[Apr-24]

GITAM (Deemed to be University)
[CSEN3151]
GST/GSS/GSB/GSHS. Degree Examination

IV Semester

ADVANCED DATA STRUCTURES

(Effective from the admitted batch 2021-22)

Time: 2 Hours **Max. Marks: 30**

Instructions: All parts of the unit must be answered in one place only.

Section-A

1. **Answer all Questions:** **(5×1=5)**
   a) What is a LIFO data structure?
   b) Explain collision in a hash table.
   c) Compare between B-Tree a binary tree?
   d) What is an Acyclic graph?
   e) Select an application of pattern matching.

Section-B

Answer the following: **(5×5=25)**

UNIT-I

2. Evaluate the importance of Priority Queues in various real-world applications, providing examples to support your reasoning. Justify if a heap implementation of priority queue is a non linear data structure.

OR

3. Differentiate between Simple Queue, Circular Queue, Queue using a linked list, Double ended queue and priority queue.

UNIT-II

4. Explain the role of hash functions in hash tables and how they contribute to efficient data retrieval. Compare and contrast separate chaining and open addressing collision resolution techniques.

OR

5. Evaluate the performance of linear probing, quadratic probing, and double hashing as collision resolution techniques in hash tables. Discuss their advantages and disadvantages in terms of handling collisions, clustering, and overall efficiency.

UNIT-III

6. Compare and contrast AVL trees, Splay trees, and Red-Black trees as balanced search tree data structures.

OR

7. Compare binary search trees, B-Trees, and multiway search trees regarding their performance characteristics and suitability for different applications. Analyze factors such as height, average case time complexity for search, insertion, and deletion operations, memory usage, and adaptability to varying dataset sizes.

UNIT-IV

8. Compare and contrast Prim-Jarnik's Algorithm and Kruskal's Algorithm for finding the minimum spanning tree in a graph. Discuss their underlying principles, data structures used, and how they ensure the optimality of the resulting spanning tree. Evaluate their time and space complexity.

OR

9. Explain the concept of Directed Acyclic Graphs (DAGs) and their significance in modeling various real-world scenarios. Discuss the properties of DAGs that distinguish them from general graphs, such as absence of cycles and topological ordering.

UNIT-V

10. Compare and contrast the brute force, Boyer Moore, and Knuth-Morris-Pratt (KMP) algorithms for pattern matching. Evaluate their time and space complexity, particularly in scenarios with varying pattern lengths and text sizes, and explain how each algorithm handles mismatches and character comparisons differently.

OR

11. Explain the concept of Tries and their significance in storing and searching for strings efficiently. Discuss the differences between standard Tries, compressed Tries, and suffix Tries in terms of their structure, memory usage, and search performance.