Model Question Paper

COURSE: M.TECH. **BRANCH**: COMPUTER SCIENCE ENGINEERING

SEMESTER: 1 . **SUBJECT**: ADV DATA STRUCTURE AND ALGORITMS

Duration: 3:00 hrs **Max marks: 100**

Note: Attempt all questions.

1. **Attempt any four parts of the following.** 5x4 = 20

   A. Discuss different types of randomized algorithms.
   B. Differentiate between recursion and iteration with an example.
   C. Explain in brief blockchain data structures.
   D. Give an introduction to genetic algorithms.
   E. Given two arrays of unordered numbers, check both arrays have same set of numbers using hash tables.
   F. Describe data structures and code used for concurrent queues.

2. **Attempt any two parts of the following.** 10x2=20

   A. Explain insertion and deletion algorithms in Red-Black trees with examples.
   B. Explain how AVL tree is different from the binary search tree.
   C. Construct max heap for the following sequence of input: 25 14 16 13 10 7 12. What is the resultant max heap after 2nd delete.

3. **Attempt any two parts of the following.** 10x2=20

   A. Explain any 2 types of heaps and their insertion.

   B. Define B-Tree. Generate a B-Tree of order 3 (2-3 tree) for the following key values

   25,10,12,15,39,64,53.

   C. Explain collision resolution techniques in hashing.

4. **Attempt any two parts of the following.** 10x2=20

   A. The Keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k) = k mod 10 and linear probing. What is the resultant hash table?

   B. Explain Rabin-Karp string matching algorithms and analyze its running time.

   C. Explain knapsack problem with examples.

5. **Attempt any two parts of the following.** 10x2=20

A. Explain in detail the concept of NP hard and NP complete with suitable examples.

B. What are Splay Trees? Discuss Splay operation. Start with a Splay tree that is a 15-node full binary tree. The keys are 1-15. Remove the keys in order 11, 14, 13, 15, 9,12, 2, 3 and 1. Draw your tree immediately after each rotation. Also label rotation with rotation type.

C. Write a short note on

   a) Online paging problem
   b) K-server problem