Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

End Term (Odd) Semester Examination November 2025

Roll no.....

Name of the Course and semester: BCA/BCA(AI/DS)/B.Sc. (IT)
Name of the Paper: Introduction to Data Structures
Paper Code: TBC 301/TBD 301/TBI 303/TBL305
Time: 3-hour Maximum Marks: 100

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Note:

(i) All the questions are compulsory.
(ii) Answer any two sub questions from a, b and c in each main question.
(iii) Total marks for each question is 20 (twenty).
(iv) Each sub-question carries 10 marks.

Q1. (2X10=20 Marks) (CO1, CO2, CO3)

a. write applications of stack and queue in computer science.

b. Assume that you have a single linked list. First node of the linked list is pointed by a pointer PTR. Write a C function to count all the nodes having even information.

c. Convert the following infix expression into postfix expression using stack.
(A+B*C)-D/E-F^G

Q2. (2X10=20 Marks) (CO1, CO2, CO3)

a. Assume that you have a double linked list. First node is pointed by pointer Ptr. Write a C function to delete first node of the double linked list.

b. Explain followings with examples malloc() , calloc() ,free() , realloc()

c. Write a C function implement Push operation of stack using linked list.

Q3. (2X10=20 Marks) (CO2, CO3, CO4)

a. Evaluate the following postfix expression using stack show (all the steps)
6,2, *,6,2, -, *,6, /,4,2, ^, + (Here comma is used as separator only).

b. Draw a binary tree using its in-order and pre-order traversals:
In order: D, B,E,A,F,C,G
Pre-order: A, B, D, E, C, F, G.

c. Write a c program to store N elements in 1 D array then count frequency of each element in the array. (Do not use temporary array)

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Q4. (2X10=20 Marks) (CO2, CO3, CO4)

a. Apply bubble sort on following data: 22,8,12,13,4,5,18,30 (show all the steps).

b. Write a C function to create a binary search tree and then count total number of leaf nodes in the binary search tree.

c. Explain following:
i)Circular Queue ii) Doubly Ended Queue iii) Priority Queue

Q5. (2X10=20 Marks) (CO3, CO4, CO5)

a. Explain Huffman's algorithm. Draw Huffman's tree using following data.

Data Item:	A	B	C	D	E	F
Weight:	1	2	1	3	4	2

b. Write the limitations of single linked list and double linked list.

c. Explain following:
i) Linear probing
ii) Quadratic probing
iii) Synonym chaining