Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Back/Scholarship Exam – 2081/2082 Chaitra/Baishakh

Program:	**Diploma in Computer Engineering/ Diploma in Information Technology**	**Full Marks: 80**
Year/Part:	**II/I (2016, 2018)**	**Pass Marks: 32**
Subject:	**Data Structure and Algorithm (DSA)**	**Time: 3 hrs.**

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 questions.

1. What is an algorithm? Define and explain Big-Oh notation. [2+6]
2. What is stack? Write an algorithm to implement stack. [2+6]
3. What are the operations in queue? Write an algorithm to implement circular queue. [2+6]
4. Explain the Tower of Hanoi (ToH) problem with its solution. [8]
5. What is linked list? Write algorithms to insert a node at the beginning and to delete a node from the end of the singly linked list. [2+3+3]
6. What is binary tree? Write an algorithm to delete nodes in a binary search tree with an example. [2+6]
7. Draw the Binary Search Tree (BST) for: [8]
   20, 30. 15, 10, 5, 40, 50, 60, 35, 55, 45. 80, 90
8. What is meant by minimum spanning tree? Explain Kruskal's algorithm for finding minimum spanning tree in a graph with an example. [2+6]
9. Sort the following data in an array using bubble sort: [8]
   5. 2, 1. 4, 3, 7, 6

10. Write short notes on: (any **TWO**) [2×4]
    a. Linear Queue
    b. Recursion
    c. Sorting
    d. Breadth First Traversal

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam – 2081 Bhadra/Ashwin

Program:	**Diploma in Computer Engineering/ Information Technology**	**Full Marks: 80**
Year/Part:	**II/II (2022)**	**Pass Marks: 32**
Subject:	**Data Structure and Algorithm**	**Time: 3 hrs.**

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

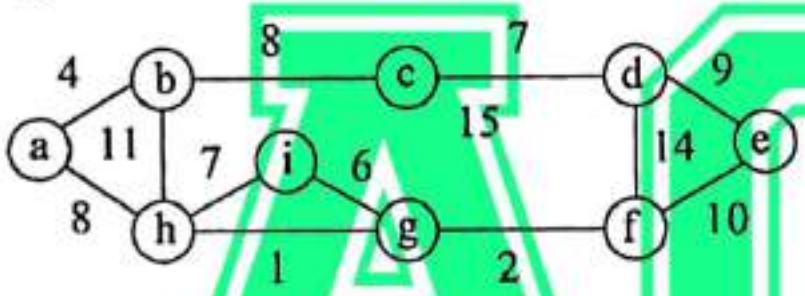
Attempt any EIGHT questions.

1. Define data structure. Explain the basic operation on stack with algorithm. Also, describe asymptotic notation. [2+6+2]
2. Convert the following infix expression to postfix expression: [5+5]
   $[(A + (B * C - (D/E - F) * G) * H)]$
   Explain different operators on linear queue.
3. Define singly linked list. Write an algorithm for inserting the node and deleting the node from specified position in singly linked list. [2+8]
4. Define and write advantages of linked list. Explain Tower of Hanoi (TOH) problem. [5+5]
5. What is binary search tree? Construct an AVL tree for the following sequence of data: [2+8]
   21, 26, 30, 9, 4, 14, 28, 18, 15, 10, 2, 3, 7
6. Explain types of sorting. Suppose we have following data in array as 40, 30, 55, 11, 90, 40, 99, 20, 29. Now sort them using selection sort technique. [3+7]

7. Differentiate between breadth first traversal and depth first traversal. Explain collision resolution techniques in detail. [5+5]

Cont. .....

8. What do you mean by minimum spanning tree? Find the minimum spanning tree from the given graph using Kruskal's algorithm. [2+8]



9. Write short notes on: (any **TWO**) [2×5]
   a. Hash function and hash table
   b. Recursion and iteration
   c. Algorithm and its types
   d. Graph representation

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Back Exam-2080/2081, Chaitra/Baishakh

Program:	**Diploma in Computer Engineering/ Diploma in Information Technology**	**Full Marks: 80**
Year/Part:	**II/I (2018)**	**Pass Marks: 32**
Subject:	**Data Structure and Algorithm**	**Time: 3 hrs.**

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 EIGHT questions.

1. Define data structure and algorithm. List different types of data structure. Explain algorithm with proper example. [2+2+6]

2. Convert following infix expression to prefix and postfix: A^B*C-D+E/F/(G+H) [10]

3. Differentiate between linear and circular queue with diagram. Explain the concept of priority queue. [6+4]

4. What is stack? Explain stack operations and its application. [2+6+2]

5. Write algorithm for deletion operation at different position on doubly link list. [10]

6. What is binary tree? Explain insertion, deletion and traversal of BST with proper example. [2+8]

7. Define graph with its types. Explain BFS and DFS with example. [5+5]

8. Define sorting and searching. Sort the following numbers using merge and bubble sort. 32, 8, 3, 15, 11, 21, 6, 25 [2+8]

9. Write short notes on: (any **TWO**) [2×5]

   a. Hash function

   b. Recursion

   c. Linked lists

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Scholarship Exam - 2080 Magh/Phagun

Program:	**Diploma in Computer Engineering/ Information Technology**	**Full Marks: 80**
Year/Part:	**II/II (2022)**	**Pass Marks: 32**
Subject:	**Data Structure and Algorithm**	**Time: 3 hrs.**

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 FIVE questions.

1. a. Define algorithm and its types. Explain stack with example. [4+4]
   b. Convert the following infix expression to postfix and prefix expression. (A+B/(C+D$E*F) [4+4]
2. a. Explain the structure of doubly linked list. Write an algorithm to insert and delete node from the end in doubly linked list. [3+5]
   b. Differentiate between recursion and iteration. Write a program to display Fibonacci series using recursion. [4+4]
3. a. Draw AVL tree for: 50, 40, 35, 58, 48, 42, 60, 30, 33, 32 [8]
   b. What is binary search tree? Draw the binary search tree for. [2+6]
   Pre order: ABCEIFJDGHKL
   In order: EICFJBGDKHLA
4. a. Let us consider we have following data in array as 44, 33, 11, 55, 77, 90, 40, 60, 99, 22, 88. Now sort them using quick sort. [8]
   b. Explain the various types of graphs with example. [8]
5. a. Explain about collision resolution techniques. [8]
   b. Explain Kruskal's algorithm with suitable example. [8]
6. a. Explain about types of graph traversal with suitable examples. [8]
   b. Write short notes on: (any **TWO**) [2×4]
      i. Big O, Big-Ω, Big θ Notation
      ii. Sequential search
      iii. Merge sort
      iv. Adjacency sets and tables

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Back Exam-2080, Bhadra

Program: Diploma in IT / Computer Engg. **Full Marks: 80**

Year/Part: II/I (2016, 2018) **Pass Marks: 32**

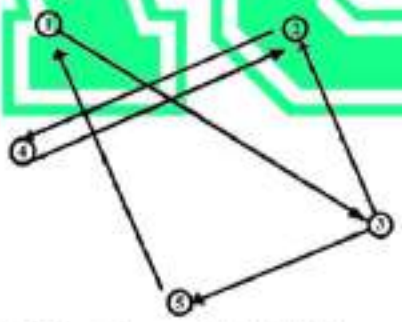
Subject: Data Structure & Algorithm **Time: 3 hrs.**

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 Five questions.

1. a) What is data structure? Explain different types of asymptotic notations. [2+6]
   b) Define Algorithm. Explain the basic operation in stack with algorithm. [2+6]
2. a) Define queue data structure. Explain queue as ADT. [2+6]
   b) Define linked list. Write algorithm to insert a node at the end of singly linked list. [2+6]
3. a) What are differences between recursion and iteration? Write an algorithm to find the factorial of given number. [4+4]
   b) Construct a binary tree from given preorder and inorder sequence. [8]

   Pre order: ABDGCEHIF Inorder: DGBAHEICF
4. a) Differentiate between Depth first traversal and breadth first traversal of graph. [8]
   b) Write the adjacency matrix and adjacency list of following graph. [4+4]



5. a) Write an algorithm to implement bubble sort. [8]
   b) Sort the following data using selection sort 64, 25, 12, 22, 11. [8]

6. Write short notes on : **(Any Four)** [4x4=16]
   a) Linear Vs Circular Queue
   b) AVL Tree
   c) Tower of Hanoi problem
   d) B-Tree
   e) Hash function and Hash table

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular Exam-2079, Bhadra/Ashwin

Program:	**Diploma IT/Computer Engineering**	**Full Marks: 80**
Year/Part:	**II/I (2016, 2018 New Course)**	**Pass Marks: 32**
Subject:	**Data Structure & Algorithm**	**Time: 3 hrs**

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 Eight questions.

1. Explain ADT, data structure, algorithm and asymptotic notations (Big o and Big θ). [2+2+2+4]
2. Convert the following in fix expression to prefix and postfix expression. $ASB/(C * (DAE)) - F + G$ [5+5]
3. What is stack? Explain Queue with an example and its types. [2+8]
4. List out the rules of TOH problems. Write a program to display the Fibonacci, series using recursion. [2+8]
5. Define linked list. Write algorithm to insert and delete node from specified position in singly linked fist. [2+8]
6. What is binary tree? Draw BST for 14, 15, 4, 9, 7, 18, 3, 5, 16, 4, 20, 17, 9, 14, 5. [2+8]
7. Describe Breadth First Traversal (BFT) and Depth First Traversal (DFT) with example. [5+5]
8. Sort the following set of numbers using bubble sort and insertion sort: 27, 38, 39, 0, 22, 18, 7, 15 [10]

9. Write short notes on **(Any Two)** [2×5=10]
   a) Dynamic memory allocation
   b) Kruskal's algorithm
   c) Hash data structure and hash function

Good Luck!

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2078, Kartik/Mangsir

Program:	**Diploma in IT / Computer Engineering**	**Full Marks: 80**
Year/Part:	**II/I (2016, 2018 New Course)**	**Pass Marks: 32**
Subject:	**Data Structure & Algorithm**	**Time: 3 hrs**

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 Eight questions.

1. Illustrate the importance of stack with definition. Write source code to implement stack operation. [4+6]
2. Explain queue with an example? Write an algorithm of circular queue. [10]
3. Write algorithm to insert and delete a node after an existing node in doubly linked list. [10]
4. How does recursion differ from other function? Write a recursive function to find the factorial of an input integer. [4+6]
5. What is AVL tree? Draw the AVL tree for the following sequence of data: [10]
   2, 7, 6, 4, 9, 10, 12, 8, 5
6. Define Tree with example. Draw the binary search tree for: [2+8]
   Pre-order: ABCEIFJDGHKL
   in-order: EICFJBGDKHLA
7. What is array? List some examples array application. Write codes to search an integer 40 in array list of 15 elements. [2+2+6]
8. What is sorting? Sort the following list of numbers using insertion sort. [10]
   44, 33, 55, 77, 90, 40, 60, 99, 22, 88, 66
9. Explain the various types of graph with example. [10]
10. Write short notes on : **(Any Two)** [2x5=10]
    a) Linear queue
    b) Linked list
    c) Depth first traversal
    d) Hashing

Good Luck !

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2076, Falgun/Chaitra

Program:	**Diploma in Computer Engineering / Information Technology**	**Full Marks: 80**
Year/Part:	**II/I (New+ Old Course)**	**Pass Marks: 32**
Subject:	**Data Structure & Algorithm**	***Time:* 3 *hrs***

Candidates are required to give th practicable. The figures in the ma

Attempt **Any Eight** Questions

1. Define stack with example and write down its algorithm. [10]
2. Prove that queue as a ADT. Write down the types of queue. [6+4]
3. What do you mean by linked list? Enlist the advantages and disadvantages of linked list over doubly linked list. [4+6]
4. Explain recursion with example. Write down its application [10]
5. Convert the following infix expression to postfix and prefix expression: [10]

   A $ b* C - D + E / F / (G+H)
6. What do you mean binary search tree? Draw the BST for 12,16,4,10,17,18,3,5,15,4,20,11,9,14,13 (Show all necessary steps) [10]
7. Sort the following list of numbers using selection short and bubble sort. 23 78 45 8 32 56 [10]
8. Write an algorithm of sequential search and tree search algorithm. [10]

9. Define graph with it's types. Describe about Breadth first search technique with example. [3+7]

Good Luck!

Council for Technical Education and Vocational Training

Office of the Controller of Examinations

Sanothimi, Bhaktapur

Regular/Back Exam-2074, Falgun/Chaitra

Program:	Diploma in Computer Engg./Information Technology	**Full Marks: 80**
Year/Part:	**II/I (New + Old Course)**	**Pass Marks: 32**
Subject:	**Data structure and Algorithm**	***Time:* 3 *hrs***

Candidates are required to gi as practicable. The figures in

Attempt **Any 8** Questions

1. What are the data structure ? list down carious approach of data structure ? write an algorithm to push and pop element in stack. [2+2+6]
2. Explain Queue as an Abstract data type. write algorithm to en-queue and de-queue element from circular queue. What are the application of Queue. [2+6+2]
3. a) Write an algorithm to insert a node at the front and deletion at the last on sing linked list. [3+3]
   b) Write down the advantage of doubly linked listed over singly linked list. [4]
4. a) Explain the concept of doubly linked list. [4]
   b) Convert the following infix expression to postfix and prefix expression [3+3]
   A $ b *C-D + E /F/ (G+H)
5. What do you mean by binary search tree? draw the BST for 14,15,4,9,7,18,3,5,16,4,20,17,9,14,5 (Show all necessary steps) [3+7]
6. Draw the AVL tree for the following sequence of elements: 8,9,10,2,1,5,3,6,4. [10]
7. What are recursion? write the properties of recursion ? How recursion will be helpful while solving Fibonacci sequence. [2+3+5]
8. Explain the bubble short and insertion sort with an example [10]
9. Define the term hashing and hash function . How do we resolve hash collision ? [10]
10. What are the difference between tree and graph ? write an algorithm for depth first traversal and Breath first traversal. [4+3+3]

Good Luck!

Council for Technical Education and Vocational Training
Office of the Controller of Examinations
Sanothimi, Bhaktapur
Regular/ Back Exam- 2073, Falgun

Program:	Diploma in Computer/ IT Engineering	Full Marks: 80
Year/Part:	II/I (New Course)	Pass Marks: 32
Subject:	Data Structure & Algorithm	Time: 3 hrs

Candidates are required to give their answers in their own words as far as practicable. The figures in the margir

Attempt Any Five questions

1. (a) Why data structure is needed? Explain the basic operation in stack. [2+6]
   (b) convert the following infix expression to post fix expression: [8]
   A* (B+C$0) –E$F* (G/H)
2. (a) Define Queue. Differentiate between Enqueue and dequeue algorithm with suitable example. [2+6]
   (b) Define link list. Explain the structure of link list and list. Out the advantage & disadvantage of link list. [2+6]
3. (a) List out properties of recursion. Write an algorithm and recursive function to find the Fibonacci sequence of given number. [2+6]
   (b) Construct AVL tree for given data: [8]
   50, 40, 35, 58, 48, 42, 60, 30, 33, 32
4. (a) What is binary tree? Explain pre-order. In- order r and post-order traversal with structure. [2+6]
   (b) Sort the following data using bubble sort 13, 32, 20, 62, 68, 52, 38, 46 [8]
5. (a) Suppose we have following data [8]
   44, 33, 11, 55, 77, 90, 40, 60, 99, 22, 88, 66. Now sort them using insertion sort
   (b) Explain the types of algorithm of graph traversal with suitable example. [8]

6. Write short notes on: **Any Four** [4x4=16]
   (a) ToH problem (b) B-Tree (c) Methods of specifying ADT.
   (d) Algorithm of selection sort (e) Hash function and Hash table

Good Luck