

**DIPLOMA IN COMPUTER SCIENCE AND  
TECHNOLOGY (DCSVI)/ADVANCED LEVEL  
CERTIFICATE COURSE IN CSE (ACCSVI)**

**Term-End Examination**

**December, 2013**

**BICS-029 : ALGORITHMS AND LOGIC DESIGN**

*Time : 2 hours*

*Maximum Marks : 70*

*Note : Question no. 1 is compulsory. Attempt any four from the rest. Assume missing data, if any.*

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1. (a) Analysing an algorithm has come to mean predicting the resources that the algorithm requires : 2  
 (i) True  
 (ii) False
- (b) Worst case running time is the longest running time for any input of size  $n$  : 2  
 (i) True  
 (ii) False
- (c) Insertion sort runs in  $O(n^v)$  worst case time : 2  
 (i) True  
 (ii) False
- (d)  $\Omega(g(n)) = \{f(n) : \text{there exist positive constants } e \text{ and } n_0 \text{ such that } 0 \leq f(n) \leq eg(n) \text{ for all } n \geq n_0\}$  : 2  
 (i) True                      (ii) False

- (e) A function  $f(n)$  is monotonically increasing if  $m \leq n$  implies :
- (i)  $f(m) \leq f(n)$                       (ii)  $f(n) = f(m)$   
 (iii)  $f(m) < f(n)$                       (iv) none of above
- (f) The symbol for 'processing steps' in a flowchart is :
- (i) Circle                                      (ii) Rectangle  
 (iii) Arrow                                      (iv) none of above
- (g) Pseudo code can be represent :
- (i) refind version of C program  
 (ii) language dependent code (C code)  
 (iii) outcome of compilation process  
 (iv) none of the above
2. (a) What kinds of problems can be solved using algorithm ? Explain with examples. 8  
 (b) Write down the characteristics of a good program. 6
3. (a) Write an algorithm for selection sort and apply this algorithm to sort following elements. 8  
 45, 25, 75, 15, 65, 55, 95, 35  
 (b) Explain various phases in the life cycle of a software system / program. 6
4. (a) Consider the followings : 8  
 (i)  $f(n) = 3n^2 + 4n + 1$   
       show  $f(n)$  is  $o(n^2)$   
 (ii)  $f(n) = n^3 + 20n$ , show  $f(n)$  is  $\Omega(n^2)$   
 (b) Write an algorithm to sort an array of 10 elements using Bucket sort algorithm. 6

5. (a) Differentiate Dynamic programming and greedy algorithm. 6  
(b) Design an algorithm to compute the sum of the first  $n$  terms ( $n \geq 1$ ) of the series  $S = 1 - 3 + 5 - 7 + 9$  8
6. (a) Design a flow chart to implement a Fibonacci series. 6  
(b) Write pseudo code for insertion sort and explain the term 'loop invariants' and the 'correctness' for the same. 8
7. (a) Write a function to create a random number sequence using recursion. 6  
(b) What is 'time - space trade off' of an algorithm? Find out the Best case, Average case and Worst case complexity for straight sequential search and fibonacci search. 8
8. Write short notes on **any four** : **3.5x4=14**  
(a) Merge sort  
(b) Binary search  
(c) Recursive function  
(d) Divide and conquer approach  
(e) Asymptotic notation.  
(f) Brute - force solution.
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