## Tribhuwan University
## Institute of Science and Technology
## 2070

Bachelor Level / third-semester / Science

Full marks: 60

**Computer Science and Information Technology(CSC206)**

Pass marks: 24

(Data Structures and Algorithms)

Time: 3 hours

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

The figures in the margin indicate full marks.

---

**Section (A)**

**Attempt any two questions:(2x10=20)**

**1. Trace out Infix to Postfix conversion algorithm with given Infix expression.**

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

**Evaluate the postfix expression acquired from above for the given values:**

**A = 6, B = 2, C = 4, D = 3, E = 8, F = 2, G = 3, H = 5, I = 1.**

**2. Explain the structure of Doubly Linked List (DLL). Differentiate the difference between DLL and Doubly Circular Linked List (DCLL). Explain the procedures to insert a node in DLL at the beginning and at the last.**

**3. Define Binary Search Tree (BST). Write an algorithm to insert a node in non-empty BST. Construct BST from the data:**

**10, 20, 30, 25, 27, 7, 4, 23, 26, 21.**

**Section B**

**Attempt any eight questions: (5x8=40)**

**4. Write C function to insert an item circular queue in array implementation. Write assumptions, you need.**

**5. What is an algorithm? What is to analyze in algorithm? Define Big Oh notation for time complexity measurement of algorithm.**

**6. State TOH problem. Explain a recursive algorithm to solve the problem.**

**7. Trace selection – sort algorithm for the following data:**

**42, 23, 74, 11, 65, 58, 94, 86**

**8. What is Hashing? What collision means? State collision resolution techniques. Explain one of them in brief.**

**9. What is weighted graph? Explain Depth-first traversal of a graph.**

**10. Create a Huffman tree for the following set of data:**

| Characters | a | b | c | d | e | f |
|---|---|---|---|---|---|---|
| Probability | 48 | 13 | 11 | 16 | 07 | 05 |
| Encode | 0 | 101 | 100 | 111 | 1101 | 1100 |

**11. What is dynamic memory allocation? How it is achieved for declaring two dimensional array? Explain.**

**12. Explain efficiency of**

a) Binary Searching

b) Quick sort

13. Write short notes on (any two):

a) Queue in circular linked list

b) ADT

c) MST (Minimum Cost Spanning Tree) of a graph.