

GBCS SCHEME

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18CS652

Sixth Semester B.E. Degree Examination, Feb./Mar.2022 Introduction to Data Structures and Algorithms

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain about functions in C language. Explain importance of built-in functions. (06 Marks)
- b. Write C program to swap two numbers using call by reference method and call by value method. (04 Marks)
- c. Write algorithm and C program to find maximum product of two integers in a given array of integers. If input is [2, 3, 5, 7, -7, 5, 8, -5], output is $7 \times 8 = 56$ (10 Marks)

OR

- 2 a. Explain user defined data types in detail with examples. (06 Marks)
- b. Write C program to calculate factorial of a number using while loop and recursive function. (04 Marks)
- c. Write C program and algorithm to separate even and odd numbers of a given array of integers. (10 Marks)

Module-2

- 3 a. What are the characteristics of an algorithm? (03 Marks)
- b. What is asymptotic analysis? Explain BigO notation with relevant diagram and example. (07 Marks)
- c. Write algorithm and C program to insert element in an array. (10 Marks)

OR

- 4 a. A 10×12 matrix is implemented using array A[10][12]. If the base address of the array is 200 and the word size is 2 then compute the address of the element A[4, 7] in Row major order and column major order. Assume that the lower bound of both row and column indices is 1. (04 Marks)
- b. Write C program to find transpose of a given 3×3 matrix. (06 Marks)
- c. Explain in detail about different types of data structures. (10 Marks)

Module-3

- 5 a. What is a linked list? Write advantages of linked list over array. (04 Marks)
- b. What is a stack? Explain Push and Pop operations of stack with diagram. (06 Marks)
- c. Write algorithm and C program to implement insert operation of circular linked list. (10 Marks)

OR

- 6 a. What are the difference between array and stack in their logical representation? (04 Marks)
- b. Write C program to implement push and pop operations using array. (06 Marks)
- c. Write algorithm and C program to implement deletion operation of doubly linked list. (10 Marks)

Module-4

- 7 a. Explain threaded Binary trees. (04 Marks)
 b. What are the task to be performed to implement insert and delete operations of circular queue? (06 Marks)
 c. Write C program to implement insert, delete display functions of the priority queue. (10 Marks)

OR

- 8 a. What is double ended queue? What are the two categories? What are the four operations possible for a double ended queue? (04 Marks)
 b. Write algorithms and C program functions for Preorder traversal, Inorder traversal, Postorder traversal. (06 Marks)
 c. Write a C program functions for inserting and searching an element into binary search tree. (10 Marks)

Module-5

- 9 a. Write C program deriving the shortest path matrix of a diagraph using the modified Warshall's method. (10 Marks)

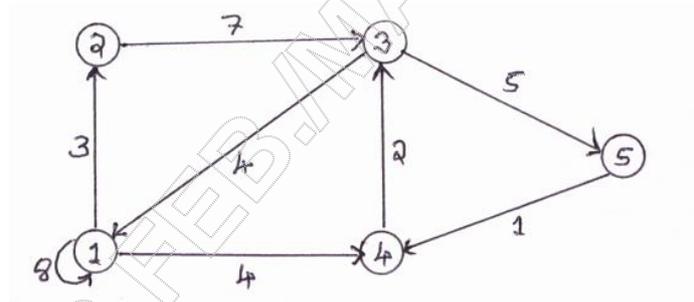


Fig. Q9(a)

- b. Explain adjacency matrix and path matrix methods of graph implementation. (10 Marks)

OR

- 10 a. Write algorithm and C program to perform insertion sort. (10 Marks)
 b. Write algorithm and C program to perform Binary search. (10 Marks)
