COMP 4-2 (RC)

S.E. Computer (Semester – IV) (Revised Course) Examination, November/December 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 a recursive function in C for 6
   i) N-disk problem in Tower of Hanoi.
   ii) Fibonacci series.

   B) Write a C program to append the contents of one file to another. 6

   C) Define the following : 4
   a) Macros
   b) Strings

   D) Write a C program to interchange the m^{th} and n^{th} elements of a linked list. 4

2. A) Write a C function to accept a string and convert the characters from uppercase to lowercase. 4

   B) There are 2 linked lists A and B containing some data. Write a program to create :
   a) A linked list C that contains only those elements that are common in linked list A and B.
   b) A linked list D that contains all elements of A as well as B ensuring that there is no repetition of elements. 8

P.T.O.

C) Explain the use of the following string handling functions :

a) strncmp

b) strstr

c) strncpy

d) strncat. 4

D) Write an algorithm to insert an element at the front of a linked list. 4

MODULE – II

3. A) Create a BST if the nodes visited in inorder and postorder traversals are GBADFCHE and ABGDCFEG respectively. Show stepwise construction. 6

B) Draw the binary search tree whose pre-order traversal is given by :

30, 20, 10, 15, 25, 23, 39, 35, 42. 6

i) For the above given sequence, is the search tree unique ? Why or Why not ?

ii) List the post order traversal sequence of the tree.

C) Write an algorithm for inserting an item into a double ended queue. 4

D) What are threaded trees ? Explain with suitable examples. 4

4. A) Explain the following with suitable examples : 4

i) Height balanced binary tree

ii) Almost complete binary tree.

B) Suppose the following alphabets are inserted in order on the empty list. 6

B, A, H, I, K, L, O, Y, X, J, C, S

Draw a Binary Search tree for the above list.

C) Compare the following : 4

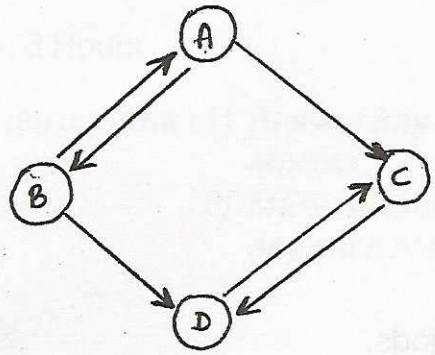
i) Circular Queue

ii) Linear Queue

D) Write functions to insert and delete from a linear queue. (Use linked list implementation). 6

MODULE – III

5. A) Is the following directed graph strongly connected ? List all the simple paths. 4



B) For the above digraph, obtain 8

i) The indegree and outdegree of each vertex.

ii) Adjacency matrix

iii) Adjacency list

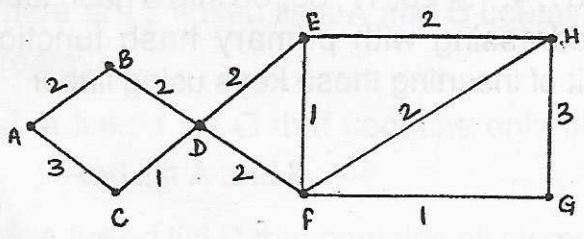
iv) Strongly connected components.

C) Write a short notes on : 8

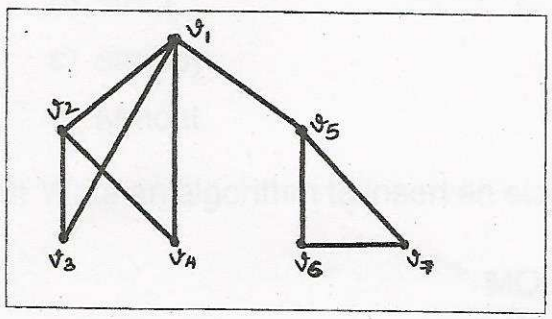
i) Reference count method

ii) Garbage Collection.

6. A) What is a spanning tree ? List the properties of spanning tree. Find the minimum spanning tree for the following graph using Kruskals algorithm. 8



B) Write an algorithm to traverse a graph using DFS. Traverse the following graph using DFS and BFS. 7



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

MODULE – IV

7. A) Write an algorithm to evaluate a postfix expression. Evaluate the following postfix expression using stack. (Show steps). 8

6 2 3 + – 3 8 2 / + * 2 $ 3 +

B) Write a program to implement binary search (recursive) and validate it with an example. 6

C) Sort the list 415, 213, 700, 515, 712, 715 using Radix Sort method. 6

8. A) Out of 100 letters 40 letters are 'e' , 20 letters are 'n', 20 letters are 'g', 10 letters are 'i' and 10 letters are 'r'. Create a Huffman for the above set of letters and code the word "engineer". 6

B) Write a C program to implement selection sort. 8

C) Consider inserting the keys 10, 22, 31, 4, 15, 28, 17, 59, 88 into a hash table with m = 11 slots using open addressing with primary hash function h_1 (k) = k mod m. Illustrate the result of inserting these keys using linear probing. 6
