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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

December, 2015

BICS-029 : ALGORITHMS AND LOGIC DESIGN

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. Question number **1** is **compulsory**. Each question carries equal marks.*

1. Choose the correct answer from the given four alternatives :

(a) The average number of comparisons in sequential search is *2*

(i) $\frac{n+1}{2}$

(ii) $\frac{n(n+1)}{2}$

(iii) $\frac{1}{2}(n-1)$

(iv) $\frac{n(n-1)}{2}$

(b) In the worst case time complexity of binary search is 2

(i) $O(n \log n)$

(ii) $O(\log n^2)$

(iii) $O(\log n)$

(iv) $O(\log n - 1)$

(c) The number of interchanges needed in Insertion Sort method is on an average 2

(i) $\frac{n(n-1)}{2}$

(ii) $\frac{n^2}{4}$

(iii) $\frac{n^2}{2}$

(iv) $\frac{n(n+1)}{2}$

(d) The runtime efficiency of Quick Sort in the worst case situation is 2

(i) $O(\log n)$

(ii) $O(n \log n)$

(iii) $O(\log 2n)$

(iv) $O(n^2)$

(e) In which sort the storage complexity is ***not*** best ? 2

(i) Heap Sort

(ii) Bucket Sort

(iii) Merge Sort

(iv) Quick Sort

(f) Which one of the following methods is most efficient, if the successor value of k is kept prime to each other ? 2

(i) Bucket Sort

(ii) Shell Sort

(iii) Merge Sort

(iv) Heap Sort

(g) The average number of comparisons in Bubble Sort is 2

(i) $\frac{n(n-1)}{2}$

(ii) $\frac{n^2}{4}$

(iii) $\frac{n^2}{2}$

(iv) $\frac{n(n+1)}{2}$

2. (a) Illustrate with an example the components and design of a flow chart. 7

(b) What do you understand by the term algorithm ? Explain the necessary steps for the development of an algorithm. 7

3. (a) What is pseudocode ? Explain and discuss the use of pseudocode. 7

(b) What is a recursive algorithm ? Explain with the help of an example. 7

4. (a) What do you understand by sorting technique ? Write an algorithm for Quick Sort and explain it. 7

(b) Differentiate between straight sequential search and binary search technique with examples. 7

5. (a) Write the divide and conquer approach for binary search and calculate its average time complexity. 7

(b) Differentiate between Insertion Sort and Selection Sort with examples. 7

6. (a) How do you validate an algorithm ? Explain the steps needed to test a program. 7

(b) Write and explain all the stages of Program Development Life Cycle. 7

7. (a) What is a complexity ? Write the types of complexity and also explain Big-oh and Big-omega notations. 7

(b) Write an algorithm for Merge Sort. Sort the following values as per your algorithm : 7

5, 8, 1, 2, 6, 7, 3

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

(a) Bubble Sort

(b) Shell Sort

(c) Merge Sort

(d) Fibonacci Search

(e) Analyze Algorithm

(f) Sequential Search