LUMBINI ENGINEERING COLLEGE (LEC)

Final Internal Exam

Level: Bachelors Degree **Year: 2023**
Program: Computer 3rd sem. **Full Mark:100**
Course: DSA **Pass Mark: 45**

Attempt all the questions

1.a) Define ADT. Justify the statement "Data Structure is the backbone of software programming". (8)

b) Why infix is converted to pre or postfix? Convert into postfix. (A+B*C/D)+E*F-(F*H+I-J). (7)

2.a) Differentiate between Recursion and Interation. Write Algorithm for TOH. (7)

b) What is the condition of stock overflow of underflow? Write down C/C++ program for stock operation. (8)

3.a) Difference between BST and AVL Tree. Construct the BST from 14,10,17,12,11,20,18,25,20,8,22,23 and show VLR, LVR, LRV. (7)

b) Write an algorithm for insertion & deletion of the node in singly linked list. (8)

4.a) Construct a heap from 56, 103, 88, 24, 77, 89, 53, 47, 90 and perform heap sort. (8)

b) What do you man by spanning tree? Explain dikstra's algorithm to find shortest path. (7)

5.a) Distinguish linear and binary search. Show steps to search 46 from 7, 13, 36, 42, 43, 46, 85. (7)

b) Explain divide and conquer strategy. Write an algorithm for Insertion sort. (7)

6.a) What is the purpose of hashing? Show the linear probing & use chaining from {2,17,49,37,25,67,82,4,9,3} and h(x)=x mod.

b) Generate the Huffman conde along with tree from "LUMBINIENGINEERING" and encode BEELR, NENGB. (8)

7. Write short notes on (any two) **(4*2=8)**
   a) Radix sort
   b) Directed, undirected weighted Graph
   c) Circular Queue
   d) MST

COSMOS COLLEGE
OF MANAGEMENT AND TECHNOLOGY

Term Test I

Date	2080/11/06		
Level	BE	Full Marks	50
Programme	BCT	Time	
Semester	II	1.5 hrs	

Subject: - Data Structure & Algorithms

- ✓ *Candidates are required to give their answers in their own words as far as practicable*
- ✓ *Attempt All questions*
- ✓ *The figures in the margin indicate Full Marks*
- ✓ *Assume suitable data if necessary*

1. Define ADT. Data structure is the backbone of software programming. Justify this statement with an example. [2+5]
2. Classify Data Structure. What are the primitive operations that are performed On a data structure? [2+5]
3. Write an algorithm to push an element into the stack. Implement the algorithm to create a function in any programming language. [3+4]
4. Convert the given infix expression to postfix expression: [7]
   ((A + B) - C * (D / E)) + F
5. Explain Queue ADT. Write an algorithm to dequeue an element from the queue. [3+4]
6. List any four applications of the queue in the real world. Explain the limitations of a linear queue. [4+4]
7. Write short notes on: (Any TWO) [2*3.5]
   a. LIFO and FIFO Principle
   b. Overflow and Underflow
   c. Precedence of operators

National Academy of Science and Technology

(Affiliated to Pokhara University)

Dhangadhi, Kailali

Pre-University Examination

Level : Bachelor Semester: **II_Spring** Year : 2022

Programme: B.E.(Computer) F.M. : 100

Course: **Data Structure and Algorithm** P.M. : 45

Time : 3hrs

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks

Attempt all the questions.

1. a) Why do we need data structure? Explain divide and conquer, backtracking algorithm design techniques. 7

   b) Write a C program to implement operation of stack. 8

2. a) Explain Queue as an ADT. Write an algorithm for insert and delete operation in circular Queue. 8

   b) What are the advantages of doubly linked list over singly linked list? Write an algorithm to insert a node at last and delete node from first in singly linked list. 7

3. a) Write an algorithm to implement queue operation using linked list. 7

   b) Compare recursion and iteration. Write a program to find greatest common divisor. 8

4. a) Construct an AVL tree for following data. Also, explain the methods of balancing the AVL tree. 7

   35, 56, 64, 68, 65, 44, 31, 49, 45, 20, 25

   b) Construct a Huffman tree for string "MISSISSIPPIRIVER" 8

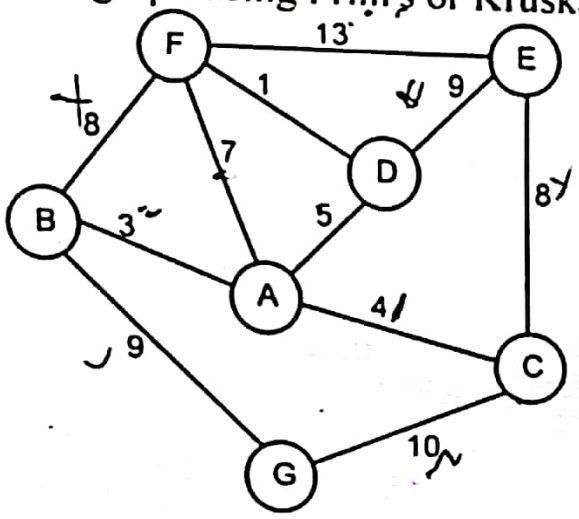
5. a) Define internal and external sort. Sort the following data using quick sort : 78,44,92,10,26,34,61,21,48,82,68,55 8

   b) What is hashing? Given input{4371,1323,6173,4199,4344,9679,1989} and a hash function H(x) = x % 10, show the resulting 7

      i) Separate chaining ii) Quadratic Probing

6. a) Explain single source shortest path problem with Dijkstra's algorithm with example.

b) What is minimum spanning tree? Find minimum spanning tree for the given graph using Prim's or Kruskal's algorithm.



7. Write short notes on following **(Any Two)** 5

a) Rate of Growth and Big O notation

b) B Tree

c) Transitive Closure

National Academy of Science and Technology

(Affiliated To Pokhara University)
Dhangadhi Kailali
Accredited by University Grants Commission, Nepal (2022)

First Terminal Examination

Level: Bachelor
Programme: BE Computer II
Semester – Spring
Year : 2022
Full Marks : 100
Pass Marks: 45
Time : 3hrs.

Course: Data Structure and Algorithm

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

1. a) Define data structure and list its types. Explain the ADT for natural numbers. 7

   b) Write an algorithm to convert infix expression to postfix. Apply the algorithm to convert : **(a+b)-((c/d-e) + (f+g/k))** 8

2. a) Write an application area of queue. Write an algorithm for enqueue, dequeue of queue. 8

   b) What are the advantages of linked list? Write an algorithm to insert a node in first and last in singly linked list. 7

3. a) Why stack is called LIFO structure? Write an algorithm to implement stack push and pop operation. 7

   b) Explain how recursion uses stack. Write a program to solve Tower of Hanoi (TOH) problem. 8

4. a) What is a binary search tree? Form a BST by inserting number from 14,10,17,12,11,20,18,25,20,8,22,23. Also, find preorder and postorder. 7

   b) Why do we need algorithm analysis? Explain worst case, best case and average case analysis. 8

LUMBINI ENGINEERING COLLEGE (LEC)

Final Internal Exam

Level: Bachelors Degree **Year: 2023**
Program: Computer 3rd sem. **Full Mark:100**
Course: DSA **Pass Mark: 45**

Attempt all the questions

1.a) Define ADT. Justify the statement "Data Structure is the backbone of software programming". (8)

b) Why infix is converted to pre or postfix? Convert into postfix. (A+B*C/D)+E*F-(F*H+I-J). (7)

2.a) Differentiate between Recursion and Interation. Write Algorithm for TOH. (7)

b) What is the condition of stock overflow of underflow? Write down C/C++ program for stock operation. (8)

3.a) Difference between BST and AVL Tree. Construct the BST from 14,10,17,12,11,20,18,25,20,8,22,23 and show VLR, LVR, LRV. (7)

b) Write an algorithm for insertion & deletion of the node in singly linked list. (8)

4.a) Construct a heap from 56, 103, 88, 24, 77, 89, 53, 47, 90 and perform heap sort. (8)

b) What do you man by spanning tree? Explain dikstra's algorithm to find shortest path. (7)

5.a) Distinguish linear and binary search. Show steps to search 46 from 7, 13, 36, 42, 43, 46, 85. (7)

b) Explain divide and conquer strategy. Write an algorithm for Insertion sort. (7)

6.a) What is the purpose of hashing? Show the linear probing & use chaining from {2,17,49,37,25,67,82,4,9,3} and h(x)=x mod. (8)

b) Generate the Huffman conde along with tree from "LUMBINIENGINEERING" and encode BEELR, NENGB. (8)

7. Write short notes on (any two) (4*2=8)

a) Radix sort
b) Directed, undirected weighted Graph
c) Circular Queue
d) MST

LUMBINI ENGINEERING COLLEGE (LEC)

First Term Exam

Level: Bachelors Degree Year: 2023
Program: Computer 2nd sem. Full Mark:50
Course: Data Structure & Algorithm Pass Mark: 20

Attempt all the questions

1.a) Why do we need data structure? Explain ADT.
b) Convert infix expression to postfix. (6)
A+(B*C-(D/E^F)*G)*H, where ^ power operator (6)

2.a) Implement stack operations using C program. (7)
b) What are the advantage of doubly linked list over single list? Write an algorithm to insert & delete the node in singly linked list. (7)

3.a) Write an algorithm for Enqueue and Dequeue operations. (7)
b) Write a program to implement Fibonacci series using recursion. (6)

4.a) What is recursion? Differentiate Recursion with Iteration explain TOH. (7)
b) Difference between stack and Queue. (4)

LUMBINI ENGINEERING COLLEGE (LEC)

Final Internal Exam

Level: Bachelors Degree **Year: 2023**
Program: Computer 3rd sem. **Full Mark:100**
Course: DSA **Pass Mark: 45**

Attempt all the questions

1.a) Define ADT. Justify the statement "Data Structure is the backbone of software programming". (8)

b) Why infix is converted to pre or postfix? Convert into postfix. (A+B*C/D)+E*F-(F*H+I-J). (7)

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5.a) Distinguish linear and binary search. Show steps to search 46 from 7, 13, 36, 42, 43, 46, 85. (7)

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b) Generate the Huffman conde along with tree from "LUMBINIENGINEERING" and encode BEELR, NENGB. (8)

7. Write short notes on (any two) (4*2=8)

a) Radix sort
b) Directed, undirected weighted Graph
c) Circular Queue
d) MST

National Academy of Science and Technology

(Affiliated to Pokhara University)

Dhangadhi, Kailali

Pre-University Examination

Level : Bachelor Semester: **II_Spring** Year : 2022

Programme: B.E.(Computer) F.M. : 100

Course: **Data Structure and Algorithm** P.M. : 45

Time : 3hrs

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicate full marks

Attempt all the questions.

1. a) Why do we need data structure? Explain divide and conquer, backtracking algorithm design techniques. 7

   b) Write a C program to implement operation of stack. 8

2. a) Explain Queue as an ADT. Write an algorithm for insert and delete operation in circular Queue. 8

   b) What are the advantages of doubly linked list over singly linked list? Write an algorithm to insert a node at last and delete node from first in singly linked list. 7

3. a) Write an algorithm to implement queue operation using linked list. 7

   b) Compare recursion and iteration. Write a program to find greatest common divisor. 8

4. a) Construct an AVL tree for following data. Also, explain the methods of balancing the AVL tree. 7

   35, 56, 64, 68, 65, 44, 31, 49, 45, 20, 25

   b) Construct a Huffman tree for string "MISSISSIPPIRIVER" 8

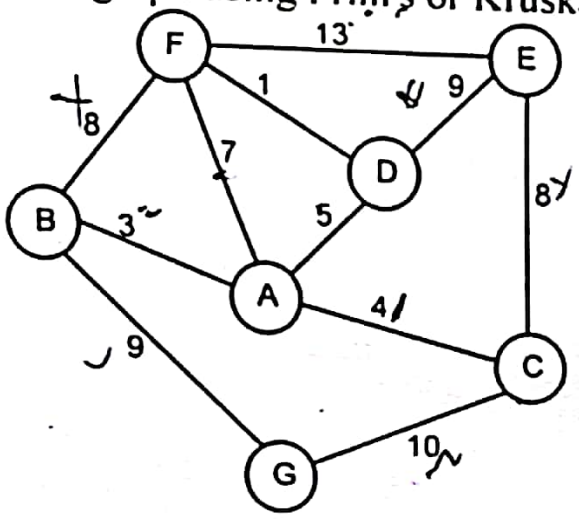
5. a) Define internal and external sort. Sort the following data using quick sort : 78,44,92,10,26,34,61,21,48,82,68,55 8

   b) What is hashing? Given input{4371,1323,6173,4199,4344,9679,1989} and a hash function H(x) = x % 10, show the resulting 7

      i) Separate chaining ii) Quadratic Probing

6. a) Explain single source shortest path problem with Dijkstra's algorithm with example.

b) What is minimum spanning tree? Find minimum spanning tree for the given graph using Prim's or Kruskal's algorithm.



7. Write short notes on following **(Any Two)** 5

a) Rate of Growth and Big O notation

b) B Tree

c) Transitive Closure

stack (tos) = data,

top 5:- stop

NEPAL COLLEGE OF INFORMATION TECHNOLOGY

Level: Bachelor Assessment
Programme: BE (Computer Day/Morning)
Course: Data Structure and Algorithm

Year : 2023
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

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

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) What is ADT?. Explain how you can represent stack as an ADT. 7
   b) Convert infix to postfix: K+L-M*N+(O^P). Also for K=3, L=5, M=2, N=2, O=5 and P=2, evaluate the converted postfix expression. 8

2. a) Differentiate between linear and circular queue. Write an algorithm to insert and delete a element in circular queue. 7
   b) Differentiate between singly linked list and double linked list. Write an algorithm for doubly linked to insert a node in a specified position and explain with an example. 8

3. a) Write a program in C/C++ to find the GCD of any two numbers using recursion. 7
   b) What are the advantages of recursion? Explain TOH with an example which having 4 disks. 8

4. a) Construct an AVL tree by inserting the following data: 7
   31,22,3,15,6,27,9,10,11,12,15
   b) Construct Huffman tree using Huffman algorithm and also find the Huffman code of the following character frequency. 8
   Note: Given below is character : frequency
   a : 1, b : 1, c : 2, d : 3, e : 5, f : 8, g : 13, h : 21

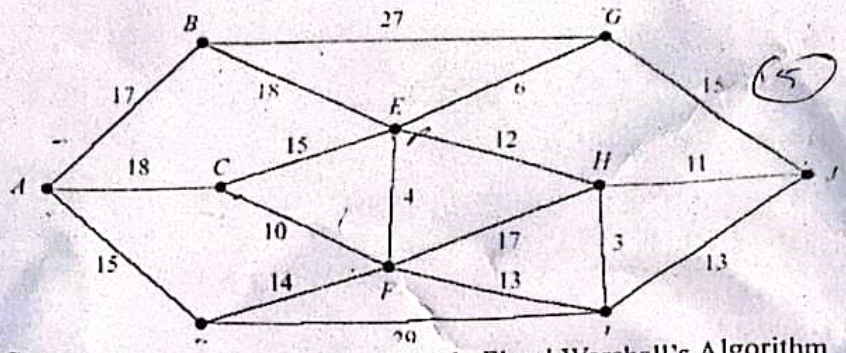
5. a) Sort the following data using quick sort: 7
   21, 43, 51, 32, 20, 35, 8, 12.
   b) Why do we use hash functions in searching? For the following data: {2, 17, 50, 26, 65, 01, 81, 5, 9} and hash function h(x) = x mod 10, find the resulting:

i. Hash table using linear probing.
ii. Hash table using double hashing

8

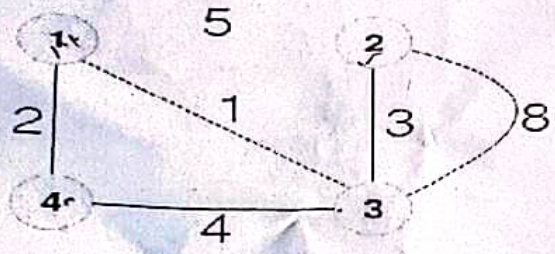
6. a) What is a graph and how to represent a graph explain its different method and find the shortest path from A to J using Dijkstra shortest path algorithm.

8



b) Define a minimum spanning tree. Explain Floyd Warshall's Algorithm and find transitive closure for the given graph.

7



7. Write short notes on: **(Any one)**

2×5

a) Game Tree
b) Backtracking
c) Growth Rate

MADAN BHANDARI MEMORIAL ACADEMY NEPAL

INTERNAL ASSESSMENT

DATA STRUCTURE AND ALGORITHM **F.M: 100**

TIME: 3 HRS **P.M: 45**

1. Define data structure. Explain the different operations to be performed on data structure. [7]
2. Write the algorithm to convert the infix expression to postfix expression using stack implementation. Evaluate the following expression: [8]
   ABC/-DE*F-* (where A=6,B=5,C=2,D=3,E=4 and F=1)
3. Write an algorithm to insert an item in a circular queue in array implementation. Write assumptions you need? [7]
4. Define list. Describe merits of linked list over contiguous list. Write an algorithm to insert an item in a static list. [8]
5. Differentiate between singly linked list and doubly linked list. Write an algorithm for push and pop operations on stack using linked list. [8]
6. Construct a binary tree from the following inorder and preorder sequences. [7]
   PreOrder: F A E K C D H G B
   InOrder: E A C K F H D B G
7. What is height balanced tree? Insert 3,2,1,4,5,6,7 in an empty AVL tree showing all the rotations required. [8]
8. Write an algorithm to build a Huffman Tree. Construct a Huffman tree for the following data items and their frequency. & generate their prefix code. [8]

Data_Item	A	B	C	D	E	F	G	H
Frequency	22	5	11	19	2	11	25	5

9. Define selection sort. Trace quick sort algorithm for the following data: [7]
   25,57,48,37,12,92,86,33
10. 66,47,87,90,126,140,145,153,177,285,393,395,467,566,620,735. From above data , store the values in hash table with 20 positions, using division method(key % table_size) of hashing and the linear probing method for resolving collison. [8]
11. Let G=(V,E) with V={a,b,c,d} and E={(a,d),(b,a),(b,c),(c,a),(c,d),(d,c)} be a directed graph. Find the transitive closure of the graph G using Warshall's algorithm , showing each iterations. [8]
12. Define graph traversal. Differentiate between DFS and BFS with example. [7]
13. Write short notes on **(Any two)** [5*2=10]
    a. Asymptotic Notations
    b. Minimum Spanning Tree
    c. TOH

NEPAL ENGINEERING COLLEGE

Level: Bachelor | Assessment | Year: 2023
Programme: BE- Computer | Full Marks: 100
Course: Data Structure and algorithm | Pass Marks: 45
Time: 3 hr.

Candidates are required to give their answers in their own words as far as practicable.
*The figures in the margin **indicate full marks.***
Attempt all the questions.

1. a. What is an algorithm? What is to analyze in an algorithm? Explain best case, worst case and average case analysis of an algorithm.[7]
   b. Define queue as an ADT and its applications. Discuss the merits and demerits of contiguous list and non-contiguous list. [8]
2. a. Write C functions to add and delete the items from a circular queue implemented as an array. [7]
   b. Trace out Infix to Postfix conversion algorithm with given Infix expression. [8]

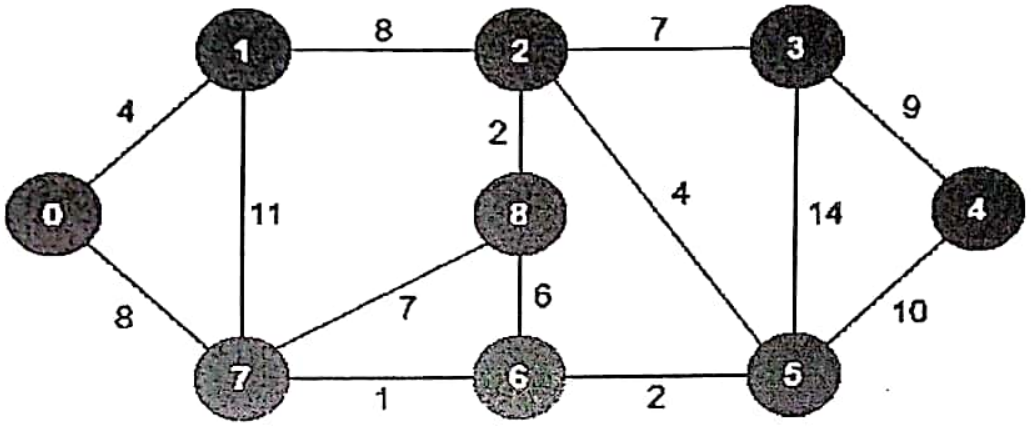
   A + (((B + C)*(D - E) + F) / G)

   Evaluate the postfix expression acquired from above for the given values:
   A = 10, B = 2, C = 4, D = 3, E=8, F = 2 and G =3.
3. a. State TOH problem. Explain a recursive algorithm to solve the problem. [7]
   b. Explain the structure of Singly Linked List (SLL). Differentiate between Singly Linked List (SLL) and Doubly Linked List (DLL). Explain the algorithm to insert a node in SLL at the beginning.[8]
4. a. Define complete binary tree. Construct a BST from the following data: 15,25,35,30,32,22,12,9,28,10,14,13 and also show the result of deleting 25, 32, and 13 in that order. [7]
   b. Discuss different types of rotation of an AVL tree. Create a balanced AVL Tree with the following data:
   10 20 30 50 45 40 8 5 3 [8]
5. a. Explain the basic principle of merge sort and write down its merge algorithm. Trace the sorting steps in merge sort algorithm for the following data:[7]
   12, 11, 30, 21, 25, 39, 36, 17, 29, 10, 26, 33, 7, 9

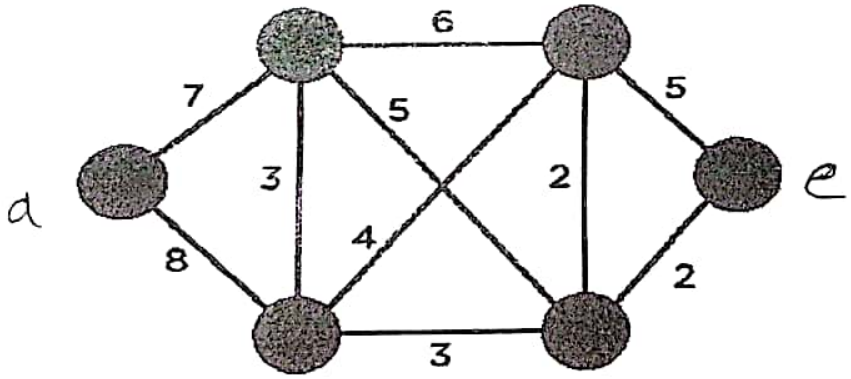
b. What is Hashing? Given input {4371, 1323, 1222, 3424, 6173, 4199, 4344, 9679, 1989} and with hash function:h(x) = x mod 10, show the following [8]

i. Hash table using linear probing
ii. Hash table using quadratic probing
iii. Hash table using Double hashing

6. a. Define MST. Apply Kruskal's algorithm to find the minimum spamming tree of the following graph. [7]



b. Define Adjacency matrix with an example. Apply Dijkstra's algorithm to find the shortest path from vertex A to E. [8]



7. Write short notes on ANY TWO: [5 * 2 = 10]

a. Deterministic and Non Deterministic Algorithm
b. Greedy Algorithms and Backtracking
c. Create Huffman tree with following data: A=48, B=11,C=9,D=14,E=7,F=11.
d. Trace Exchange – sort algorithm for the following data: 50,20,15,60,48,42,40

UNITED TECHNICAL COLLEGE

Level: Bachelor | Semester: Second | Year : 2023
Programme: BI | Full Marks: 50
Course: Data Structure and Algorithm | Pass Marks: 25
Time :1.5hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt any three questions from 1 to 6.(Q.N. 7 is compulsory)

1 a) What do you understand by computational complexity? Define Asymptotic analysis and their types in brief. Calculate the time complexity of following code snippet: 7

```
void print(int n)
{ for(int i = 1;i<=n; i++){ for(int j = 1;j<=n;j++){ printf("i =%d and j = %d",i,j); } printf("End of inner loop") } printf("End of outer loop");}
```

b) Trace the algorithms to convert postfix expression with the following infix expression

((A+B)-C*D/E)$*(H-I)*F+G

Evaluate postfix expression obtain from above with the following values for
A=4,B=2,C=4,D=3,E=8,F=2,G=3,H=5 and I=1. 8

2 a) What do you understand by recursion? Explain types of recursions. How memory allocation occurs in recursion? Difference between recursion vs iteration. 8 7

b) What is doubly linked list (DLL) and Circular Linked List (CLL)? WAP to illustrate the insertion of elements at first in singly linked list.

3 a) State the advantage of a linked list over contiguous list. Write the steps involved in deleting an item in a contiguous list. 8

b) Construct an AVL Tree by inserting numbers from 1 to 8. 7

4 a) What is tree traversal? Perform preorder, in order and post-order tree traversal for following data: 7

UNITED TECHNICAL COLLEGE

Level: Bachelor | Semester: Second | Year : 2023
Programme: BI | Full Marks: 50
Course: Data Structure and Algorithm | Pass Marks: 25
Time : 1.5hrs.

Candidates are required to give their answers in their own words as far as practicable.
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b) Construct an AVL Tree by inserting numbers from 1 to 8. 7

4 a) What is tree traversal? Perform preorder, in order and post-order tree traversal for following data: 7

27 14 10 19 35 31 42 22 11 55 12 18 9

b) How does the Huffman algorithm work? Explain with a complete example. 8

5 a) Sort the following data using Quick-sort algorithm. 66, 33, 40, 22, 55, 88, 60, 11, 80, 20, 50, 44, 77. 7

b) What is hashing. Explain in detail about the technique used for collision resolution. 8

6 a) Define graph and diagraph? 8

Let G be the graph represented by this adjacently list.

Vertex	Adjacent list
A	F
B	C
C	B
D	A,B
E	C,D,
F	E

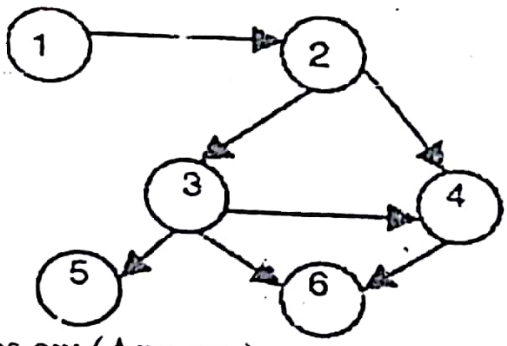
i. Draw G.

ii. Is G a directed graph?

iii. Is G weakly connected?

iv. Give the adjacency matrix for G.

b) Define graph. connected graph and spanning tree. Perform the topological sort from the following graph. 7



7 Write short notes on: (Any one) 1×5

a) Game Tree.

b) Rate of growth of an algorithm.