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S.E. (Information Technology) (Semester- III) (Revised Course 2007-08)  
EXAMINATION MAY/JUNE 2019  
Data Structures Using C

[Duration : 3 Hours]

[Max Marks : 100]

**Instructions:**

- i) Answer any five questions by selecting at least one question from each Module.
- ii) Make necessary assumptions if required. Clearly state any such assumptions made.

**MODULE-I**

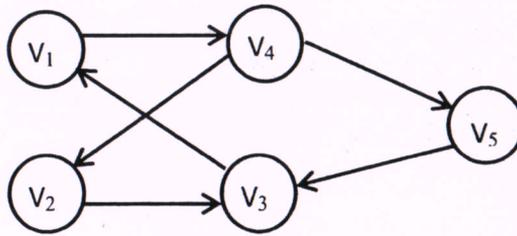
- Q.1
- a) What is dynamic memory allocation? Explain the various memory allocations function in C. **05**
  - b) Write a recursive C function to generate the Fibonacci sequence. Give the disadvantages of recursive function calls. **07**
  - c) Write a program to find the length of a string: **08**
    - i) Using pointers
    - ii) Without using pointer
- Q.2
- a) What is the difference between structures and unions? Explain with an example **05**
  - b) Write a C program that will read a file NUM.txt containing integers and write only those integers divisible by 3 into a file DIV3.txt **07**
  - c) Define a structure for a person having name, age, height and weight. Write a C program to input the details for 10 persons and print details of only those persons who are above 50 years of age. **08**

**MODULE -II**

- Q.3
- a) What is the difference between array implementation and dynamic representation of a linked list. **05**
  - b) How can a polynomial be represented using linked list? Write a program to add two polynomials using linked list. **07**
  - c) What is a circular queue? Write a C program to perform insertion and deletion operations on circular queue **08**
- Q.4
- a) What are the basic queue operations? Explain them. **05**
  - b) Write a C program to convert infix expression to postfix using stacks **07**
  - c) Write C functions to implement the following operations on a doubly linked list **08**
    - i. Append a node
    - ii. Delete an intermediate node

**MODULE-III**

- Q.5 a) Construct a B-tree of order 5 by inserting the following elements in order: 10, 40, 30, 35, 20, 15, 50, 28, 25, 5, 60, 19, 12, 38, 27, 90, 45, 48 **05**
- b) Draw an AVL tree after every insertion of the below keys: 3, 2, 1, 4, 5, 6, 7, 31, 29, 13 **08**
- c) Write a non-recursive procedure for traversing a binary tree in post-order **07**
- Q.6 a) Define complete binary tree with an example **02**
- b) Explain the Prim's algorithm with an appropriate example **08**
- c) Consider the graph given below: **10**



- Give the following for the above graph:
- i. Adjacency matrix representation
  - ii. Adjacency list representation
  - iii. Traversal using BFS
  - iv. Traverse using DFS

**MODULE-IV**

- Q.7 a) Differentiate between sequential and binary searching techniques with examples. **06**
- b) Write the status of the following list at the end of each phase of the heapsort 10, 4, 20, 30, 7, 25, 3, 11, 22, 5, 19 **07**
- c) What is Hashing? Can a perfect Hash function be made? Justify your answer. Explain in detail any 2 methods used to resolve collision **07**
- Q.8 a) Write a C program to perform selection sort **06**
- b) Show the steps of merge sort for the following input 98, 23, 45, 14, 6, 67, 33, 42 **06**
- c) Explain the following sorting technique
- i. Radix sort **04**
  - ii. Quicksort **04**