

03-06-15 (14)



## COMP 4 – 2(RC)

S.E. (Computer) (Semester – IV) (Revised Course)

Examination, May/June 2015

### DATA STRUCTURES

Duration : 3 Hours

Total Marks : 100

- Instructions:** 1) Answer **any five** questions by selecting atleast **one** from **each Module**.
- 2) Make suitable assumptions **wherever** required. **Clearly** state any such assumptions made.

#### MODULE – I

1. A) Write C functions to add, multiply and negate complex numbers using structures. 8
- B) What are recursive functions ? Explain the efficiency of recursion. 6
- C) Write functions to find : (2+4)
  - i) Number of elements in a linked list
  - ii) Reverse a linked list.
2. A) Write a C function to concatenate two linked lists. 6
- B) Write a C function search (l, x) that accepts a pointer l to list of integers and an integer x and returns a pointer to a node containing x, if it exists, and a null pointer otherwise. 6
- C) Explain the following file management functions : 4
  - a) fseek b) ftell
  - c) rewind d) fopen
- D) Explain unions and macros with examples. 4

#### MODULE – II

3. A) Write a C function to check for well formed parentheses using stacks. 6
- B) Compare strictly binary tree, complete binary tree and an almost complete binary tree with the help of examples. 6

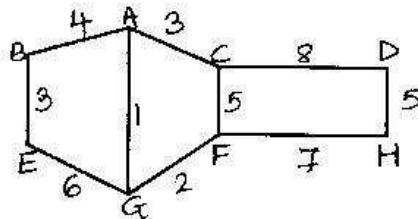
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- C) Write an algorithm for deleting an item from a linear queue. 4
- D) What are priority queues ? Explain with the help of an example. 4
4. A) Draw a binary search tree for the following set of words : 8  
 JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC.
- B) Write functions to insert and delete from a circular queue. (Use linked list implementation). 6
- C) Define a stack. Explain the operations performed on stacks. If the sequence of operations : 6  
**Push(5); Push(7); Pop; Push(5); Push(7); Pop; Pop; Pop; Push(7); Pop;**  
 are performed on a stack, what is the sequence of popped out values ?

## MODULE – III

5. A) Explain the following terms with the help of an example. 6
- Digraph
  - Strongly connected graph
  - Spanning tree
- B) For the graph given below find : (3+2+4)
- Outdegree, indegree and degree of the vertices A, E, F, G and H.
  - adjacency list representation
  - Minimum spanning tree using prims algorithm (show stepwise construction)

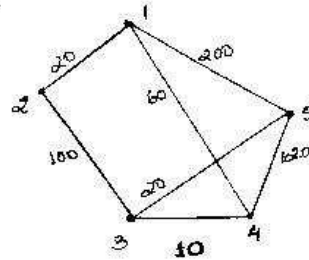


- C) Explain the best-fit, first-fit and worst-fit methods. 5

6. A) Explain the Breadth First Search algorithm. Apply Breadth First Search and Depth First Search to the complete graph on 4 vertices. List the vertices in the order they would be visited. 10
- B) Explain in brief the different methods used in the automatic list management. 8
- C) What is thrashing ? 2

MODULE - IV

7. A) Sort the following using heap sort (show each step) : 6  
44, 55, 66, 2, 3, 4, 56
- B) Write a C function to add two polynomials using linked lists. 6
- C) Using Dijkstra's Algo find the shortest path in the following figure between 2 and 3. 8



8. A) Write an algorithm to sort an array of numbers using bubble sort. Sort the following using bubble sort method. Show the array after every iteration. 8  
14, 15, 4, 9, 7, 18, 3, 5, 16, 4, 20, 17
- B) Write an algorithm to convert the given infix expression to postfix expression. Trace the conversion of the following infix expression to postfix using stacks. 8  
 $8 \wedge 2/3 * 2 + 3 / 5$
- C) List the advantages and disadvantages of chaining. 2
- D) What is tree search ? Explain. 2