. Display all not boring movies, names and ratings information (useIN predicate).
3. Display the movie name and the description directed by Shankar.

4. Count the number of movies under Interesting journal.
5. Count how many 3D movies are directed by Ang Lee.
6. Display the movie names and the production where the director'sname contains 'Jackson'
7. Delete all the boring movies.
8. Rename the table name as cinema.
9. Display the movie name and director name which has 3rd highestrating.
10. Assign update privilege only on rating column on the table cinema
11. to Jhon.

2. Create a database COMPANY under which Create a table FACULTYwith the following columns

COLUMN	DATA TYPE	CONSTRAINTS
FID	INT	PRIMARY KEY
FNAME	VARCHAR2	NOT NULL
DEPT	VARCHAR2	NOT NULL
BASIC	DOUBLE	GREATER THAN 10000

Insert minimum five records to the table
Alter the table to add the columns DA, HRA, PF, Net pay, IT. Calculate the DA, HRA, PF, IT, NETPAY as follows: DA=80% of BASIC, if BASIC<20000 else 70% of BASIC HRA=10% of BASIC
NETPAY=BASIC+DA+HRA
PF=2% of NETPAY and IT=5% of NETPAY
QUERIES:

1. Display all the available databases in MySQL.
2. Display the details of all faculty details.
3. Display the faculty names of computer science department.
4. Display the faculty names in alphabetical order.
5. List the highest net pay faculty in each department.
6. Display the details of all faculty whose net pay between 25000 and 35000
7. Display the name and basic of employees whose name contains 'Kumar'
8. Count the number of employees in each department
9. Create a new MySQL user account
10. Delete all employees from home science department

3. Create a table EMP_MASTER under COMPANY database with the following columns:

COLUMN	DATA TYPE	CONSTRAINTS
ENO	INT	Primary Key
ENAME	VARCHAR	NOT NULL
DEPTNO	INT	NOT NULL
JOB_TITLE	ENUM	Must be 'Sales Rep','Marketing', ' Administrative Assistant'
SALARY	DOUBLE	NOT NULL
COMMISSION	DOUBLE	
JOIN_DATE	DATE	NOT NULL

QUERIES:

1. Show all the tables available in company database.
2. Modify eno column as primary key.
3. Display the employee's name, department and their job title with a second highest salary.
4. List the names of employees whose names are five character long
5. Display the employee details and sort the results as per job title 'Marketing', 'Sales Rep', 'Administrative

Assistant'.

6. Find all the department that have at least 2 Sales Rep.
7. Display the no of employees joined in the year 2014.
8. Display the first 4 records of the emp_master table.
9. who don't earn commission ,10% increase in salary and commission that is 15% of their salary?
10. Assign SELECT and INSERT privileges on the table emp_master to Harry.

4. Create the following tables under College database with the following columns:

Table Name: Faculty

COLUMN	DATA TYPE	CONSTRAINTS
Fid	Int	Primary Key
Fname	Varchar	NOT NULL
Qualification	Varchar	NOT NULL
DepId	Int	Foreign key References Department (DeptId

)

Table Name : Department

COLUMN	DATA TYPE	CONSTRAINTS
DeptId	Int	Primary Key
Dname	Varchar	NOT NULL

QUERIES:

1.Display the department name where there is no Ph.D qualified faculty.
2.Perform cross join between Faculty and Department tables the result should contain department no 1.
3.Find department name of each faculty (use inner join)
4.Create a view that contain Faculty Name and Corresponding Department Name.
5.Display how many faculties are there in each department.
6.Find the names of the faculty working in IT Department.
7. Display the department name where there is no Faculty enrolled.
8. Perform left join between department and faculty tables display the faculty name, department name.

5. Table Name: Sailors

COLUMN	DATA TYPE	CONSTRAINTS
Sid	Int	Primary Key
Sname	Varchar	NOT NULL
Rating	Int	NOT NULL
Age	Int	NOT NULL

Table Name: Boats

COLUMN	DATA TYPE	CONSTRAINTS
Bid	Int	Primary Key
Bname	Varchar	NOT NULL
Color	Varchar	NOT NULL

Table Name: Reserves

COLUMN	DATA	CONSTRAINTS

	TYPE	
Sid	Int	Foreign key References Sailors(Sid)
Bid	Int	Foreign key References Boats(Bid)
Day	Date	NOT NULL

QUERIES:

1. Find all information of sailors who have reserved boat number 101.
2. Find the name of boat reserved by Brutus.
3. Find the names of sailors who have reserved a red boat, and list in the order of age.
4. Find the names of sailors who have reserved at least one boat.
5. Find the ids and names of sailors who have reserved two different boats on the same day.
6. Find the name and the age of the youngest sailor.
7. Perform left outer join between sailors and reservation tables display the sid, sname, bid in ascending order.
8. Find the average age of sailors for each rating level.

6. Create the following tables under LIBRARY database with the following columns:

Table Name: Book

COLUMN	DATA TYPE	CONSTRAINTS
Book_id	Int	Primary Key
Title	Varchar	NOT NULL, UNIQUE
Publisher_Name	Varchar	NOT NULL
Pub_Year	Year	NOT NULL

Table Name: Book_Lending

(Book_id, Card_No)-is Composite Primary Key.

COLUMN	DATA TYPE	CONSTRAINTS
Book_id	Int	Foreign key References Book (Book_id) On Delete Cascade
Card_NO	Int	NOT NULL
Date_Out	Date	NOT NULL
Due_Date	Date	NOT NULL

Table Name: Book_Copies

(Book_id, Branch_name)-is Composite Primary Key.

COLUMN	DATA TYPE	CONSTRAINTS
Book_id	Int	Foreign key References Book (Book_id) On Delete Cascade
Branch_name	Varchar	NOT NULL
No_of_Copies	Int	NOT NULL

QUERIES:

1. Display the particulars of borrowers and the book name who have borrowed books from Jan 2021 to March 2021.
2. Create a view of all books and its number of copies that are available in the library.
3. Display branch wise available books name and total no of copy available and list in the order of branch

name.
4. Display the particulars of borrowers and the book name who have borrowed more than 3 books, but from Feb 2021 to April 2021.
5. Create a view table, which consist of book title, publication and year of publication. (year wise latest books first)
6. Display how many books are available under the 'PEARSON' Publication.
7. Display the branch name which has less than 35 books as a whole.
8. Delete Book_id 1 from book table and show that all the relevant data of the same bookid got deleted from book_lending, book_copies tables;

V Semester	
Course Code: G505DC5.5	**Course Title: Programming in Python**
Course Credits: 4	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Objectives

After the successful completion of the course, the student will be able to:

- Setup python to develop simple applications
- Understand the basic concepts in Python Programming
- Learn how to write, debug and execute Python programs
- Understand and demonstrate the use of advanced data types such as tuples, dictionaries and lists, Tuples and Sets
- Design solutions for problems using object-oriented concepts in Python
- Use and apply the different Python Libraries for Data Analysis and Data Visualization.
- Extend the knowledge of python programming to build successful career in software development.

Course Outcomes (COs)

- To become familiar with the basic programming with python.
- To become familiar with data visualization, database structure and libraries in python

Content	Hours
Unit – 1	
Introduction to Features and Applications of Python; Flavors of python. Thrust Areas of python. **Python Basics:** Identifiers, Keywords, Statements and Expressions, Variables Operators, Precedence and Association, Data Types, Indentation, Comments, reading input, print output, Type Conversions, type() functions and special operators. Python Libraries; Importing Libraries with Examples. Format Specifiers; Escape Sequences; mathematical functions and random functions. **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. **Exception Handling:** Types of Errors; Exceptions, Exception Handling using try, except and finally. Python Functions: types of functions, built in functions, python user defined functions, types of function arguments, anonymous functions, recursion	13
Unit – 2	
Strings: Creating and Storing Strings; Accessing String Characters; the str () function, Operations on Strings- Concatenation, Comparison, Slicing and Joining, String Methods, formatting strings. **Lists:** Creating Lists, Operations on Lists, Built-in Functions on Lists, list methods, del statement **Dictionaries:** Creating Dictionaries, Operations on Dictionaries, Built-in Functions on Dictionaries, Dictionary Methods. **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, frozen set.	13
Unit – 3	
Object Oriented Programming: Classes and Objects; Creating Classes and Objects; Constructor Method; Classes with Multiple Objects, Inheritance- Single and Multiple Inheritance, Multilevel and Multipath Inheritance; Encapsulation- Definition, Private Instance Variables; Polymorphism. **Pandas-** Introduction to Pandas, Series and Data Frames, Creating Data Frames from Excel Sheet and .csv file, Dictionary and Tuples. Operations on Data Frames. **Data Analysis:** NumPy- Introduction to NumPy, Array Creation using NumPy, Operations on Arrays;	13
Unit - 4	
Data Visualization: Introduction to Data Visualization; Matplotlib Library; Different Types of Charts	13

using Pyplot- Line chart, Bar chart and Histogram and Pie chart. **Database Connectivity:** Types of databases used with Python, Using MySQL from Python, Retrieving and Inserting, updating and deleting data in a table, Creating Database tables through Python.		

Text Books:

1. Introduction to Python Programming, Gowrishankar S et al.,2019, CRC Press
2. Programming in python, Dr Pooja Sharma BPB publication.

Reference Books:

1. Think Python How to Think Like a Computer Scientist, Allen Downey et al., 2nd Edition, 2015, Green Tea Press. Freely available online @ https://www.greenteapress.com/thinkpython/thinkCSpy.pdf
2. Python Data Analytics: Data Analysis and Science Using Pandas, matplotlib, and the Python Programming Language, Fabio Nelli, 2015, Apress®
3. Advance Core Python Programming, Meenu Kohli, 2021, BPB Publications
4. 5Core PYTHON Applications Programming, Wesley J. Chun, 3rd Edition, 2012, Prentice
5. Hall
6. Automate the Boring Stuff, Al Sweigart, 2015, No Starch Press, Inc.

Data Structures and Program Design Using Python, D Malhotra et al., 2021, Mercury

7. Learning and Information LLC

Course Code: G505DC5.5P	**Course Title: Python Lab**
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 2:30minutes

Part-A

1. A cashier has currency notes of denominations 100, 500, and 2000. Write Program to display the total number of currency notes of each denomination the cashier will have to give to the customer.
   Note: Display an error message if the input is not matching with the specified denomination.
2. Write a program to Check if a number belongs to the Fibonacci Sequence
3. Write a Python program to accept the issue date and return date and calculate the fine as below.
   For first 5 days the fine is 50 paise, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled.
   1. *Assume the due date as 15 days from the date of issue*
4. Create a list with random numbers. Receive a Number from keyboard and report position of all occurrence of this number and count frequency of this number.
5. write a python function program to Count all letters, digits, and special symbols from a given string also find sum of all integer numbers and print letters in uppercase.
6. Program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
7. Perform following operations with tuple
   1. program to populate tuple with user entered items.
   2. create a tuple with list of items
   3. concatenate tuples.
   4. unpack values to a variable.
8. Write a python dictionary program to input roll numbers and their names of students of your class and store them in the dictionary as the key-value pair. Perform the following operations on the dictionary:
   a) Display the Roll numbers and name for all students.
   b) Add a new key-value pair in this dictionary and display the modified dictionary
   c) Delete a particular student's record from the dictionary
   d) Modify the name of an existing students.'''
9. write a python dictionary programs to count number of times each word appears in a sentence.

10. write a python program to perform following set operations Union, intersection, difference, add, update, remove, pop and clear

PART-B

11. Program to read the students marks and calculates the result using class and constructors.
12. There exists a CSV file student.csv with following columns (regno, name, python, networks, pythonlab, networklab, total, average) of n students.
    Write commands to do the following using panda's library.
    a) Display the top 10 rows
    b) Display the students list in the order regno in descending order
    c) Display the maximum mark
    d) filter the student data
13. write a python program to create a numpy array and perform addition, subtraction, multiplication and transpose of arrays.

14. Given the school result data, analyses the performance of the students on different parameters, e.g. subject wise or class wise.x-axis is showing the subject and y -axis shows the markers in each subject. draw line graph, pie chart and bar graph for the given data.
15. Write a menu drive program perform the following operations on Employee table
    a) Insert employee record
    b) Update Salary of all employees.
    c) Display the records'''
16. Write a program to design a shopping cart with the following options
    a) Add item to the cart
    b) view cart
    c) delete item from the cart

V Semester

Course Code: G505DC6.5	**Course Title: computer networks**
Course Credits: 4	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Objectives

After the successful completion of the course, the student will be able to:

- Define various data communication components in networking.
- Describe networking with reference to different types of models and topologies.
- Understand the need for Network and various layers of OSI and TCP/IP reference model.
- Explain various Data Communications media.
- Describe the physical layer functions and components CO6 Identify the different types of network topologies and Switching methods.
- Describe various Data link Layer Protocols.
- Identify the different types of network devices and their functions within a network.
- Analyze and interpret various Data Kink Layer and Transport Layer protocols.
- Explain different application

Course Outcomes (COs)

- To become familiar with the basic programming with network.
- To familiar with network concepts, communication and design of networks.

Content	**Hours**
Unit – 1	
Computer Network: Definition, Broadcast, Point-To-Point Networks, Multicasting, Unicasting. **Introduction: Uses of Computer Networks and its Applications**-Business Applications, Home Applications,Mobile Users, Social Issues. **Network Topologies**: Bus, Star, Ring, Mesh **Network Hardware**-Local Area Networks, Metropolitan Area Networks, Wide Area Networks, and Internetworks. **Network Software** - Connection-oriented vs. Connectionless service, Service Primitives. **Reference Models**-The OSI Reference Model, The TCP\IPReference Model, A Comparison of the OSI and TCP Reference Models.	13
Unit – 2	
The Physical Layer: **Transmission Media**- Twisted Pair, Coaxial Cable and Fiber Optics. **Wireless Transmission**- Radio Transmission, Microwave Transmission, Infrared, Light Transmission. Switching – Circuit switching, Packet switching, Message switching. **The Data Link Layer: Data** link layer design issues-Services Provided to the Network Layer, Framing, Error Control, andFlow Control. Error Detection and Correction-Error CorrectingCodes -Hamming Codes, Error Detecting Codes- CRC. Elementary Data Link Protocols- An Unrestricted Simplex Protocol, A Simplex Stop-and-Wait Protocol for an Error-Free Channel, A Simplex Protocol for a Noisy Channel.	13
Unit – 3	
The Network Layer: Network layer design issues-Store-and-Forward Packet Switching, Services Provided to the Transport Layer. Routing Algorithms-Flooding, Distance Vector Routing, Link State Routing,	13

Broadcast Routing, Multicast Routing. Networking Devices: Hub, Switch, Router. The network layer in the Internet- The IP Version 4 Protocol, IP Address, IP Version 6		
Unit - 4		
The Transport Layer: The Transport Service-Services Providedto the Upper Layers. Elements of Transport Protocols- Addressing, Connection Establishment, connection Release, Error control and Flow Control. The Internet Transport Protocols-(TCP and UDP) Connection oriented protocol TCP and connectionless protocol UDP. **Application Layer Protocols:** DNS, DHCP, WWW, HTTP, HTTPs, FTP, SMTP, POP, IIMAP	13	

Text Book

1. Computer Networks, Andrew S. Tanenbaum, 5th Edition, Pearson Education, 2010.

References:

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

Course Code: G505DC6.5P	**Course Title: computer network Lab**
Course Credits: 2	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 25
Exam Marks: 25	Exam Duration: 2:30minutes

Part A (Using Cisco Packet Tracer)

1. Demonstrate creating a LAN network with a Star Topology in Cisco Packet Tracer.
   i) Using a Hub.
   ii) Using a Switch
2. Demonstrate connecting 2 different LAN's using 1 router having 2 networks with 3 systems each. Specify static IP address to all the devices using Static Route Configuration.
3. Demonstrate connecting 4 different LAN's using 2 routers having 4 networks with 2 systems each. Specify static IP address to all the devices using Static Route Configuration.
4. Demonstrate mesh topology using 5 routers
5. Demonstrate hybrid topology linked by 3 routers having 4 networks
   (a) Bus Topology
   (b) Mesh Topology
   (c) Ring Topology
   (d) Star Topology
6. Connect 4 different networks using 4 routers. Show simulation from network 1 to 4 and from network 3 to 1
7. Connect 2 different networks using 1 router and configure router as DHCP Server.
8. Connect 2 different networks using 1 router and configure it using a server as DHCP Server

Part B (using Java Programming)

9. Implement a one-way communication system in Java using sockets, where a client sends a message to a server.
10. Implement bidirectional communication between a client and a server in Java using socket programming.
11. Implement a server program that receives the file name from the client and sends back the contents

of the requested file if present.

12. Write a java program to perform Cyclic Redundancy Check by sending and verifying the transmitted data.
13. Write a java program to accept Classful Addressing by taking the IP address (Dotted-Decimal notation) as input and print the corresponding class, network id and host id.
14. Simulate stop and wait protocol for a noisy channel.
15. Write a java program to implement ping command and trace the route.

VI Semester

Course Code: G505DC7.6	Course Title: Web Technologies
Course Credits: 4	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Outcomes (COs)

After the successful completion of the course, the student will be able to:

- Understand basics of web technology
- Recognize the different Client-side Technologies and tools like, HTML, CSS, JavaScript
- Learn Java Servlets and JDBC
- Web Technology for Mobiles and Understand web security

Content	Hours
Unit – 1	
Introduction and Web Design: Introduction to Internet, WWW and Web 2.0,Web browsers, Web protocols and Web servers, Web Design Principles and Web site structure, client-server technologies, Client side tools and technologies, Server side Scripting, URL, MIME, search engine, web server- Apache, IIS, proxy server, HTTP protocol. Introductions to HTML. HTML5 Basics tags, Formatting tags in HTML, HTML5 Page layout and Navigation concepts,Semantic Elements in HTML, List, type of list tags, tables and form tags in HTML, multimedia basics, images, iframe, map tag, embedding audio and video clips on webpage.	13
Unit – 2	
Introduction to XML: XML Syntax, XML Tree, Elements, Attributes, Namespace, Parser, XSLT DOM, DTD, Schema. Introduction to CSS, CSS syntax, CSS selectors, CSS Background Cursor, CSS text fonts, CSS-List Tables, CSS Box Modeling, Display Positioning, Floats, CSS Gradients, Shadows, 2D and 3 Transform, Transitions, CSS Animations.	13
Unit – 3	
Introduction to JavaScript: JavaScript Data type and Variables, JavaScript Operators, Conditional Statements, Looping Statements, JavaScript Functions, Number, Strings, Arrays, Objects in JavaScript, Window and Frame objects, Event Handling in JavaScript, Exception Handling, Form Object and DOM, JSON, Browser Object Model.	13
Unit - 4	
Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, reading initialization parameters, Handling HTTP Request & Responses, Using Cookies and sessions, connecting to a database using JDBC. Web Security: Authentication Techniques, Design Flaws in Authentication, Implementation Flaws in Authentication, Securing Authentication, Path Traversal Attacks. Injecting into Interpreted Contexts, SQL Injection, NoSQL Injection, XPath Injection, LDAP Injection, XML Injection, HTTP Injection, Mail Service Injection. Types of XSS, XSS in Real World, Finding and Exploiting XSS Vulnerabilities, Preventing XSS Attacks.	13

Text Book:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech

References:

1. Java Server Pages – Hans Bergsten, SPD O'Reilly
2. Java Script, D.Flanagan, O'Reilly, SPD
3. Beginning Web Programming-Jon Duckett WROX.

4. Web Applications : Concepts and Real World Design, Knuckles, Wiley-India
5. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

VI Semester

Course Code: G505DC8.6	**Course Title**: Statistical Computing & R Programming
Course Credits: 4	Hours of Teaching/Week: 4
Total Contact Hours: 52	Formative Assessment Marks: 40
Exam Marks: 60	Exam Duration: 3 Hours

Course Outcomes (COs)

- After the successful completion of the course, the student will be able to:
- Explore fundamentals of statistical analysis in R environment.
- Describe key terminologies, concepts and techniques employed in Statistical Analysis.
- Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.
- Conduct and interpret a variety of Hypothesis Tests to aid Decision Making.
- Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables

Content	Hours
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.	13
Unit – 2	
Reading and writing files, Programming, Calling Functions, Conditions and Loops: stand- alone statement with illustrations in exercise, stacking statements, coding loops, Writing Functions, Exceptions, Timings, and Visibility. Basic Data Visualization.	13
Unit – 3	
Descriptive Statistics: Types of Data, Nominal, Ordinal, Scale and Ratio, Measures of Central Tendency, Mean, Mode and Median, Percentailes , Quartiles, Measures of Variability, Mean Absolute Deviation Range, Inter-Quartile-Range, Standard Deviation, Z-Scores. Cofficient of Variation, Measure of shaper-Skewness and Kurtosis, Bar Chart, Pie Chart and Box Plot, Histogram, Frequency Polygon, Stem and Leaf Diagram. Probability, Probability and Sampling Distribution: Methods os assigning probability, Structure of probability, Marginal, union, joint and conditional probabilities. Discrete Probability Distributions: Binomial, Poisson, Continuous Probability Distribution, Normal Distribution, Uniform Distribution. Estimating the population mean using the and t-distribution.	13
Unit – 4	
Statistical Inference and Hypothesis Testing: Types of Hypothesis, and Sample, Null and Alternate Hypothesis, Level of Significance, Type I and Type II Errors, One Sample t-Test, One Sample Proportion Test, Paired Sample t-Test, Independent Samples t-Test, Two Sample Proportion Tests, One Way Analysis of Variance and Chi Square Test. Correlation and Regression: Analysis of Relationship, Positive and Negative Correlation, Perfect Correlation, Karl Pearson Coefficient of Correlation, Correlation Matrix, Scatter Plots, Simple Regression Analysis.	13

Text Books:
1. Tilman M. Davies, “The book of R: A first course in programming and statistics”, San Francisco, 2016.
2. Ken Black, Business Statistics, New Delhi, Wiley, 2013.

References:
1. Vishwas R. Pawgi, “Statistical computing using R software”, Nirali prakashan publisher, e1 edition, 2022.
2. https://www.youtube.com/watch?v=KlsYCECWEWE
3. https://www.geeksforgeeks.org/r-tutorial/
4. https://www.tutorialspoint.com/r/index.html

Scheme of Assessment for Theory Examination

<table>
<tr><th colspan="2">Question Pattern</th><th>Marks</th></tr>
<tr><td colspan="3">Part – A</td></tr>
<tr><td colspan="2">1. Answer any SIX sub-questions (6×2=12)</td><td rowspan="5">12</td></tr>
<tr><td>Sub-question</td><td>Unit</td></tr>
<tr><td>a, b</td><td>1</td></tr>
<tr><td>c, d</td><td>2</td></tr>
<tr><td>e, f</td><td>3</td></tr>
<tr><td>g, h</td><td>4</td></tr>
<tr><td colspan="3">Part – B
(Answer any ONE full question from each unit – 12 marks each)
(Combinations of sub-questions of 3 to 6 marks)</td></tr>
<tr><td colspan="2">Unit-1</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">2.</td></tr>
<tr><td colspan="2">3.</td></tr>
<tr><td colspan="2">Unit-2</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">4.</td></tr>
<tr><td colspan="2">5.</td></tr>
<tr><td colspan="2">Unit-3</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">6.</td></tr>
<tr><td colspan="2">7.</td></tr>
<tr><td colspan="2">Unit-4</td><td rowspan="3">12</td></tr>
<tr><td colspan="2">8.</td></tr>
<tr><td colspan="2">9.</td></tr>
</table>

Total	**60**