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BICS-029

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

00461

Term-End Examination

June, 2014

BICS-029 : ALGORITHMS AND LOGIC DESIGN

Time : 2 hours *Maximum Marks : 70*

Note : *Question no.* ***1*** *is* ***compulsory.*** ***Four*** *more questions are to be attempt from the rest.*

1. Choose the correct option :

(a) Which of the following is not the required condition for binary search algorithm ? *2*

(i) The list must be sorted

(ii) There should be the direct access to the middle element in any sublist

(iii) There must be mechanism to delete and/or insert element in list

(iv) None of the above

(b) Bubble sort requires extra extra memory. *2*

(i) True

(ii) False

(c) Divide-and-conquer is a 2

(i) top-down technique

(ii) bottom-up technique

(iii) Both

(iv) None

(d) The complexity of merge sort algorithm is 2

(i) O(n)

(ii) O(log n)

(iii) $O(n^2)$

(iv) O(n log n)

(e) The following process depicts which sorting algorithm : first find the smallest in the array and exchange it with the element in the first position, then find the second smallest element and exchange it with the element in the second position, and continue in this way until the entire array is sorted. 2

(i) Selection sort

(ii) Insertion sort

(iii) Bubble sort

(iv) None

(f) The time factor when determining the efficiency of algorithm is measured by 2

(i) counting microseconds

(ii) counting the number of key operations

(iii) counting the number of statements

(iv) counting the kilobytes of algorithm

(g) Which of the following cases does ***not*** exist in complexity theory ? *2*

(i) best case

(ii) worst case

(iii) average case

(iv) null case

2. (a) What is algorithm ? Explain the following : *1+6=7*

(i) Design of algorithm

(ii) Algorithm validation

(iii) Analysis of algorithm

(iv) Algorithm testing

(b) What is flowchart ? What are the components of flowchart ? Design a flowchart for an algorithm to add the test scores as given below : *1+2+4=7*

26, 49, 98, 87, 62, 75

3. (a) What is recursion ? Write a recursive algorithm to generate fibonacci sequence. *2+5=7*

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

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

(a) Selection sort

(b) Merge sort

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

(b) What is Bucket sorting ? Sort the following list using Bucket sort technique : *2+5=7*

A = < 0·23, 0·37, 0·15, 0·18, 0·34, 0·88, 0·99, 0·92 >

6. (a) What is quick sort ? Illustrate the operation of Partition on the array A = < 2, 8, 7, 1, 3, 5, 6, 4 > *2+5=7*

(b) What do you mean by validation and testing of program ? Write down the stages of program development life cycle. *2+5=7*

7. (a) What do you mean by order of growth of the running time of an algorithm ? What are the asymptotic notations ? Explain Big-Oh (O) and Big-Omega (Ω) notations. *1+4+2=7*

(b) What is best case, average case and worst case analysis ? Explain each. *7*

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

(i) Time complexity

(ii) Space complexity

(iii) Bubble sort

(iv) Shell sort

(v) Sorting by exchange

(vi) Pseudocode