Printed Pages: 1

BCS12 **Roll No.** | | | | | | | | | | | |

B. Tech.
(SEM I) ODD SEMESTER
MAJOR EXAMINATION 2015 - 2016

PRINCIPLES OF DATA STRUCTURES THROUGH C/C++

Time: 3 Hrs. **Max. Marks: 40**

Note: Answer all questions.

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

(a). Two stacks, stack_1 and stack_2, are to be implemented in memory: array [0… M-1] of stack type in such a way that neither stack overflows unless the total number of elements in both stacks together is M. Stack_1 grows from memory[0] up towards memory[M-1] and Stack_2 grows from memory[M-1] down towards memory[0]. Write functions to implement both the stack. 4

(b). A linear array A is given with lower bound as 1. If address of A[25] is 375 and A[30] is 390, then find address of A[16]. 3

(c). What is a sparse matrix? How is it stored in the memory of a computer? Write afunction to find the transpose of a sparse matrix using this representation. 3

(d) Let P be a pointer to a singly linked list. Show how this list may be used as a stack. That is, write a Funstions to push and pop elements. 3

Q.2 Attempt any Three parts of the following. Q. 2(a) is compulsory.

(a). Suppose a queue is housed in an array in circular fashion. It is desired to addnew items to the queue. Write down a function addQ to achieve this alsochecking whether the queue is full. Write another function delQ to delete anelement after checking queue empty status. 4

(b). Write a C function that accepts a singly linked list as a parameter and returns the singly linked list after reversing the order of nodes. 3

(c). Write ADT (Abstract Data Type) for QUEUE data structure. Also write functions for dynamic implementation of QUEUE. 3

(d) Discuss the polynomial representation in Linked List with example. Also write a C function to add two such polynomials passed as arguments and returns the resulting polynomial. 3

Q.3 Attempt any Three parts of the following. Q. 3(a) is compulsory.

(a). The degree of a node is the number of children it has. Show that in any binary tree, the number of leaves are one more than the number of nodes of degree 2 4

(b). Construct a binary tree whose nodes in inorder and preorder are given as follows: 3

Inorder : 10, 15, 17, 18, 20, 25, 30, 35, 38, 40, 50
Preorder: 20, 15, 10, 18, 17, 30, 25, 40, 35, 38, 50

(c). Define AVL Tree. Compute the minimum number of nodes in an AVL Tree of height h. 3

(d) Define a B-Tree. Show the result of inserting the keys, F, S, Q, K, C, L, H, T, V, W, M, R, N , P, A, B, X, Y, D, Z, E in the order to an empty B-tree of degree-3. 3

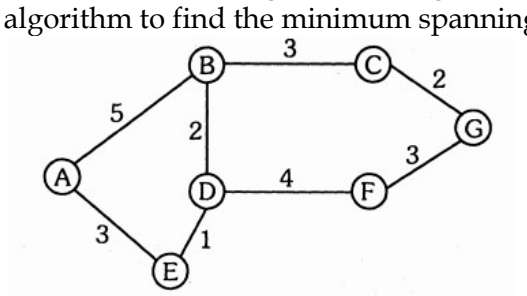
Q.4 Attempt any Three parts of the following. Q. 4(a) is compulsory.

(a). Define Graph. Discuss various implementation of Graph in computer memory using C language constructs. 4

(b). Write the program for sorting the list of integers using Quick sort algorithm. Obtain the worst case and average case time complexity of this algorithm. Show the trace of the algorithm for following key sequence. 3

24 56 47 35 10 90 82 31

(c). What is a Spanning tree of a graph? What is minimum spanning tree? ExecuteKruskal's algorithm to find the minimum spanning tree of thefollowing graph. 3



(d) Write short notes on: 3

I. Hash Functions
II. Binary Search