



Reg. No. :

Name :

**First Semester M. Tech. Degree Examination, March 2014
(2013 Scheme)**

**COMPUTER SCIENCE ENGINEERING AND INFORMATION SECURITY
RCC 1003 : Advanced Data Structures and Algorithms**

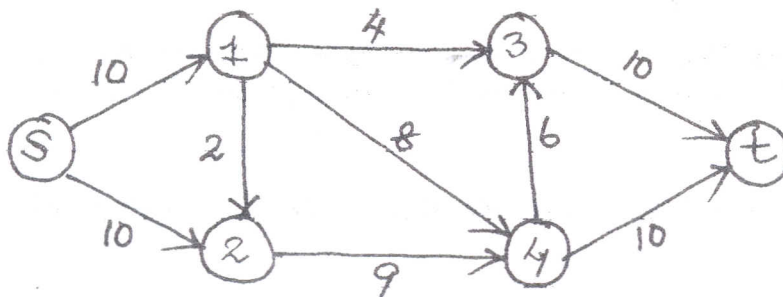
Time : 3 Hours

Max. Marks : 60

Instructions : Answer *any two* questions from *each* module.
All questions carry *equal* marks. (10 marks)

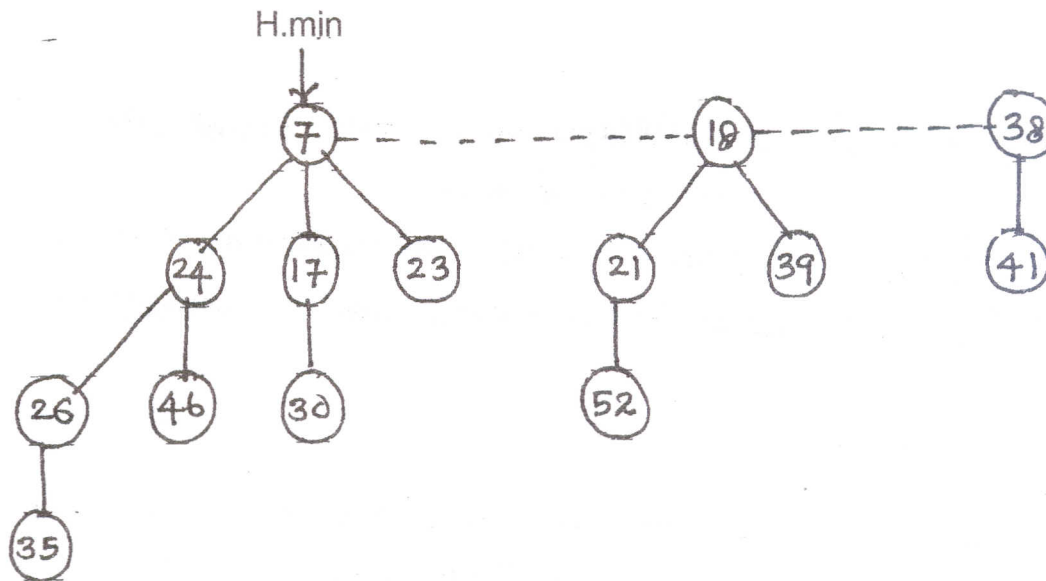
MODULE – I

1. Use aggregate analysis to determine the amortized cost per operation, for a sequence of 'n' operations on a data structure in which the i^{th} operation costs i if i is an exact power of 2, and 1 otherwise.
2. State and explain Dinic's algorithm. Find maximum flow 'f' from s to t from the given graph.





3. Discuss extract-min operation of a Fibonacci heap. Find out the resultant graph from given graph after decreasing key of a node from 46 to 15 and then 35 to 5.



MODULE – II

4. Give an $O(n \lg n)$ algorithm for determine whether any two line segments in a set of segments intersect. What are the data structures used ?
5. Explain the devide-and-conquer algorithm for finding the closest pair of points in a set Q of $n \geq 2$ points. Also calculate the running time for the same.
6. Discuss the differences between Las-Vegas and Mote-Carlo Algorithms. Give a randomised algorithm for the n -queens problem.

MODULE – III

7. Prove GCDA recursion theorem; Theorem : For any non negative integer a and any positive integer b , $\gcd(a, b) = \gcd(b, a \bmod b)$. Compute $\gcd(99, 78)$ using extended Euclid's algorithm.
8. Discuss the properties of finite group. Prove that the system $(\mathbb{Z}_n, +_n)$ is a finite abelian group.
9. Factorize 31861 using Pollard Rho method with polynomial $f(x) = x^2 + 1$ and initial guess $x_0 = 1$.