Tribhuvan University

Faculty of Humanities and Social Science

Semester: III

Subject: Data Structure and Algorithm

2023

Group B

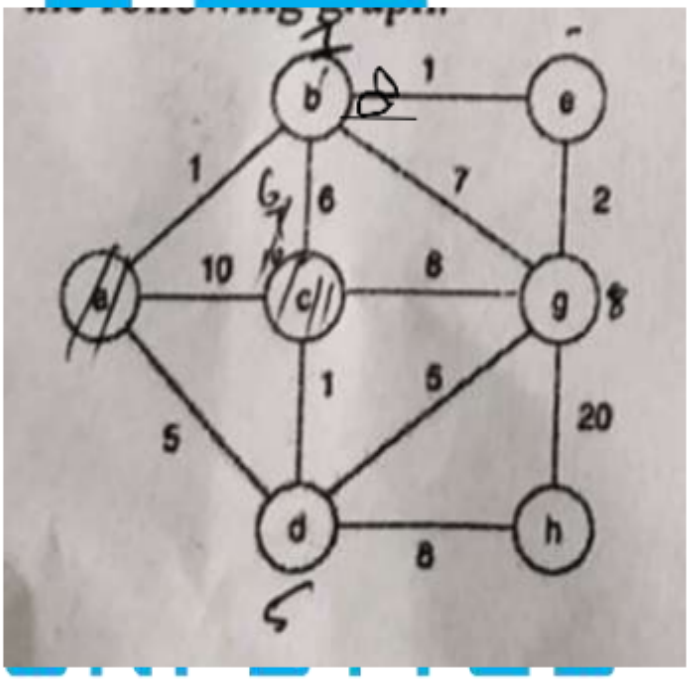
Attempt any SIX questions

2. Define stack. Why stack is considered as an ADT? List any four applications of stack.
3. Evaluate the following postfix expression using the stack: 4 5 + 7 3 – 2 + *
4. What is tower of Hanoi problem? How recursion can be used of Hanoi problem?
5. Define hashing. Explain how to resolve collisions during hashing using open addressing.
6. What is binary search? Trace the algorithm of binary search to search a key 12 in the data:11, 19, 5, 2, 7, 21, 8, 21, 12
7. What is big-oh notation? Explain about divide and conquer strategy with example.
8. What are the depth and degree of a node in a tree? Perform pre-order, in-order and post-order traversal of the following tree:

Group C

Attempt any TWO questions

9. How dynamic implementation of the queue can be done? Explain with algorithm. Also explain how insertion and deletion of a node can be done at the end of a singly linked list with algorithm.
10. Define complete binary tree and skewed tree. Write a function to implement heap sort and sort the following data using heap sort: 12, 9, 1, 13, 16, 24, 21, 5
11. How breadth first traversal and depth first traversal can be used for traversing a graph? Explain with example. Use Dijkstra's algorithm to find the shortest path from node A to all other nodes for the following graph.



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2022

Group B

Attempt any SIX questions

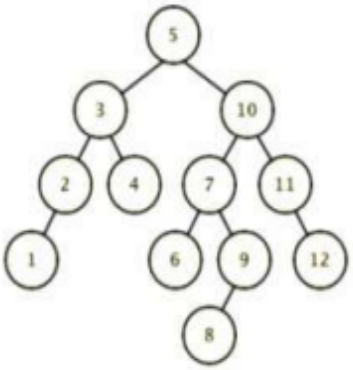
2. What is abstract data type? convert a$b*c-d+e/f/(g+h) into postfix expression using stack.
3. What is linked list? Describe types of linked list. Write an algorithm to insert and delete node from beginning of doubly linked list.
4. Describe Prim's algorithm to solve MST problem with suitable illustration.
5. What is the limitation of linear queue over circular queue? Write an algorithm to insert and delete node in circular queue.
6. What is hashing? Describe the types of collision resolution techniques with suitable example.
7. Define divide and conquer algorithm. What is binary search? Write an algorithm to search an item using binary search with suitable illustration.
8. What is minimax algorithm? Create Huffman Tree and calculate Huffman code for the following characters along with their frequencies using Huffman algorithm.

Character	A	E	I	O	U	S	T
Frequencies	10	15	12	3	4	13	1

Group C

Attempt any TWO questions

9. What is stack? List the application of the stack. Write an algorithm to perform PUSH and POP operation in stack. Describe linked list implementation of stack operations.
10. What is external sorting? Explain heap sort algorithm and trace it to sort the data: 82, 90, 10, 12, 15, 77, 55, 23, 25, 32
11. Differentiate between BST and AVL tree. Given the following AVL Tree:



Draw the resulting BST after 5 is removed, but before any rebalancing takes place. Label each node in the resulting tree with its balance factor. Replace a node with both children using an appropriate value from the node's left child.

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2021

Group B

Attempt any SIX questions

2. What is data structure? Explain its importance.
3. Write an algorithm to convert infix expression to postfix.
4. Write a recursive program to generate Fibonacci number up to nth terms.
5. What is insertion sort? Trace and sort the following data using insertion sort.
   90, 57, 80, 10, 22, 21, 45, 9, 78.
6. What is hashing? Explain with example the collision resolution method open hashing.
7. Write the difference between serial and parallel algorithm with example.
8. Write a program to implement basic operation in queue.

Group C

Attempt any TWO questions

9. What is circular linked list? Write a function to delete the node from linked list.
10. What do you means by Huffman Algorithm? Explain with example. Construct the B tree of order 5 using following data.
    20, 10, 26, 55, 80, 11, 9, 60, 67, 55, 22, 76, 56, 45, 34, 100, 150
11. . What do you means by MST? Explain Kruskal's algorithm with example.

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Semester: III

Subject: Data Structure and Algorithm

2020

Group B

Attempt any SIX questions

2. What is Data Structure? Explain different operations to be performed on data structure .
3. Define Greedy Algorithm and heuristic algorithm. Briefly explain Big-Oh Notation.
4. What is circular queue? Write an algorithm to insert an item in circular queue.
5. How does ABL tree differ from BST? Construct and AVL tree from following data: 35, 56,68,65,44,41,31,49,20.
6. What is B-tree? Create a B-Tree of order 4 using following data 6,4,22,10,2,14,3,8,11,13,5,9.
7. What is binary search? Write an algorithm to search an item using binary search.
8. What is graph? Explain Kruskal's algorithm to construct minimum spanning tree with example.

Group C

Attempt any TWO questions

9. Define stack. List the applications of stack. Trace the algorithm to convert infix to postfix with following infix expression ((A + B) - C * D/E)*(H-I)*F+G and evaluate the obtained postfix expression with following values: A = 4, B = 2, C = 4, D = 3, E = 8, F = 2, G = 3, H =5, I = 1 .
10. What is double linked list? How does it differ from circular linked list? Write an algorithm or function to add a node at the beginning and end of double linked list.
11. What is heap? Differentiate between min heap and max heap. Sort the following data in ascending order by heap sort method: 2,9,3,12,15,8,11.

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2019

Group B

Attempt any SIX questions

2. What is Data Structure? Show the status of stack converting following infix expression to prost fix P + Q – (R*S/T+U)-V*W
3. Write binary search. Consider a hash table of size 10; insert the keys 62, 37, 36, 44, 67,91 and 107 using linear probing.
4. What are deterministic and non-deterministic algorithms? Explain greedy algorithm.
5. Draw a BST from the string DATASTRUCTURE and traverse the tree in post order and preorder.
6. Define circular queue? How does circular queue overcome the limitation of linear queue? Explain.
7. What is singly linked list? Write an algorithm to add a node at the beginning and end of Singly linked list.
8. Define AVL tree. Construct AVL tree from given data set: 4, 6, 12, 9, 5, 2, 13, 8, 3, 7, 11.

Group C

Attempt any TWO questions

9. What is stack? List the applications of stack. Write an algorithm or procedure to perform PUSH and POP operation in stack.
10. What is heap? Explain quick sort algorithm with Big-oh notation in best case, average case and worst case and trace it to sort the data: 8, 10, 5, 12, 14, 5, 7, 13.
11. Define graph and tree data structure. Explain breadth first traversal and depth first traversal with example.