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BICS-029

DIPLOMA – VIEP – COMPUTER SCIENCE AND ENGINEERING (DCSVI) / ADVANCED LEVEL CERTIFICATE COURSE IN COMPUTER SCIENCE AND ENGINEERING (ACCSVI)

Term-End Examination

00174

December, 2014

BICS-029 : ALGORITHMS AND LOGIC DESIGN

Time : 2 hours *Maximum Marks : 70*

Note : *Question no. **1** is **compulsory**. Attempt **four** more questions from the rest.*

1. Choose the correct answer :

(a) Binary search algorithm cannot be applied to *2*

(i) sorted linked list

(ii) sorted binary trees

(iii) sorted linear array

(iv) pointer array

(b) An algorithm considering the elements one at a time, inserting each in its suitable place among those already considered (keeping them sorted) is called *2*

(i) Selection sort

(ii) Insertion sort

(iii) Bubble sort

(iv) None of the above

(c) Selection sort is quadratic in both the worst and the average case, and requires no extra memory. 2

(i) True

(ii) False

(d) Two main measures for the efficiency of an algorithm are 2

(i) Processor and memory

(ii) Complexity and capacity

(iii) Time and space

(iv) Data and space

(e) The worst case occurs in linear search algorithm when 2

(i) item is somewhere in the middle of the array

(ii) item is not in the array at all

(iii) item is the last element in the array

(iv) item is the last element in the array or is not there at all

(f) The complexity of Binary search algorithm is 2

(i) O(n)

(ii) O(log n)

(iii) $O(n^r)$

(iv) O(n log n)

(g) Finding the location of the element with a given value is 2

(i) Traversal

(ii) Search

(iii) Sort

(iv) None of the above

2. (a) What is algorithm ? Design an algorithm for adding the test scores as given below :

26, 49, 98, 87, 62, 75 *2+5=7*

(b) What are the principles of recursion ? Write a recursive algorithm to find the factorial of any number. *2+5=7*

3. (a) What is the difference between linear search and binary search ? Design an algorithm for finding an element in an array of n elements using linear search technique. *2+5=7*

(b) What is searching ? Design a recursive binary search algorithm for searching an element in an array of n elements. *2+5=7*

4. (a) What is bubble sort ? Write a function to arrange the list of numbers in ascending order using bubble sort technique. *2+5=7*

(b) Explain design and analysis of merge sort algorithm in brief. $3\frac{1}{2}+3\frac{1}{2}=7$

5. Design algorithms for the following : *7+7=14*

(a) Shell sort

(b) Insertion sort

6. (a) What is time complexity of an algorithm ? Explain Big-Oh (O) and Big-Omega (Ω) notation. *2+5=7*

(b) What is worst case analysis ? Prove that if $f(n) = a_m n^m + ... + a_1 n + a_0$, then $f(n) = O(n^m)$. *2+5=7*

7. (a) What is bucket sorting ? Sort the following list using bucket sort technique :

$A = < 0{\cdot}78, 0{\cdot}17, 0{\cdot}39, 0{\cdot}26, 0{\cdot}72, 0{\cdot}94, 0{\cdot}21, 0{\cdot}12, 0{\cdot}23, 0{\cdot}68 >$ *2+5=7*

(b) What is quick sort ? Illustrate the operation of partition on the array

$A = < 2, 8, 7, 1, 3, 5, 6, 4 >$ *2+5=7*

8. Write short notes on any ***four*** of the following : *$3\frac{1}{2} \times 4 = 14$*

(a) Fibonacci search

(b) Space complexity

(c) Use of psuedocode

(d) Recursive algorithm

(e) Asymptotic notations