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**Question Paper Code : 75529**

5 Year M.Sc. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

First Semester

Information Technology

XCS 115/10677 SW 105 — PROBLEM SOLVING TECHNIQUES

(Common to 5 Year M.Sc. Computer Technology/M.Sc. Software Engineering)

(Regulation 2003/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define big O notation.
2. What is a pseudo code? What are its uses?
3. Write the steps to swap two values without using a temporary variable.
4. Write a pseudo code to generate the random numbers from 0 to n.
5. Why shell sort is called diminished increment sort?
6. What is sublinear pattern search?
7. Distinguish between dynamic data structure and static data structure.
8. Write any two applications of queue.
9. What are the drawbacks of recursion?
10. Draw a binary tree whose inoder traversal sequence is DGBHEAFIC and preorder traversal sequence is ABDGEHCFI.

PART B — (5 × 16 = 80 marks)

11. (a) (i) What is program verification? How to verify various program constructs? Explain it using examples (10)  
(ii) Write an algorithm to find the square root of a number (6)

Or

- (b) (i) Compare top-down design with bottom-up design. (6)  
(ii) Write an algorithm to generate first n terms of the following sequence without using multiplication. 1, 3, 9, 27, 81,.... (10)

12. (a) (i) Formulate an algorithm to find GCD of two numbers. (8)  
(ii) Write an algorithm to find the square root of a number. (8)

Or

- (b) (i) Design an algorithm to find the maximum and minimum element and how many times they both occur in an array of n elements. (10)  
(ii) Formulate an algorithm that counts the number of digits in an integer. (6)

13. (a) Design an algorithm for quick sort and calculate the time complexity. Arrange the following numbers using quick sort.  
25, 40, 20, 10, 15, 60, 5, 55. (16)

Or

- (b) Design and implement a hash searching algorithm and explain with an example. (16)

14. (a) (i) Write an algorithm to find the  $i^{\text{th}}$  element from the top of the stack. (6)  
(ii) Design an algorithm to insert an element into a queue and delete an element from the queue. (10)

Or

- (b) Write an algorithm to perform the following operations in a singly linked list.  
(i) Counting the number of nodes (5)  
(ii) Searching a particular node with a given item (5)  
(iii) Concatenating two lists. (6)

15. (a) Write the iterative procedure for :  
(i) Preorder traversal of a binary tree (8)  
(ii) Postorder traversal of a binary tree. (8)

Or

- (b) State the towers of Hanoi problem and write the non-recursive procedure to solve the problem. (16)