Printed Pages:02 **Sub Code:KOE045**

Paper Id: 238139 **Roll No.** | | | | | | | | | | |

B.TECH.
(SEM IV) THEORY EXAMINATION 2022-23
BASIC DATA STRUCTURE & ALGORITHMS

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

(a) Discuss space and time complexity of an algorithm?
(b) Write the syntax to check whether a given circular queue is full or empty?
(c) Draw a binary Tree for the expression: A * B - (C + D) * (P /Q).
(d) What is the advantage of linked list over an array?
(e) Define transitive closure.
(f) Write an algorithm of bubble sort and its time complexity also.
(g) Write down the various applications of linked list.
(h) Write an algorithm for Breadth First Search (BFS) traversal of a graph.
(i) Differentiate between internal sorting and external sorting.
(j) Discuss about data structure which is used to perform recursion?

SECTION B

2. Attempt any *three* of the following: 10x 3 = 30

(a) Assume the declaration of multi-dimensional arrays A and B to be,
A (-2:2, 2:22) and B (1:8, -5:5, -10:5)
(i) Find the length of each dimension and number of elements in A and B.
(ii) Find the address of element B (2, 2, 3), assuming Base address of B =400 and there are W=4 words per memory location.
(b) Define Stack? Write a C program for array implementation ofa stack.
(c) Write an algorithm for Insertion Sort. Use Insertion sort algorithm, sort the following elements:
2, 8, 7, 1, 3, 5, 6, 4.
(d) Write the Dijkstra algorithm for shortest path in a graph and also discuss with the help of suitable example.
(e) Construct a Huffman tree for given characters A, B, C, D, E, F, G, H and I having frequencies 15, 6, 7, 12, 25, 4, 6, 1 and 15 respectively. What will be the code of AHEAD in binary?

SECTION C

3. Attempt any *one* part of the following: 10 x 1 = 10

(a) How to represent the polynomial using linked list Write a C program to add two polynomials using linked list.
(b) Discuss singly linked list? Write an algorithm to insert a node after agiven node in singly linked list.

4. Attempt any *one* part of the following: 10 x 1 = 10

(a) Write an algorithm for converting infix expression into postfixexpression. Trace your algorithm for infix expression Q into itsequivalent postfix expression P,
Q: A+(B*C- (D/E^F)*H

(b) Write short note on the following:
(i) Priority Queue
(ii) Circular Queue

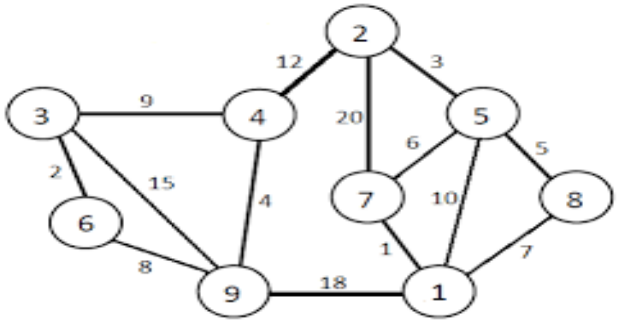
5. Attempt any *one* part of the following: 10 x 1 = 10

(a) Define Hashing. Explain midsquare and digit folding method to compute the hash functionwith the help of an example.

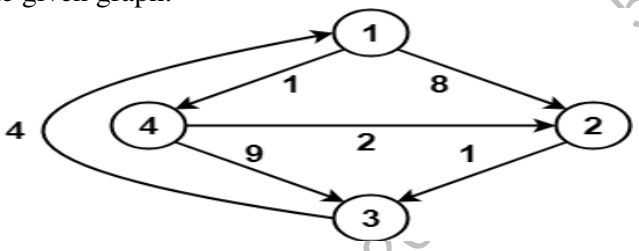
(b) Write an algorithm for Quick Sort. Use Quick sort algorithm, sort thefollowing sequence: 18, 25, 45, 34, 36, 51, 43, 24.

6. Attempt any *one* part of the following: 10 x 1 = 10

(a) Discuss spanning tree. Write down the Kruskal algorithm to obtainminimum cost spanning tree. Use Kruskal algorithm to find the minimumcost spanning tree in the following graph:



(b) Write down the Floyd Warshall algorithm to solve the all pair shortest path. Use the Floyd Warshall algorithm to find shortest path among all the vertices in the given graph:



7. Attempt any *one* part of the following: 10 x 1 = 10

(a) Explain B-tree. Write down the properties of it. Construct a B-tree on the following sequence of inputs:
10,20,35,40,50,60,75,80,95
Assume that the order of the B-tree is 3.

(b) Write short note on the following:
(i) Internal and External Sorting
(ii) B+ tree