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

Term-End Examination

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December, 2016

BICS-029 : ALGORITHMS AND LOGIC DESIGN

Time : 2 hours   *Maximum Marks : 70*

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

1. Choose the correct answer from the given four alternatives :   *7×2=14*

    (a) The time factor when determining the efficiency of an algorithm is measured by

         (i) counting microseconds

         (ii) counting the number of key operations

         (iii) counting the number of key statements

         (iv) counting the kilobytes of an algorithm

(b) The complexity of binary search algorithm is

    (i) $O(n)$

    (ii) $O(\log n)$

    (iii) $O(n^2)$

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

(c) The operation of processing each element in a list is known as

    (i)   Sorting

    (ii) Merging

    (iii) Inserting

    (iv) Traversal

(d) A data structure where elements can be added or removed at either end but not both is called a

    (i)   Linked list

    (ii) Stack

    (iii) Queue

    (iv) Deque

(e) The depth of a complete binary tree is

    (i) $D_n = n \log_2 n$

    (ii) $D_n = n \log_2 n + 1$

    (iii) $D_n = \log_2 n$

    (iv) $D_n = \log_2 n + 1$

(f) The worst case occurs in linear search algorithm when the

    (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

(g) What is the output of the compiler ?

    (i) Source code

    (ii) Op-code

    (iii) Object code

    (iv) Byte code

2. (a) What are best case, average case and worst case performances ? Explain.   7

   (b) Compute the time complexity of recursive Fibonacci procedure, where $F(n) = F(n - 1) + F(n - 2)$.   7

3. (a) Devise a version of merge sort algorithm which performs sorting in place.   7

   (b) Suggest refinements to merge sort to make it in place.   7

4. (a) How does quicksort sort the following sequence of keys in ascending order ?   7

    22, 55, 33, 11, 99, 77, 55, 66, 54, 21, 32.

   (b) Write the pseudocode for Shell sort.   7

5. Write an algorithm in pseudocode to count the number of lower case letters in a file of text. How many comparisons does it do ? What is the least number of increments it might do ? Assume that N is the number of characters in a file. Determine its time complexity using step-count method. *14*

6. (a) Explain the performance analysis of an algorithm in detail. *7*

   (b) Write an algorithm for recursive binary search. *7*

7. (a) Devise an algorithm which accepts a number in decimal and produces the equivalent number in binary. *7*

   (b) Explain clearly about space complexity. *7*

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

   (a) Bucket Sort

   (b) Randomized Algorithm

   (c) Validation of Algorithm

   (d) Recursion

   (e) Binary Search Tree

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