

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)

MSc (SS) DEGREE EXAMINATION MAY 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 Which of the following is an application of Red-black trees and why?  
(i) used to store strings efficiently  
(ii) used to store integers efficiently  
(iii) can be used in process schedulers, maps, sets  
(iv) for efficient sorting
- 2 Which of the following is the most widely used external memory data structure?  
(i) B-tree (ii) Red Black Tree  
(iii) AVL tree (iv) Both (ii) and (iii)
- 3 \_\_\_\_\_ is self-adjusting version of a leftist heap.  
(i) Rightist heap (ii) d-heap  
(iii) Binary heap (iv) Skew heap
- 4 Time taken in decreasing the node value in binomial heap is \_\_\_\_\_.  
(i) O(n) (ii) O(1) (iii) O(logn) (iv) O(nlogn)
- 5 Which algorithm is used to solve a maximum flow problem?  
(i) Prim's algorithm (ii) Kruskal's algorithm  
(iii) Dijkstra's algorithm (iv) Ford-Fulkerson algorithm
- 6 \_\_\_\_\_ is matching with the largest number of edges.  
(i) Non-bipartite matching (ii) Stable marriage  
(iii) Maximum bipartite matching (iv) Simplex
- 7 \_\_\_\_\_ is a Rabin and Karp Algorithm.  
(i) Shortest Path Algorithm (ii) Minimum spanning tree Algorithm  
(iii) Approximation Algorithm (iv) String Matching Algorithm
- 8 Rabin Karp algorithm and naive pattern searching algorithm have the same worst case time complexity.  
(i) True (ii) False (iii) May be (iv) Can't say
9. A given connected graph G is an Euler graph if and only if all vertices of G are of \_\_\_\_\_.  
(i) same degree (ii) even degree  
(iii) odd degree (iv) different degree
- 10 Topological sort can be implemented by \_\_\_\_\_.  
(i) Using Depth First Search  
(ii) Using Breadth First Search  
(iii) Using Depth and Breadth First Search  
(iv) Using level ordered search

Cont...

**SECTION - B (25 Marks)**

Answer ALL questions

ALL questions carry EQUAL Marks (5 x 5 = 25)

- 11 a Elaborate on splay trees with neat diagram.  
OR  
b Elucidate on B-trees and its operations.
- 12 a Why tree is named as Binomial Tree? Explain and draw a binomial tree with 12 elements.  
OR  
b Elaborate on Skew Heaps with example.
- 13 a Appraise on Iterative improvement technique.  
OR  
b Explain the maximum matching in bipartite graphs.
- 14 a Elaborate on Naive String Matching algorithm with appropriate example.  
OR  
b Describe the Knuth-Morris-Pattern Algorithm.
- 15 a Elucidate on Topological Sort.  
OR  
b How do you find a strongly connected components? Explain.

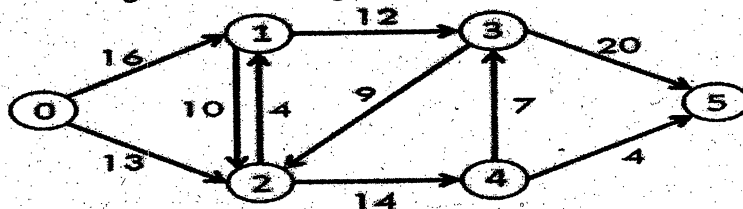
**SECTION -C (40 Marks)**

Answer ALL questions

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

*Question no. 16 is compulsory*

- 16 Describe the insertion and deletion operation in B Tree.
- 17 a Discuss the properties and operations of Leftist Heaps.  
OR  
b Elaborate on Fibonacci Heaps with suitable example.
- 18 a Analyze the Maximum Flow Problem solving method.  
OR  
b Illustrate Stable Marriage Problem with suitable example.
- 19 a Solve the following network using Ford Fulkerson method to maximize the flow.



OR

- b Enumerate on Naive String Matching algorithm.
- 20 a Describe BFS and DFS traversal in graph with example.  
OR  
b Discuss the following: i) Hamiltonian Graph ii) Isomorphism Graph.