■ Variables in C - Notes

In C programming, a variable is a container (storage area) to hold data. Each variable in C has a specific data type, which defines the size and layout of the variable's memory; the range of values that can be stored within that memory; and the set of operations that can be applied to the variable.

■ Declaration of Variables: Before using a variable, it must be declared. The syntax for declaring a variable is: ; Example: int age; float salary; char grade;

■ Initialization of Variables: Variables can be initialized during declaration. Example: int age = 25; float salary = 45000.50; char grade = 'A';

■ Types of Variables in C: 1. Local Variables: Declared inside a function or block, accessible only within it. 2. Global Variables: Declared outside all functions, accessible throughout the program. 3. Static Variables: Maintain their value between function calls. 4. Automatic Variables: Default type for all local variables. 5. External Variables: Declared using 'extern', defined in another file.

■ Rules for Naming Variables: - Can contain letters, digits, and underscores. - Must begin with a letter (A–Z or a–z) or underscore. - Case sensitive (e.g., 'Age' and 'age' are different). - No spaces or special characters like @, $, etc. - Cannot use reserved keywords (like int, float, return, etc.).

■ Variable Scope: - Local Scope: Exists within a block. - Global Scope: Exists throughout the program. - Function Scope: Specific to function parameters.

■ Variable Lifetime: - Determines how long the variable exists in memory. - Automatic variables are created on entry and destroyed on exit from a block. - Static variables exist until the program ends.

■ Example Program: #include int globalVar = 100; // Global variable void display() { static int staticVar = 0; // Static variable staticVar++; printf("Static Variable: %d\n", staticVar); } int main() { int localVar = 10; // Local variable printf("Global Variable: %d\n", globalVar); printf("Local Variable: %d\n", localVar); display(); display(); return 0; }

Output: Global Variable: 100 Local Variable: 10 Static Variable: 1 Static Variable: 2