No. of Printed Pages : 3

BCS-042

BACHELOR OF COMPUTER APPLICATIONS (Revised)

Term-End Examination

June, 2014

BCS-042 : INTRODUCTION TO ALGORITHM DESIGN

03619

Time : 2 hours *Maximum Marks : 50*

Note : *(i) Question number 1 is **compulsory.***

*(ii) Answer **any three** from the rest.*

(iii) Pseudo code should be nearer to C-Programming language notation

SECTION - A

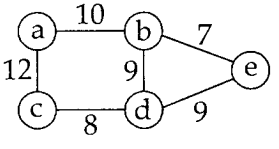
1. (a) Given the following list of 8 integers, sort them using insertion sort. Determine the number of comparisons used by the sorting algorithm as well as the total number of assignment operations. **8**

25	15	7	10	8	12	6	13

Show the process of sorting.

(b) Define Θ (big theta) notation. By using a basic definition show that $5n^2 + 9n - 8 = \Theta(n^2)$. **4**

(c) Draw all the spanning trees of the following weighted connected graph. **3**



(d) What is recurrence relation ? What is an initial condition ? Define recurrence relation and initial conditions for the followings : 5

(i) Fibonacci sequence

(ii) Factorial function

SECTION - B

2. Define a fractional knapsack problem. Find the optimal solution to the following instance of a knapsack problem. Show step by step running of the algorithm. **10**

Number of object ; $n = 5$

Capacity of knapsack ; $M = 10$

$(P_1, P_2, P_3, P_4, P_5) = (12, 32, 40, 30, 50)$

Where P_i is profit

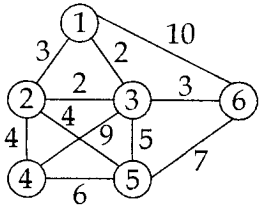
and

$(W_1, W_2, W_3, W_4, W_5) = (4, 8, 2, 6, 1)$

Where W_i - is weight

Each object has a profit P_i and weight W_i. The problem is to fill a knapsack (up to its maximum capacity M) which maximises the total profit earned.

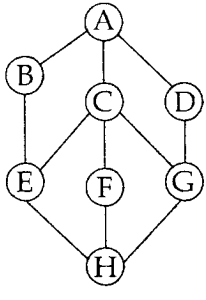
3. Write kruskal's algorithm and apply it to find a MST of the following graph also discuss complexity of the algorithm. **10**



4. (a) Define the following terms : 8
   (i) Mathematical Induction
   (ii) Dynamic programming technique
   (iii) Optimization problem
   (iv) Single source shortest path problem

   (b) What is a complete graph. Draw a complete graph with four vertics. 2

5. (a) For the given graph, write DFS and BFS travel sequence from the node A. 8



   (b) Arrange the following growth rates in increasing order : 2
   $0(3^n)$, $0(n^2)$, 0(1), 0(nlog n)