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BCS12

Roll No. | | | | | | | | | | | |

B. Tech.
(SEM-III) ODD SEMESTER
MAJOR EXAMINATION 2016 - 2017

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). What are the characteristics of an algorithm? Explain time space trade off. Which complexity is better among O(n), O(n2) and O(log n)? 4

(b). Consider a three dimensional array X whose subscript limits are: $0 \le i \le 10$, $0 \le j \le 50$, $0 \le k \le 30$. Assume that storage for the array begins at 2000 in memory and 4 bytes are required to hold each element of the array. Compute the actual address of the element X[5, 20, 10] assuming that array is stored in row major order. 3

(c). What is complexity of an algorithm? Explain various notations used to express the complexity of an algorithm. 3

(d) Distinguish between static and dynamic data structure with suitable examples. Write a C function for polynomial addition using linked list. 3

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

(a). Convert following Infix expressions into their Prefix and Postfix equivalents- 4
(i) A+((B+C)+(D+E)*F)/G (ii) A+(B*C-(D/E^F)*G)*H

(b). Define queue and state any one example of its usage. Formulate insertion and deletion algorithms/function for a circular queue. 3

(c). Write a recursive algorithm to solve Tower of Hanoi problem. Show the execution of the algorithm for 3 disks. 3

(d) What is stack? Write functions for PUSH and POP operations of stack which is implemented as linked list. 3

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

(a). What is binary search tree? Why do we need to balance its height? Write algorithm/function to delete a node from a binary search tree. 4

(b). Find the postorder traversal of a binary tree whose inorder traversal gives: 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 15, 19, 20 and preorder traversal gives: 7, 4, 2, 3, 6, 5, 12, 9, 8, 11, 19, 15, 20. 3

(c). Define AVL tree. Show the trace of element insertion, available in following sequence, for AVL tree construction. 3
9, 50, 15, 21, 36, 8, 7
Also show the deletion of node 9 (by considering inorder successor method).

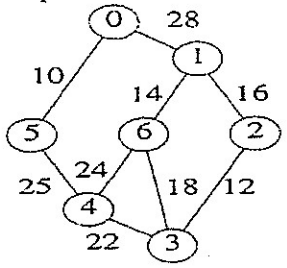
(d) How does B-Tree differ from BST? Show the result of inserting the keys A, G, F, B, K, D, H, M, J, E, S, I, R, X, C, L, N, T, U, P in the order to an empty B-tree of degree-5. 3

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

(a). What is Searching? What is the necessary condition for Binary search? Write down the algorithm for Sequential search and Binary search. 4

(b). Write Quick Sort function and give the trace of sorting for following sequence of Keys. 3
26, 33, 35, 29, 19, 12, 22

(c). Apply Prim's and Kruskal's algorithms on following graph to get a minimum cost spanning tree and compare the results of both implementations. 3



(d) What is Hashing? Is there any difference between hashing and searching? What is Hash Collision? Describe various hash functions in short. 3