International Institute of Information Technology, Hyderabad
ICS101:M-17:Computer Programming
Mid Term 2 - Set A

Max. Points: 75 [Time: 90 Mins]

Part I: *Give precise answers to the following questions.* [4 × 5 = 20]

1. Find, describe and fix all errors in the following lines of code (assume it is inside a valid main():)

```
char name[14] = "IIIT Hyderabad";
printf("%s\n", &name[0]);
```

2. Explain the difference between Call-By-Value and Call-By-Reference mechanisms for parameter passing.

3. You have to store a large square matrix, whose values are zero except when both indices are powers of 2. Write an indexing expression so that only the non-zero elements may be stored in a smaller 2D array.

4. Explain the difference between row-major and column-major representations of a 2-D array. How does these definitions extend to arrays of more than 2 dimensions?

Part II: *Give brief and precise answers in the space provided.*

1. Describe the mechanism of a function call with an example. You should describe the local variable stack and each of its contents that are relevant for the process of calling a function with parameters and returning back to the caller function. [15 marks]

2. With the help of an example, describe the relationship between the size of the local variable stack and the number of function calls in a program that uses double recursion. [15 mark

3. Write a recursive function to print all permutations of a given string. Assume all characters in t input string are unique. [10 mar

4. You are given a square matrix of integers of size $2^N \times 2^N$. Write a recursive function to determine if matrix is **perfect**. We define a square matrix to be **perfect** iff all the four $2^{N-1} \times 2^{N-1}$ submatri are perfect and the determinants of these sub-matrices are equal.

   Assume you are given a function: `int det(int mat[][N], int row, int col, int K)` that co putes the determinant of the $K \times K$ sub-matrix starting at mat[row][col]. [15 ma