B Sc Programme (CBCS) - Computer Science: 2019-20 onwards

Semester	Core DSC	Credits	Elective DSE	Credits	SEC	Credits
I	DSC-3A	6				
II	DSC-3B	6				
III	DSC-3C	6				
IV	DSC-3D	6				
V			DSE-3A	6	SEC-1 SEC-2	2 2
VI			DSE-3B	6	SEC-3 SEC-4	2 2

Discipline Specific Courses:

DSC-3A : Computer Concepts and C Programming (L:T:P::4:0:2)

DSC-3B : Data Structures and ADA (L:T:P::4:0:2)

DSC-3C : Database Management Systems (L:T:P::4:0:2)

DSC-3D : Object Oriented Programming with Java (L:T:P::4:0:2)

List of electives(DSE-3A and DSE-3B)

Select one of the following electives in both V and VI semester.

List of electives for V Semester - DSE-3A

i) Big Data Analytics (L:T:P::4:0:2)

ii) Software Engineering (L:T:P::4:0:2)

iii) Data Communication and Computer Networks (L:T:P::4:0:2)

iv) Computer Architecture and Microprocessor (L:T:P::4:0:2)

List of electives for VI Semester - DSE-3B

i) .NET Programming (L:T:P::4:0:2)

ii) Computer Graphics and Animation (L:T:P::4:0:2)

iii) System Software and Operating Systems (L:T:P::4:0:2)

iv) Project (L:T:P::0:2:4)

Skill Oriented Course

5A SEC-1 :: Computer Maintenance (L:T:P::2:0:0)

5A SEC-2 :: Python Programming (L:T:P::2:0:0)

6A SEC-3 :: Web Programming (L:T:P::2:0:0)

6A SEC-4 :: Cyber Security (L:T:P::2:0:0)

B Sc Programme (CBCS) - Computer Science

Year	Semester	Course	Title	Hours/ Week		Credits	Maximum Marks			Exam Duration	Total
							IA		Exam		
				L	T/P	L+T+P	C1	C2	C3		Marks
I Year	I Semester	DSC	Computer Science – I								
		DSC	Computer Concepts and C Programming	4	0	4+0+0	10	10	80	3 Hours	150
		DSC	C Programming Lab	0	4	0+0+2	05	05	40	3 Hours	
	II Semester	DSC	Computer Science – II								
		DSC	Data Structures and ADA	4	0	4+0+0	10	10	80	3 Hours	150
		DSC	Data Structures and ADA Lab	0	4	0+0+2	05	05	40	3 Hours	
II Year	III Semester	DSC	Computer Science – III								
		DSC	Database Management Systems	4	0	4+0+0	10	10	80	3 Hours	150
		DSC	Database Management Systems Lab	0	4	0+0+2	05	05	40	3 Hours	
	IV Semester	DSC	Computer Science – IV								
		DSC	Object Oriented Programming with Java	4	0	4+0+0	10	10	80	3 Hours	150
		DSC	Java Lab	0	4	0+0+2	05	05	40	3 Hours	

Conduction of Lecture / Tutorial / Practical Sessions by a teacher

Lecture session: It is a conventional lecturing session. It may have all students enrolled for a course attending together for the lecture to be delivered by the teacher.

Tutorial session and Practical session: It is a session where a teacher initiates students to participate actively in learning to have experiences of learning.

Example: Students can be asked to give their learning experiences on a course and also to get involved in Problem solving, Problem practicing, Poem writing, Demonstrating orally, Acting in a drama, etc.,.

For effective learning, it is advised to make batches of students for tutorial and practical classes. It is recommended to have batches of 20 students in case of non practical courses and 15 students in case of practical courses in ideal situations. However, this can be up to 30 and 20 students respectively depending on the availability of infrastructures at an institution.

I Sem B.Sc.

DSC-3A: Computer Concepts and C Programming (LTP: 4:0:2) 6 Credits

Course duration: 16 weeks with 4 hours of instruction per week.

UNIT 1: Programming Concepts and Introduction to C language

Computer Fundamentals: Introduction, Types of Computers - Analog, Digital and Hybrid Computers - Micro, Mini, Mainframe and Super Computers. Basic components of a computer: Input devices – Keyboard, Mouse. Output devices – Monitor, Printer. Memory devices – Primary memory (ROM, RAM and their types) and Secondary memory (Floppy disks and Hard disks).

Programming Concepts: System software, Application software. Program Translators – Assembler, Compiler, and Interpreter. Programming languages -Machine Level language, Assembly level language, High level language.

Program development life cycle: Problem definition, analysis, Design, Coding, Testing and debugging, Documentation and maintenance. Algorithm-Features, simple examples.

Flowchart – Symbols used in a flowchart, suitable examples.

Introduction to C language

Overview of C: Importance of C, basic structure of C program, executing a C program, sample C program, Constants, variables and data types. C character set, C tokens, identifiers, constants, variables, declaration of variables, assigning values to variables. Data type conversion.

UNIT 2: Input / Output operations, Control statement and Arrays

Operators in C: arithmetic operators, relational operators. Logical operators, assignment operators, increment and decrement operators, conditional operators, bitwise operators, special operators, precedence of arithmetical expression, relational expression, logical expressions.

Input and Output statements: Reading a character: getchar(), Writing a character: putchar(), formatted and unformatted i/o statements.

Control structures:

Branching: if, if-else, nested if, else-if ladder, switch.

Looping: while, do-while and for loop. Jump statements, nested loops.

Arrays: Introduction, single dimensional array, two-dimensional arrays, initializing two-dimensional arrays, multidimensional arrays. Operations on arrays: traversal, insertion and deletion. **Searching:** Linear search. **Sorting:** Bubble sort.

UNIT 3: Strings, Functions and Structures

Strings: Declaring and initializing string variables, reading string from terminal, writing string to screen, putting strings together. Comparison of two strings, length of a string, copying a string, string operations using library functions & User defined functions.

Functions: Introduction, types of functions, need for user-defined functions, function call, types of arguments, nesting of functions, a multi function program, recursion, storage classes.

Structures: Definition and declaration of a structure, assigning and accessing the members of a structure, structure initialization, structure elements in memory, comparison of structure variables, structure with in the structure, array within structures.

Introduction to Dynamic Memory Allocation - Malloc( ), Calloc( ), Realloc( ) and Free( ).

UNIT 4: Unions, Pointers and Files

Unions: Definition and declaration, accessing the members of a union. Comparison of structure and union.

Pointers: Advantages of pointers, declaration of pointer variable, pointer expressions, pointers and functions: call by value and call by reference, pointers and arrays, array of pointers, pointer to pointer.

Files: Definition, types of files. Creating text file. Modes of opening a file, formatted and unformatted I/O operations, random files.

Texts Books

1. Programming in ANSI C - E. Balaguruswamy, Tata Mc Graw-Hill
2. Problem Solving with C - PHI (EEE). By - M. T. Somashekara.
3. Programming with C - S. Byron Gottfried, Tata McGraw-Hill(2000)
4. Let us C - Yashawant Kanetkar:
5. ANSI C Programming (PHI) - Brain Verminghan & Dennis M. Ritchie

C Programming
Lab Cycle Programs

Part A

1. Programs to demonstrate *input-output* statements.
2. Programs to demonstrate *conditional* statements using if constructs.
3. Programs to demonstrate *switch* statement.
4. Programs to demonstrate *looping* statements.
5. Programs to demonstrate *one-dimensional array*.
6. Programs to demonstrate *two-dimensional array*.

Part B

1. Programs to demonstrate *string* operations.
2. Programs to demonstrate a function using *Call by Value* technique.
3. Programs to demonstrate a function using *Call by Reference* technique.
4. Programs to demonstrate *recursion* function.
5. Programs to demonstrate *structure*s.
6. Programs to demonstrate *pointers*.
7. Programs to demonstrate *file* operations.

II Sem B.Sc.

DSC-3B: Data Structures and ADA (LTP: 4:0:2) 6 Credits

Course duration: 16 weeks with 4 hours of instruction per week

Unit-1: Introduction

Basic Data Structure: Primitive and non primitive, Abstract data structure, Operations, Data representation.

Linear Data Structure: Arrays - Memory representation of one and two dimensional arrays, ***Stack*** – Operations, Applications – Recursion, infix to postfix conversion, evaluation of postfix expression, ***Queues*** – Operations, Applications, circular queue-Operations, Dequeue, priority queue – uses of priority queues, ***Linked list*** - Dynamic memory allocation, Singly linked list – Operations, Circular linked list – Operations, Applications of linked list, doubly linked list – memory representation.

Unit-2: Non-Linear Data Structure

Non-Linear Data Structure: Tree – Terminologies, tree properties, binary tree-properties, memory representation – Array and Linked list representation, Binary search tree – Creation through insertion, searching, deletion algorithms, Tree traversal, balanced trees, Applications of binary tree, sets: Dictionary implementation, sets with merge-find operations.

Unit-3: Searching and sorting

Searching: Sequential search and Binary search.

Sorting: Internal and external sorting - bubble, selection, insertion, quick sort and merge sort, heap sort, comparison of different sorting techniques.

Unit-4: ADA

Introduction to Analysis and Design of Algorithm (ADA): Notation of Algorithm, Asymptotic Notation, Mathematical Analysis of Recursive and Non-recursive algorithms.

Brute Force Approaches: Introduction, Sequential Search and Brute Force String Matching.

Divide and Conquer: Introduction, Binary Search, Merge Sort, Quick Sort and its Performance.

Text Books

1. An Introduction to Data Structures with Applications (Tata McGraw Hill) by J P Trembly and Sorenson.
2. Computer Concepts & C Programming by P B Kotur.
3. Classic Data Structures (PHI) by Debasis Samanta.
4. Data Structures using C by H K Gundurao, N S Manjunath, M N Nachappa.
5. Introduction to the Design & Analysis of Algorithms (Pearson) by Anany Levitin

Data Structures and ADA
Lab Cycle Programs

PART-A

1. Write a Program to insert an element at k^{th} position in a one dimensional array.
2. Write a Program to delete an element at k^{th} position in a one dimensional array.
3. Write a Program to search an element using sequential search and binary search.
4. Write a Program to implement stack operations using array.
5. Write a Program to solve a tower of Hanoi problem using recursion.
6. Write a Program to implement queue operations using array.
7. Write a Program to implement circular queue operations using array.
8. Write a program to convert an infix expression to postfix.

PART - B

1. Write a Program to create a linked list and display the elements.
2. Write a Program to insert a new node at the beginning and end of the singly linked list.
3. Write a Program to delete a node containing given item of information.
4. Write a program to create a binary search tree and traverse it in all the three modes.
5. Write a Program to sort a given set of numbers using selection sort.
6. Write a Program to sort a given set of numbers using insertion sort.
7. Write a Program to sort a given set of numbers using quick sort.
8. Write a Program to sort a given set of numbers using merge sort.
9. Write a program to find the time and space complexity for the factorial of the n number (using recursion).
10. Write a program to find the time and space complexity for the factorial of the n number (non-recursion).

Scheme of Examination

Theory

Marks: 80 **Time: 3 Hours**

PART – A

Answer all the Questions **2X8=16 Marks**

1
2
3
.
.
8

(Two questions from each unit.)

PART – B

Answer any Two Questions from each Main. **16 Marks**

13 a.
b.
c.

(Questions should be from Unit - 1 and can have subdivisions.)

14 a. **16 Marks**
b.
c.

(Questions should be from Unit - 2 and can have subdivisions.)

15 a. **16 Marks**
b.
c.

(Questions should be from Unit - 3 and can have subdivisions.)

16 a. **16 Marks**
b.
c.

(Questions should be from Unit - 4 and can have subdivisions.)

Scheme of Valuation for Practical Exam

C1 and C2 are internal tests to be conducted during 8th and 16th week of the semester respectively. C3 is the semester-end examination conducted for 3 hours.

The student has to compulsorily submit the practical record during C1 and C2. For C3, the record has to be certified by the Head of the Department.

- The student is evaluated for 10 marks in C1 and C2 respectively.
  (Average of C1 and C2 for 10 Marks.)
- The student is evaluated for 40 marks in C3 as per the following scheme:

There will be two questions. A candidate has to prepare procedures for both the questions and execute any one of examiner's choice.

Procedure Development	:	10 x 2=20 Marks
Implementation	:	10 x 1=10 Marks
Viva	:	05 Marks
Record	:	05 Marks
Total	**:**	**40 Marks**