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BICS-007

B.Tech. – VIEP – COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

00304

Term-End Examination

June, 2014

BICS-007 : DATA STRUCTURES

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks.*

1. (a) Suppose multidimensional arrays A and B are declared using A (– 2 : 2, 2 : 22) and B (1 : 8, – 5 : 5, – 10 : 5). Find the length of each dimension and number of elements in A and B. Consider B (3, 3, 3] in B. Find the effective indices E_1, E_2, E_3 and the address of the elements, assuming Base (B) = 400 and there are w = 4 words per memory location. *6*

(b) What is Garbage collection ? Explain the concept of overflow and under flow in case of linked list, with the help of suitable example. *4*

2. (a) Write an algorithm for binary search. What are its limitations ? *4*

(b) Given the following arithmetic expression in infix notation as

$$12 / (7 - 3) + 2 * (3 + 8) - 7$$

Translate this expression into postfix notation and then evaluate it. *6*

3. (a) Write a program to construct and delete elements in a circular queue using linked list. *5*

(b) What is a threaded binary tree ? Explain with the help of example. What are its advantages ? *5*

4. (a) What is a stack ? Explain the applications of stack. Write an algorithm to push and pop elements from stack using array. *1+2+4*

(b) Define data, information, algorithm and data structure. Give the difference between linear and nonlinear data structures. *3*

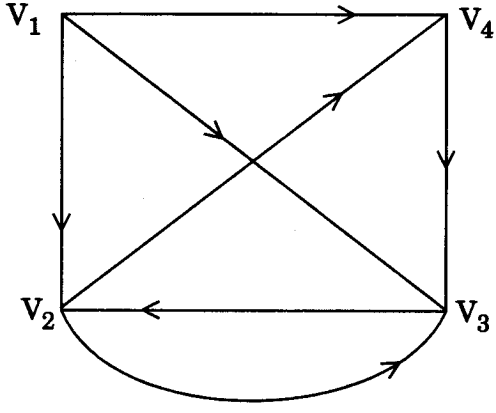
5. (a) Define time complexity. Explain Big Oh (O) notation. *4*

(b) Write an algorithm to sort an array of elements using insertion sort. *6*

6. (a) Write an algorithm for inserting and deleting on queues using array. *6*

(b) Define dynamic implementation of linear linked list. *4*

7. (a) Find the incidence matrix of the graph. *6*



(b) Draw all (non similar) trees with exactly six nodes. *4*

8. (a) What is hashing ? Explain the concept of Collision Resolution in hashing. *4*

(b) Suppose the following sequences, list the nodes of a binary tree T in pre-order and in-order :

Pre-order G, B, Q, A, C, K, F, P, D, E, R, H

In-order Q, B, K, C, F, A, G, P, E, D, H, R

Draw the diagram of the tree. 6

9. (a) Explain Warshall's algorithm. *4*

(b) What is a Hash function ? Explain the different kinds of Hash functions. *6*

10. Attempt any ***two*** parts : *5×2=10*

(a) Spanning trees

(b) Comparison of Indexing and Hashing

(c) Tower of Hanoi Problem