19SSP53A

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc(SS) DEGREE EXAMINATION DECEMBER 2023
(Ninth Semester)

Branch – **SOFTWARE SYSTEMS (Five Year Integrated)**

DISCIPLINE SPECIFIC ELECTIVE – IV: ADVANCED DATA STRUCTURES

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 x 1 = 10)

1. What are splay trees?
   (i) self-adjusting binary search trees (ii) a tree with strings
   (iii) a tree with probability distributions (iv) self-adjusting binary trees

2. Which one of the following data structures are preferred in database-system implementation?
   (i) AVL tree (ii) B-tree (iii) B+ - tree (iv) Splay tree

3. What is the complexity of adding an element to the heap?
   (i) O (log n) (ii) O(h) (iii) O (log n) & O(h) (iv) O(n)

4. What is the fundamental operation performed in skew heaps?
   (i) intersection (ii) sorting (iii) merging (iv) difference

5. Which is the correct technique for finding a maximum matching in a graph?
   (i) DFS traversal (ii) BFS traversal
   (iii) Shortest path traversal (iv) Heap order traversal

6. What is the total number of iterations used in a maximum- matching algorithm?
   (i)[n/2] (ii) [n/3] (iii) [n/2]+n (iv) [n/2]+1

7. What is the running time of Karger's algorithm to find the minimum cut in a graph?
   (i) O(E) (ii) $O(|V|^2)$ (iii) O(V) (iv) O(|E|)

8. Which of the following is the fastest algorithm in string matching field?
   (i) Boyer-Moore's algorithm (ii) String matching algorithm
   (iii) Quick search algorithm (iv) Linear search algorithm

9. When the Depth First Search of a graph is unique?
   (i) When the graph is a Binary Tree (ii) When the graph is a Linked List
   (iii) When the graph is a n-ary Tree (iv) When the graph is a ternary Tree

10. What can be the applications of Depth First Search?
   (i) For generating topological sort of a graph
   (ii) For generating Strongly Connected Components of a directed graph
   (iii) Detecting cycles in the graph
   (iv) All of the above

SECTION - B (25 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 5 = 25)

11 a. Compare binary search tree with B-Tree.

(OR)

11 b. What is a splay tree in data structure? Illustrate.

Cont...

12 a. Distinguish Binomial heaps with binomial trees.

(OR)

12 b. How many types of the merge available in skew heaps? Brief with example.

13 a. Narrate Complete Bipartite Graph with neat diagram.

(OR)

13 b. State the advantages and disadvantages of max flow problem.

14 a. Discuss about flow decomposition technique.

(OR)

14 b. How do you solve a Naive string-matching algorithm and state its best case of matching.

15 a. Distinguish between Hamiltonian and Euler circuits.

(OR)

15 b. Illustrate the sufficient conditions for graph isomorphism.

SECTION -C (40 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 x 8 = 40)

Question No 16 is Compulsory

16. Define B-tree. How is it different from binary tree? Explain in detail about the Insertion and deletion operation in B-tree.

17 a. Discuss about the common operations involving heaps and its implementation.

(OR)

17 b. Explain in detail about i) Min-Max Heaps ii) d-Heaps.

18 a. Explain the stable marriage problem with neat illustration.

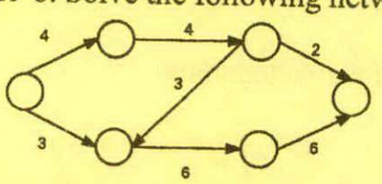
(OR)

18 b. Explain the concept of Maximum matching in bipartite graphs.

19 a. How do you classify flow problems in flow networks? Explain in detail.

(OR)

19 b. Solve the following network using Ford Fulkerson method to maximize the flow.



20 a. Discuss about sequential representation of graphs and linked representation of graphs with diagrams.

(OR)

20 b. Discuss about Graph traversal algorithms with neat diagrams.

Z-Z-Z END