

2021

Computer Science

[P.G.]

(CBCS)

(M.Sc. First Semester End Examination-2021)

PAPER- CS-101

(Data Structure)

Full Marks: 40

Time: 02 Hrs

The figures in the right hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

Group A

1. Answer any FIVE questions of the following: 5x2=10

- a) What are sparse matrices? Give example.
- b) If the starting address of array [1:5, 1:6] is 500 then what will be the address of a [4,5] element in both order?
- c) What is priority Queue? Explain its two variations.
- d) What is asymptotic notation? Explain the big-Oh notation.
- e) What is linked list? What are its advantages? Can we do a binary Search on a linked list?
- f) Consider the initial and final states of a stock are shown below:

INITIAL: 100, 150, -60, 32, 23, - , - , -

(2)

FINAL: 100, 17, 8, 32, 45, -, -, -

Write the series of PUSH and POP operations that will transform the stack from its initial state to its initial state to its final state.

- g) What is recursion? What are differences between iterative method and recursive method?
- h) Suppose a queue is maintained by a circular array QUEUE with $n=12$ memory cells. Find the number of elements in QUEUE if
 - i) front = 4, rear = 8
 - ii) front = 10, rear = 3

Group B

Answer any FOUR questions of the following: **5x4 = 20**

- 2. Write an algorithm to convert prefix expression to infix expression. Use this algorithm to convert the following prefix expression to infix:
 $++a+b*c+de/fg$
- 3. Define binary search tree. Suppose the following list of alphabets is inserted in order into an empty binary search tree :
J,R,D,G,T,E,M,H,P,A,F,Q
find the final tree T.
- 4. Write an algorithm to implement the recursive version of post-order traversal of binary tree. Suppose the following

(3)

sequence list the nodes of a binary tree T in preorder a inorder respectively ;

Preorder: G,B,Q,A,C,K,F,P,D,E,R,H

Inorder: Q,B,K,C,F,A,G,PE,D,H,R

Find the post-order traversal of the tree T.

- 5. Explain quick sort with a suitable example. In which situation quick sort exhibits worst case time complexity?
- 6. What do you mean by hashing? What are the different collision resolution techniques?
- 7. What is heap? Build a max-heap with the following list of n numbers:
44,30,50,22,60,55,77,55,10,89

Group C

Answer any ONE questions of the following: **10x1 = 10**

- 8. a) Explain quick sort using the following list. Show each step clearly.
59,66,90,21,32,70,41,93,52,49
b) Write an algorithm to insert an element into a binary search tree. **6+4**
- 9. a) Define AVL tree. Insert the following keys in the order shown to construct an AVL search tree.
3,5,11,8,4,1,12,7,2,6,10,9,13
b) Write an algorithm to implement binary technique. **7+3**