हिमाचल प्रदेश केन्द्रीय विश्वविद्यालय
Central University of Himachal Pradesh
(Established under Central Universities Act 2009)

Examination: Mid-Term 2023 (Sem-1st) **Time: 90 Min.**
Name of the Course: Data Structure (MCA-501) **F.M. 40 Marks**

SECTION – A (1X10 = 10 Marks)

1. Answer all the ten questions with ONE mark each.
(निम्नलिखित सभी 10 प्रश्नों के उत्तर दें| प्रत्येक का 01 अंक है)

a) Quick sort algorithm is an in-place algorithm(True/False).
b) Write the expression of Master theorem?
c) Define Big oh of a function.
d) How to read it: int *P2[5];
e) Multiplication & Division operations are not allowed on pointers. (True/False).
f) int* X1, X2, *X3;
What are X1, X2, X3?
   a) X1, X2 are int* & X3 is an int**
   b) X1, X3 are int* & X2 is an int
   c) *X3 cause compiler error, otherwise X1, X2 are int*
g) How can we describe an array in the best possible way?
   a) The Array shows a hierarchical structure.
   b) Arrays are immutable.
   c) Container that stores the elements of similar types
   d) The Array is not a data structure
h) How can we initialize an array in C language?
   a) int arr[2]=(10, 20)
   b) int arr(2)={10, 20}
   c) int arr[2] = {10, 20}
   d) int arr(2) = (10, 20)
i) If the size of the stack is 10 and we try to add the 11th element in the stack then the condition is known as___
   a) Underflow
   b) Garbage collection
   c) Overflow
   d) None of the above
j) Which data structure is mainly used for implementing the recursive algorithm?
   a) Queue
   b) Stack
   c) Binary tree
   d) Linked list

SECTION – B (2X 5 =10 Marks)

Answer any 02 of the following 04 questions; each question carries 5 marks.
(निम्नलिखित 04 प्रश्नों में से किन्ही 02 प्रश्नों का उत्तर दें| प्रत्येक प्रश्न 5 अंक का है)

2. Explain the linear and non-linear data structure with suitable example.
3. Write a function sumAndDiffAB which returns both sum and difference using pointer as an argument.
4. Given, $f(n) = n^2 + n + 5$ and $g(n) = n^2$. Prove that $f(n) = \Theta\, g(n)$ and calculate the value of C_1, C_2, and n_0.
5. Find the time complexity for
A(n){ if (n<=1) return Constant; else return (A root(n)); }

SECTION – C (2x10=20 Marks)

Answer any 02 of the following 04 questions; each question carries 10 marks.
(निम्नलिखित 04 प्रश्नों में से किन्ही 02 प्रश्नों का उत्तर दें| प्रत्येक प्रश्न 10 अंक का है)

6. Write the binary search algorithm and recurrence relation. Derive the time and space complexity.
7. Writes merge sort algorithm, merging and recurrence relation. Discuss time and space complexity.
8. Solve the recurrence using recurrence tree method.
$T(n) = T(n/10) + T(9n/10) + n$.
9. Write the partition and quicksort algorithm. Discuss the time complexity in Best, worst and average case.

----------**End of the paper**----------