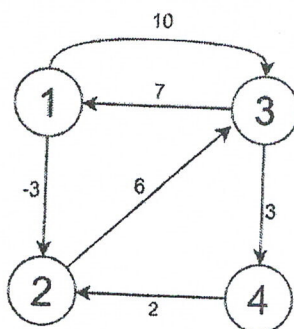


Exam.	Back (New Course)	
Level	BE	Full Marks 60
Programme	BCT	Pass Marks 24
Year / Part	II / II	Time 3 hrs.

Subject: - Data Structure and Algorithm (ENCT 252)

- ✓ 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. What does the Big-Omega notation determine in an algorithm analysis? Explain divide and conquer approach of an algorithm. [3+2]
2. Define stack. Convert the following infix expression to postfix using stack. Infix expression: $A + B * (C \wedge D - E) / (F - G + H)$. [1+4]
3. Construct the recursive call tree for the Tower of Hanoi problem with 3 disks, showing each recursive call to move disks from peg A to peg C using peg B. [3]
4. How circular queue overcomes the problem of linear queue in terms of memory efficiency? What do you mean by priority queue and what are their types? [4+3]
5. Differentiate between static and dynamic list with suitable example. Write an algorithm to add two polynomials using linked list. [3+4]
6. How do you delete a node with one child in binary search tree? Create a AVL tree for following sequence of elements: 3, 2, 1, 4, 5, 6, 7, 16, 15, 14, 13, 12. Construct a B-tree of order 3 for given data: 52, 46, 27, 81, 90, 108, 72, 110, 35, 115, 121, 86. [1+4+4]
7. Define transitive closure. Explain Prim's algorithm with an example. Apply the Floyd-Warshall algorithm to find the shortest paths between all pairs of vertices in the following weighted directed graph: [1+3+4]



8. Define internal and external sorting. Sort the data 81, 89, 9, 11, 14, 76, 54, 22, 49 and 37 using Heap sort. Also define the time and space complexity of heap sort. [2+5+1]
9. Explain sequential search efficiency. Write an algorithm for Binary search. Insert keys 89, 18, 49, 58 and 69 with hash table size 10 using quadratic probing. [1+3+4]

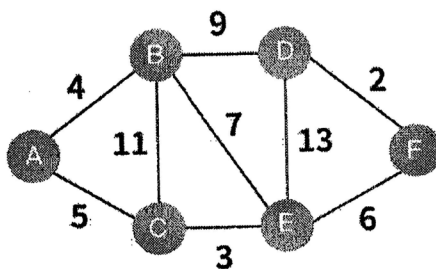
TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division
2082 Bhadra

Exam.	Regular (New Course)		
Level	BE	Full Marks	60
Programme	BCT	Pass Marks	24
Year / Part	II / II	Time	3 hrs.

Subject: - Data Structure and Algorithm (ENCT 252)

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- ✓ Attempt All questions.
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1. Define data structure. Differentiate between linear and non-linear data structures with examples. What is the rate of growth of an algorithm, and why is it important? [1+2+2]
2. Convert following infix expression into postfix expression showing status of stack in each step $A*B - (C*D - (E/F) * G*H) - I$. Generate a recursion tree to evaluate 4th Fibonacci term. [4+4]
3. What is the problem with linear queue implementation? Also explain solution for the problem with example and respective enqueue and dequeue algorithms. [2+2+3]
4. In a linked list data cannot be accessed randomly, justify with suitable example. Explain with algorithm how the addition of polynomial equations is done using linked list. [2+5]
5. a) Define a linked list. Write algorithms for push and pop operations in the dynamic implementation of a stack using a singly linked list. [1+3]
b) Write an algorithm to insert a node at a specified position in a doubly linked list. Describe how a polynomial can be represented using a linked list with an example. [3+2]
6. Define minimum spanning tree. Write an algorithm to find MST using Kruskal's algorithm. Find the shortest path from point A to point F using Dijkstra's algorithm. [1+3+4]



7. What do you mean by in place and not in place sorting? Explain. Sort the given elements using quick sort algorithm, showing important steps:
20, 50, 40, 30, 10, 90, 80, 35. [3+5]
8. Define hashing. Write an algorithm for binary search. Insert keys 12, 22, 34, 41, 53, 64, 79 into a hash table of size 10 using linear probing with hash function $h(k) = k \bmod 10$. Show each step and the final table. [1+3+4]
