No. of Printed Pages : 3 **BICS-014**

B.Tech. – VIEP – COMPUTER SCIENCE AND ENGINEERING (BTCSVI)

Term-End Examination

00559

December, 2017

BICS-014 : DESIGN AND ANALYSIS OF ALGORITHM

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks.*

1. (a) What is a RAM model ? Explain asymptotic notations in brief. *5*

   (b) What is Amortized Analysis ? Explain the different methods of amortized analysis. *5*

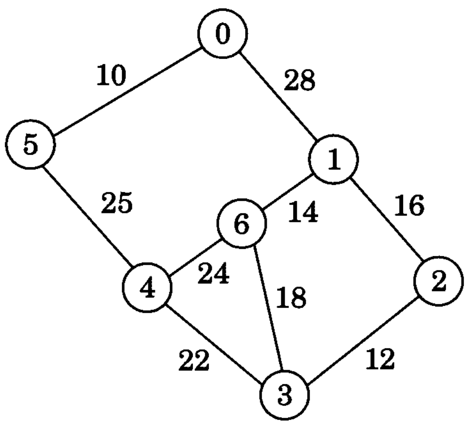
2. What is the difference between Heap and Tree ? Write the algorithm of heap sort. Illustrate the operations of heap sort in the following array of data : *10*

   A = < 5, 13, 2, 25, 7, 17, 20, 8, 4 >

3. Briefly discuss the following types of problems, i.e., P, NP, Co-NP, NP-Hard and NP-Complete. Prove that the vertex cover problem is NP-complete. *10*

4. What is Dynamic programming ? How does dynamic programming differ from the Greedy approach ? Explain the characteristics of dynamic programming with examples. *10*

5. What is a Minimum Cost Spanning Tree ? Write Prim's algorithm. Generate a minimum cost spanning tree for the following graph using Prim's algorithm : *10*



6. Explain the Travelling Salesman Problem, with suitable example. *10*

7. Explain the dynamic programming solution for matrix chain multiplication. *10*

8. (a) Find the minimum number of operations required for the following chain matrix multiplication using dynamic programming : *5*

$A(30 \times 40) \times B(40 \times 5) \times C(5 \times 15) \times D(15 \times 6)$

(b) How does Binary tree differ from Binary search tree ? Write an algorithm to generate a binary search tree. *5*

9. (a) Solve the following 0/1 knapsack problem using dynamic programming : *5*

$m = 6, n = 3; (w_1, w_2, w_3) = (2, 3, 3);$

$(P_1, P_2, P_3) = (1, 2, 4)$

(b) Differentiate between Dynamic Knapsack and Branch-and-Bound Knapsack algorithms. *5*

10. Write short notes on any ***two*** of the following : *10*

(a) Greedy Algorithm

(b) Randomized Algorithm

(c) Approximate Algorithm