

END TERM EXAMINATION

SECOND SEMESTER [BCA] JULY 2023

Paper Code: BCA-106

Subject: Data Structure and Algorithm Using C

Time: 3 Hours

Maximum Marks: 75

Note: Attempt five questions in all including Q. No.1 which is compulsory. Select one question from each unit.

Q1 Answer the following:-

(2.5x10=25)

- (a) Define an Algorithm.
- (b) What is Dynamic Memory Allocation method?
- (c) List down any four application of data structure.
- (d) Define Stack and Queue.
- (e) Define Graphs and Tree.
- (f) Define the hash function.
- (g) What are the asymptotic notations?
- (h) Define the Acyclic graph.
- (i) What are Binary Trees?
- (j) Define adjacency matrix.

UNIT-I

- Q2 (a) What is Sparse Matrix and how will you represent Sparse Matrix by 2D Array? (8.5)
- (b) What is Time Complexity also write the Time Complexity of Selection Sort, Bubble Sort, Insertion Sort, Heap Sort, Quick Sort, Merge Sort, Radix sort? (4)

OR

- Q3 (a) Consider the following array: Arr= 14, 33, 27, 35, 10, Sort this array using Bubble sort Algorithm? (9.5)
- (b) Explain in Simple term how Hash Tables are implemented? (3)

UNIT-II

- Q4 (a) What is Dynamic Memory Allocation and how can you determine the size of an allocated portion of memory? (6.5)
- (b) Write the Difference between:
- (i) Static and Dynamic Memory Allocation
 - (ii) Calloc() and Malloc()

OR

- Q5 (a) Write a Program in C to create and Display a Singly Linked List. (6.5)
- (b) Write an algorithm for Binary Search and also write a simple Binary Search Program in C. (6)

UNIT-III

- Q6 (a) Write a Program to Reverse a String using Stack. (6)
- (b) Write the steps to Convert Infix Expression to a Postfix Expression and Convert an Infix Expression $exp = "a+b*c+d"$ to Postfix Expression. (6.5)

OR

- Q7 (a) Write a Short note on:
- (i) Linear Queue
 - (ii) Circular Queue
 - (iii) Priority Queue
- (b) What is Abstract Data Types and its features, also write the advantages and Disadvantages of Abstract Data Types. (6.5)

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OR

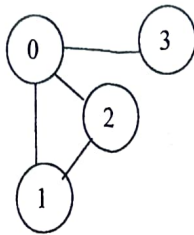
- Q8 (a) Convert the infix expression $A \times B + A \times (B \times D + C \times E)$ into Polish notation? **(6.5)**
(b) Why and when should I use Stack or Queue data structures instead of Arrays/Lists? **(6)**

UNIT-IV

- Q9 (a) Define the terms: **(8)**
(i) Graphs
(ii) Acyclic Graphs
(iii) AVL
(iv) Heap Tree
(b) What do you mean by degree of vertex? Define indegree and outdegree of vertex with example. **(4.5)**

OR

- Q10 (a) What is Adjacency Matrix, what are pros and cons of Adjacency Matrix. Draw the Matrix representation of the graph for a given tree. **(8.5)**



- (b) Explain how Heap Sort Works with the help of an example. **(4)**
