LECTURE NO.1   **TIME: 30 MIN.**

PREVIEW OF TODAY'S TOPIC	
A. Identifier and its types B. Variable, declaration, definition and initialization rule for naming variables	Name: _____ Roll No: _____ Date: _____

IDENTIFIER AND ITS TYPE
LONG QUESTION

1.   **What is identify? Describe its type in detail.**

SHORT QUESTIONS

1.   **What is identifier?**   **(GRW 2022) (LHR 2021) (MTN 2021) (U.B)**
2.   **What is standard identifier?**   **(U.B)**
3.   **What is user defined identifier?**   **(K.B)**
4.   **Define keywords in C-Language.**   **(LHR 2021) (DGK 2021, 2022) (BWP 2022)**

IDENTIFIER:
1)   The names used to represent variables, constants, types, functions and labels in the program are called **identifiers.**
2)   Identifiers in C can contain any number of characters but only **31 characters** are significant to C compiler.

There are two types of identifiers in C.
a)   Standard Identifiers
b)   User defined Identifiers
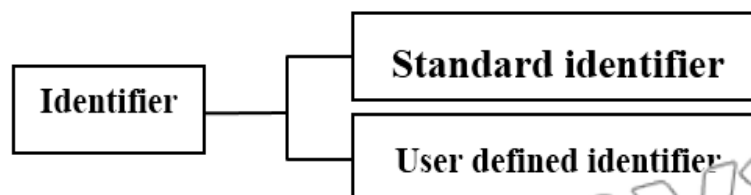
- **Standard Identifier:**
   1) The identifiers that have special meanings in C are called **standard identifiers.**
   2) These can be redefined to use in the program for other purposes but this is not recommended.
   3) Examples of standard identifiers are printf, scanf etc.
- **User defined identifier:**
   1) The identifiers that are defined by the programmer may need to access memory location for storing data and program results are called user **defined identifiers.**
   2) Examples of user defined are roll no, marks etc.

MULTIPLE CHOICE QUESTIONS

(i) Another name for keyword is (BWP 2021)

     (a) Reserved word (b) Special word

     (c) comment (d) Identifier

(ii) The names to represent variables, constants, types, labels and functions are called:

     (a) Procedure (b) Identifier

     (c) Operator (d) Constant

(iii) How many types of identifier?

     (a) 3   (b) 2

     (c) 4 (d) 5

(iv) The Identifier that have special meaning in C language are called:

     (a) User defined identifier (b) Function identifier

     (c) Standard identifier (d) None of these

(v) printf and scanf are examples of:

     (a) User defined identifier (b) Standard identifier

     (c) Both of these (d) None of these

(vi) The identifier that is defined by Programmer to store data is called.

     (a) Programmer identifier (b) Standard identifier

     (c) User defined identifier (d) Both A and C

SHORT QUESTIONS

1. What is identifier?   **(GRW 2022) (LHR 2021) (MTN 2021) (K.B)**

Ans: The names used to represent variables, constants, types, functions and labels in the program are called identifiers. Identifiers in C can contain any number of characters but only 31 characters are significant to C compiler. There are two types of identifiers in C.

- Standard Identifiers
- User defined Identifiers

2. What is standard identifier?   **(K.B)**

Ans: The identifiers that have special meanings in C are called standard identifiers. These can be redefined to use in the program for other purposes but this is not recommended. Examples of standard identifiers are printf, scanf etc.

3. What is user defined identifier?   **(K.B)**

Ans: The identifiers that are defined by the programmer to access memory location for storing data and program results are called user defined identifiers. Examples of user defined are rollno, marks etc.

4. Define keywords in C-Language   **(LHR 2021) (DGK 2021, 2022) (BWP 2022)**

Ans: The words which have predefined meaning in C language are called keywords or reserved words. There are 32 keywords in C language.

     For example int, void etc.

VARIABLE, VARIABLE DECLARATION, DEFINE AND INITIALIZE
LONG QUESTION

1. **What is variable? How a variable can declare, define and initialize in C language.**

SHORT QUESTIONS

1. **Differentiate between declaring and defining a variable.** (LHR 2022) (SWL 2021)(U.B)
2. **What is variable?** (K.B)
3. **What is the meant by declaring a variable in C.** (SWL 2022) (RWP 2022)(U.B)
4. **What is garbage value?** (GRW 2022) (U.B)
5. **Write down a C statement that initialize a character variable ch1, ch2, ch3 in one line.** (DGK 2022)(K.B)
6. **What is meant by initializing a variable in C.** (RWP 2022) (A.B)

VARIABLE:

- Variable are the named **memory locations.**
- Variable are used to store program **input data or computations results** during program executions.
- The value of variable may change during the program execution.
- The variables are created in **RAM.**
- One should not mix the contents of a variable with its address.
- The contents of a variable is the data that is stored in memory location, while the address of the variable is the memory location number.
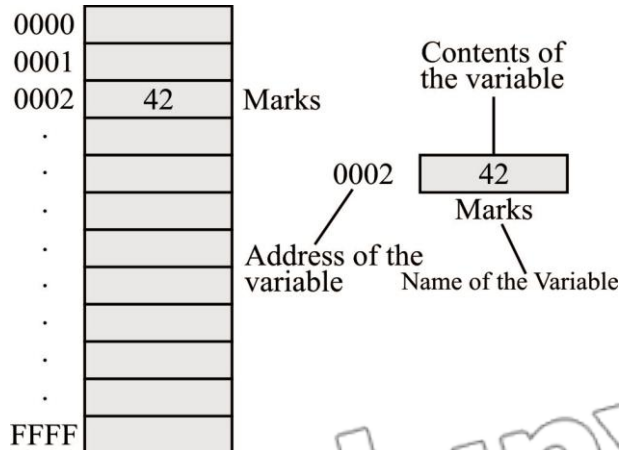
- **Declaring a variable in C:** (LHR 2021) (SWL 2021)

   A variable in C is declared by specifying its data type and name.

   If an undeclared variable is used in C program the compiler will report an error.

   The syntax of variable declaration is:

   data type variable_name;

   The data type refers to the type of the data being stored in the variable.

   For example:

   int marks; **float** area;

   To declare more variables of the same data type such as

   int rollno, marks;

float fee, average;

- **Declaring vs Defining a variable:**

  In a C program **variable declaration** tells the compiler the name of the variable to be used in the program and the type of data stored in it.

  For example:

  float area,

  int mark;

- A variable declaration does not set aside memory location for the data to be stored.

- While the definition of the variable that set aside the memory location for the variable.

- However, in C, the declaration statement not only declares the variable but also defines it. It does not mean that the declaration of a variable cannot be separated from its definition in C language.

- **Initializing a variable:**

  - Assigning a value to a variable at the time of its declaration is called **initializing a variable.**

  - The variable store meaningless data (garbage) if it is not initialized.

    int marks;(variable declare and define)

    marks=76;(variable initialized)

    float volume=6.7; (variable declare, define and initialized)

RULES FOR NAMING VARIABLES IN C LANGUAGE

Rules for naming variables in C:

The following are some important rules for naming a variable in C

- A variable name can consist of letter, digits and the underscore character.

- The first character of the name must be a letter or underscore but the underscore is not recommended. Therefore, 5hours, 2kg are invalid names.

- C is a case sensitive language, thus the names volume, VOLUME are two different variables.

- C keywords cannot be used as variable names. Thus the use of int, void, float is invalid.

- C variable name can be up to 31 characters long for many compliers. If a variable consists of more than 31 characters, the compiler uses first 31 characters and remaining characters will be ignored.

- Blank spaces are not allowed in the name of variable. For example, student name is an invalid variable name.

- A variable can only be declared for one data type.

MULTIPLE CHOICE QUESTIONS

(i) The quantity whose value may change during programs execution are called:**(SGD 2021)**

        (a) Operator(b) Constant

        (c) Comments(d) Variable

(ii) A variable is declared by specifying its:

    (a) Value   (b) Name

    (c) Data type   (d) Both (b) & (c)

(iii) Which statement not only declare the variable but also define it?

    (a) Assignment   (b) Compiling

    (c) Declaration   (d) Linking

(iv) Assigning value at the time of variable declaration is called:

    (a) Define   (b) Loading

    (c) Allocating   (d) Initializing

(v) Which of the following is a valid initializing a variable statement?

    (a) a = 10;   (b) int m;

    (c) int d = 10;   (d) int p, q;

SHORT QUESTIONS

1. **Differentiate between declaring and defining a variable.** (LHR 2022) (SWL 2021)(U.B)

Ans: In a C program **variable declaration** tells the compiler the name of the variable to be used in the program and the type of data stored in it.

For example:

    float area;

int mark;

- A variable declaration does not set aside memory location for the data to be stored.
- While the definition of the variable that set aside the memory location for the variable.

However, in C, the declaration statement not only declares the variable but also defines it. It does not mean that the declaration of a variable cannot be separated from its definition in C language.

2. **What is variable?** (K.B)

Ans:

Variable are the named memory locations which are used to store program input data or computations results during program executions.

The value of variable may change during the program execution. The variables are created in RAM.

3. **What is the meant by declaring a variable in C.** (SWL 2022) (RWP 2022)(U.B)

Ans:

A variable in C is declared by specifying its data type and name. If an undeclared variable is used in C program the compiler will report an error.

The syntax of variable declaration is:

data type variable_ name;

The data type refers to the type of the data being stored in the variable.

For example:

    int marks;

    float area;

4. **What is the meant by initializing a variable in C.** (RWP 2022) (U.B)

Initializing a variable:

Assigning a value to a variable at the time of its declaration is called initializing a variable. The variable store meaningless data (garbage) it it is not initialized.

   int marks; (variable declare and define)

   marks=70;(variable initialized)

   float volume=6.7; (variable declare, define and initialized)

5. **What is garbage value?** (GRW 2022)(K.B)

Ans: During the initialization is if the variable in not initialize then the see compiler store meaning less data into the variable this meaning less data is called garbage value.

6. **Write down a C statement that initialize a character variable ch1, ch2, ch3 in one line.** (DGK 2022) (A.B)

Ans: Char ch1, ch2, ch3= a;

7. **Write down three rules for naming variable in C language?** (MTN 2021, 2022) (SWL 2021)

 Ans:

   • A variable name can consist of letter, digits and the underscore character.

   The first character of the name must be a letter or underscore but the underscore is not recommended. Therefore, 5hours, 2kg are invalid names.

   C is a case sensitive language, Thus the names volume, VOLUME are two different variables.

   C keywords cannot be used as variable names. Thus the use of int, void, float is invalid.

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PREVIEW OF TODAY'S TOPIC

C.Constant and its types and Data types

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**CONSTANT AND ITS TYPES**

LONG QUESTION

1.   What is use of data type in C language? Explain different data types.

SHORT QUESTIONS

1.   **What is Constant?**

2.   **What is character constant?**   (SWL 2022) (DGK 2022) (K.B)

3.   **Write a note on string constant. Give two example.**   (FSD 2021) (U.B)

4.   **Write a note on long double data type.**   (BWP 2021) (U.B)

5.   **List any two data type in C.**   (BWP 2021) (DGK 2021)

CONSTANT AND ITS TYPES
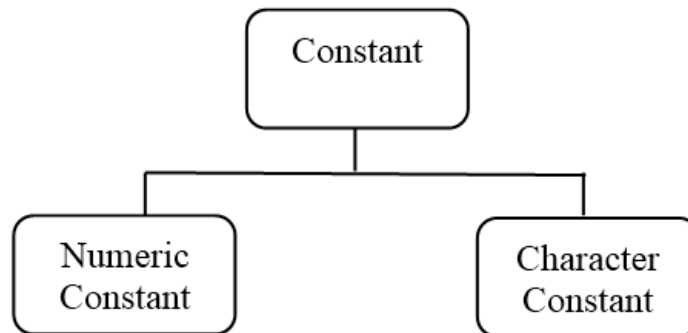
•**"Constant** is a quantity whose value cannot be change during the program execution**"**.

•The define directive can be used to define constant macros.

For example:

 # define PI3.142857

There are two types of constant:

1.Numeric constants

2.Character constants

•**Numeric constants:**

    •Numeric constants consist of numbers

    •It can be further divided into integer & floating point constants.

•**Integer constants:**

Integer constants represent values that are counted and do not have a fractional part

For example:

        +66, -878, 45 etc

•**Floating point constants:**

Floating constants represent values that are measured **for example** -9.8, 6.0, 0.85

CHARACTER CONSTANT:

    1) A character constant is a single alphabet, a single digit or a single symbol enclosed within **apostrophes (').**

    2) The maximum length of character constant is one character and its take one byte in memory.

    3) For example:

        'n','6','=', 'B' are character constants.

DATA TYPE

(i) The data type defines a set of values and a set of operations on those values.

(ii) The type of each data value is identified at the beginning of program design.

(iii) In a C program we may need to process different type of data.

(iv) Therefore, variables should be capable of storing data of different types.

(v) This is done by associating certain data types to the variables.

(vi) C defines some standard data types and **user-define data types**

(vii) The standard data type is predefined in the language such as int, float, char, double etc.

- **Data types for integer (int, short, long):**

    1) The data type int is used to represent integer.

    2) The integer variables store number that has no fractional parts such as **1028, -512,198** etc. There are two more types of integer that is short int and long int.

    3) The integer variable may of signed or unsigned.

    4) If not mentioned all integers are consider to be signed.

- **Data Type of integers are**

    - int & short, long

- **int data type:**

    - The data type int take two bytes in memory and can hold number ranging from -2^{15} through 2^{15}-1.

    - It means the value from **-32768 to 32767.**

- **Unsigned int data type**

    1) The data type unsigned int can store only positive number.

    2) It takes two bytes in memory and can hold number ranging from **0 through 2^{16}-1**. It means the value from **0 to 65635.**

- **Long data type:**

    1) The data type long represents larger integers.

    2) It takes four bytes in memory and can hold number ranging from -2^{31} through 2^{31}-1.

    3) It means the value from **-2147483648 to 2147483647**

Data Type	Bytes	Other Names	Rang of values
Int	2	Signed	-32768 to 32767
Unsigned int	2	Unsigned	0 to 65635
Short	2	Short int	-32768 to 32767
Unsigned short	2	Unsigned short int	0 to 65635
Long	4	Long int	-2147483648 to 2147483647
Unsigned long	4	Unsigned long int	0 to 4294967295

DATA TYPE FOR FLOATING POINT NUMBER:

1) Floating point number are the numbers that have a fractional part for example 3.15, **0.426 and -8.76 etc.**

2) Floating point number are used to represent values that are measured.

3) The floating point number are represented in computer by scientific notation.

4) There are **three floating point types** these are

- Float & double, long double

•Float data type:

- Float data type takes **4-bytes** in memory.
- It can store values of range **3.4 x10-38 to 3.4x10+38.**
- It provides the precision up to **6 decimal places.**

•Double data type:

- Double data type takes **8-bytes** in memory.
- It can store values of range **1.7 x10-308 to 1.7 x 10+308.**
- It provides the precision up to **15 decimal places.**

•Long double data type:

- Long double data type takes **10 bytes** in memory.
- It can store values of range **1.7 x10-4932 to 1.7 x 10+4932.**
- It provides the precision up to **19 decimal places.**

DATA TYPE FOR CHARACTER – (CHAR)

- The data type char is used to represent a letter, number, or punctuation mark.
- It takes one byte in memory and expressed as enclosed in apostrophes as **'a', 'm', '5', '%' etc.**
- Like number, characters can also be compared, added and subtracted.

REPRESENTATION THE FLOATING POINT IN EXPONENTIAL NOTATION:

1) In floating point representation, the storage area is divided into two section that is mantissa and exponent.

2) The mantissa is the value of the number and the exponent is the power to which it is raised.

Cancellation Error:

1) When we add a large number and a small number, the larger number may cancel out the smaller number resulting in a cancellation error.

2) For example, the result of addition of 1850.0 and 0.000000254 may compute to 1850.000000 on some computers.

Arithmetic underflow:

1) When two very small numbers are manipulated the result may be too small to be represented accurately so it will be represented as zero.

2) This phenomenon is called arithmetic underflow.

Arithmetic overflow:

1) When two very large number are manipulated the result may be too large number.

2) This phenomenon is called arithmetic overflow.

MULTIPLE CHOICE QUESTIONS

(i) Which of the following data type offers the highest precision? (MTN 2021) (FSD 2021)

(vi) (DKG 2022)

(a) float   (b) long int

(c) long double   (d) unsigned long int

(ii) Which data type is used to store a string value in a variable? (RWP 2018)

(a) int   (b) float

(c) long   **(d) char**

(iii) Which of the following is a valid character constant? (MTN 2021)

(a) "b"   (b) a

(c) '6'   (d) =

(iv) The number of bytes used by long double data types is:

(a) 4   (b) 8

(c) 10   (d) 12

(v) When two small number are manipulated, the result will be represented as zero this phenomenon is called.

(a) Cancellation error   **(b) Arithmetic underflow**

(c) Arithmetic overflow   (d) None of these

SHORT QUESTIONS

Q.1 What is Constant?

Ans: Constant is a quantity whose value cannot be change during the program execution. The define directive can be used to define constant macros.

For example:

 # define PI3.142857

There are two types of constant

    1. Numeric constants

    2. Character constants

Q.2 What is character constant?   **(SWL 2022) (DGK 2022) (K.B)**

Ans: A character constant is a single alphabet, a single digit or a single symbol enclosed within **apostrophes ('')**. The maximum length of character constant is one character and its take one byte in memory.

For example:

'n', '6', '=', 'B' are character constants.

Q.3 Write a note on string constant. Give two example.   **(FSD 2021) (U.B)**

Ans: String constant is a collection of characters written in double quotation marks. It may consists of alphabetic characters, numbers or special symbols.

For example: "ahead", "42 Lahore" etc.

Q.4 Why is C known as strongly typed language?

Ans: C is a strongly typed language. It means that a variable must always be declared before it can be used in a program. If undeclared variable is used in a program the compiler gives an error message.

Q.5 What is arithmetic overflow?

Ans: When two very large number are manipulated the result may be too large number. This phenomenon is called arithmetic overflow.

Q.6 **Write a note on long double data type.** (BWP 2021) (U.B)

Ans: Long double data type:

- Long double data type takes **10 bytes** in memory.
- It can store values of range **1.7 x10-4932 to 1.7 x 10+4932.**
- It provides the precision up to **19 decimal places.**

Q.7 **List any two data type in C.** (BWP 2021) (DGK 2021)

Ans: Following are the data type in C.

- Char
- Int.
- Float

PREVIEW OF TODAY'S TOPIC

D. Operator in C and its types

OPERATOR IN C AND ITS TYPES
EXTENSIVE QUESTION

Q.1   What is operator? Briefly explain in different types.

SHORT QUESTIONS

(i)   Write a note arithmetic operators.   **(FSD 2022) (U.B)**

(ii)   What is a relational operators?   **(BWP 2022)(K.B)**

(iii)   Write a note on assignment operator.   **(RWP 2022)(U.B)**

(iv)   Define a logical operators in C language.   **(SWL 2021) (MTN 2021) (DGK 2021)(K.B)**

(v)   Define compound condition.   **(RWP 2022) (K.B)**

(vi)   Compare unary and binary operators.   **(FSD 2021) (U.B)**

OPERATORS AND ITS TYPES
(i)Operator:
   1)Operators are symbols which are **used to perform certain operations on data.**
   2)There are different types of operators in C.
   3)These are **arithmetic operators, relational operators, logical operators etc.**

(ii)Arithmetic operator:
   1)Arithmetic operators are used to perform arithmetic operations of data (numbers). Following is the list of arithmetic operators.

   Suppose a and b are two integers variables having values 8 and 5 respectively then.

Operation	Symbol	Expression	Evaluation
Addition	+	a + b	13
Subtraction	-	a - b	3
Multiplication	*	a * b	40
Division	/	a / b	1
Modulus(Remainder operator)	%	a % b	3

(iii)Relational operator:
   1)Relational operators are **used to compare two values.**
   2)These operators always evaluate to produce a non-zero value (1) if the relationship evaluates to true and a zero (0) if the relationship evaluates to false.
   3)There are **six relational operators** in C language.

   Suppose a and b are two integers variables having values 10 and 50 respectively then.

Operation	Symbol	Expression	Evaluation

Equal to	=	a == b	False(zero)
Less than	<	a < b	True(non-zero)
Greater than	>	a > b	False(zero)
Less than or equal to	<=	a <= b	True(non-zero)
Greater than or equal to	>=	a >= b	False(zero)
Not equal to	!=	a != b	True(non-zero)

(iv)Logical operator.

　　1)Logical operators combine two or more relational expressions to construct compound
　　　　expressions.

　　2)There are three logical operators in C language. These are &&(and), || (or) and! (not).

Symbols	Expression	Evaluation
&&	Exp1 && Exp2	True: if both Exp1 and Exp2 are true otherwise false
||	Exp1 && Exp2	True: if any one of the Exp1 and Exp2 are true otherwise false
!	! Exp	Reverse the result of the evaluation of condition

(v)Assignment operator:

　　1)The Assignment operator is used to store a value or a computational result in a variable.

　　2)The symbol = is called the assignment operator.

(vi)Compound Assignment Operator:

　　1)The operators that can increment or decrement the value of their operand by other then
　　　　one are called compound assignment operator.

　　2)These are +=, -=, *= and /=

MULTIPLE CHOICE QUESTIONS

　　(i) The logical not operator, denoted by!, is a:(LHR 2022)

　　　　(a) Ternary operator　　　　　　　　(b) Unary operator

　　　　(c) Binary operator　　　　　　　　　(d) Bitwise operator

　　(ii) The expression 14% 3 has a value equal to:(FSD 2022)

　　　　(a) 2　　　　　　　　　　　　　　　　(b) 4

　　　　(c) 4.66　　　　　　　　　　　　　　　(d) 11

　　(iii) The logical not operator denoted by I, is a:(SWL 2022)

　　　　(a) Ternary Operator　　　　　　　　(b) Unary Operator

　　　　(c) Binary Operator　　　　　　　　　(c) Bitwise Operator

　　(iv) The result of C expression 9/4*2 will be equal to:(FSD 2021)

　　　　(a) Ternary Operator　　　　　　　　(b) Unary Operator

　　　　(c) Binary Operator　　　　　　　　　(d) Bitwise Operator

　　(v)a + = b is equivalent to:(**LHR 2022) (GRW 2022)(SWL 2022) (FSD 2022) (DGK
　　　　2021)(SWL 2019)**

　　　　(a) b + = a　　　　　　　　　　　　　(b) a = + b

　　　　(c) a = a + b　　　　　　　　　　　　(d) b = b + a

SHORT QUESTIONS

Q.1 **Write a note arithmetic operators.** (FSD 2022) (U.B)

Ans: Arithmetic operators are used to perform arithmetic operations of data (numbers).
Following is the list of arithmetic operators
Suppose a and b are two integers variables having values 8 and 5 respectively then.

Operation	Symbol	Expression	Evaluation
Addition	+	a + b	13
Subtraction	-	a – b	3
Multiplication	*	a * b	40
Division	/	a / b	1
Modulus(Remainder operator)	%	a % b	3

Q.2 **Define the logical operator in C language.** (SWL 2021) (MTN 2021) (DGK 2021)(K.B)

Ans: Logical operators combine two or more relational expressions to construct compound expressions. There are three logical operators in C language. These are &&(and), || (or) and !(not).

Symbols	Expression	Evaluation
&&	Exp1 && Exp2	True: if both Exp1 and Exp2 are true otherwise false
||	Exp1 && Exp2	True: if any one of the Exp1 and Exp2 are true otherwise false
!	! Exp	Reverse the result of the evaluation of condition

Q.3 **Write a note on relational operators?** (BWP 2022)(K.B)

Ans: Relational operators are **used to compare two values.** These operators always evaluate to produce a non-zero value (1) if the relationship evaluates to true and a zero (0) if the relationship evaluates to false.
There are **six relational operators** in C language. Suppose a and b are two integers variables having values 10 and 50 respectively then.
a == b, a < b, a > b, a <= b, a >= b, a! = b

Q.4 **Write a note on assignment operator.** (RWP 2022)(U.B)

Ans: The Assignment operator is used to store a value or a computational result in a variable.
The symbol = is called the assignment operator.
For example
area = height * width;
The value of right side of the operator is assigned to the variable on the left side of the assignment operator. This statement is also called assignment statement.
The general form of assignment statement is
Variable = expression

Q.5 **Define compound condition.** (RWP 2022) (K.B)

Ans: A compound condition is a combination of two or more conditions which are connected each other with the logical operators (OR & AND). The Result of the compound condition is zero or one depending upon the logical operator used in condition.

Q.6 **Compare unary and binary operators.** (FSD 2021) (DGK 2018)(U.B)

Ans:

Unary operator	Binary operator
The Operators which operate on Single Operand known as Unary Operators, some of the unary operators are: ++ Increment Operator -- Decrement Operator & Address Of Operator - Unary Minus Operators ~ (One's Compliment) Negation Operator ! Logical NOT	**The Operators which operate on Two Operands known as Binary Operators**, some of the binary operators are: + Binary Plus Operator - Binary Minus Operator == Equal to Operator < Less than Operator

LECTURE NO.1   **TIME: 30 MIN.**

PREVIEW OF TODAY'S TOPIC

Increment and decrement operators & operator precedence

INCREMENT AND DECREMENT OPERATORS & OPERATOR PRECEDENCE

EXTENSIVE QUESTION

Q.1 What are the increment and decrement operators explain with the help of examples.

SHORT QUESTIONS

(i)	**What are the use of increment operators?**	**(RWP 2022) (U.B)**
(ii)	**Rewrite the expression [n++;] without using the operator ++?**	**(SGD 2021) (A.B)**
(iii)	**What is the prefix and postfix increment operators?**	**(K.B)**
(iv)	**What is decrement operator?**	**(K.B)**
(v)	**What is the meant by operator precedence?**	**(K.B)**

INCREMENT OPERATOR:

- Increment operator increases the value its operand by one.

  It is denoted by ++.

  For example, a++ where a is variable.

  There are two types of increment operator.

  - Prefix increment
  - Postfix increment.
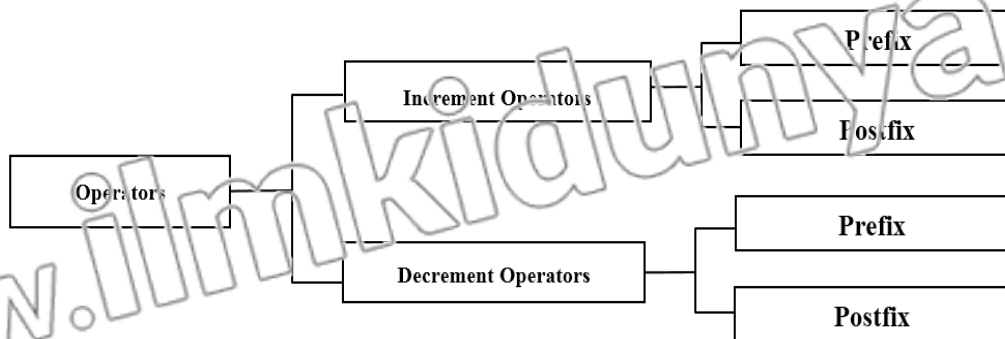
(i)Prefix Increment

- In prefix increment the ++ precedes its operand.

  For example, ++a.

Consider the following statements.

    a=10;

    b=++a;

- The first statement assigns the value of 10 to variable a.
- In second statement first the value of a is incremented by 1 (i.e. a=10+1=11) and then assign to variable b (i.e. b=11).
- Therefore, after the execution of above two statement value of a and b will be 11.

(ii)Postfix increment:

- In prefix increment the ++ is follows its operand.

    For example, a++;

Consider the following statement.

    a=10;

    b=a++;

- The first statement assigns the value of 10 to variable a.
- In second statement first the value of a is assigned to variable b (i.e. b=10) and then the value a is incremented by 1(i.e. a=10+1=11).
- Therefore, after the execution of above two statement, the variable a will have the value 11 and the variable b will have value 10.

DECREMENT OPERATOR:

- Decrement operator deceases the value its operand one.
- It is denoted by --.

    For example, a-- where a is variable.

There are two types of decrement operator.

- Prefix decrement.
- Postfix decrement.

(i)Prefix decrement:

- In prefix decrement the -- precedes its operand.

    For example --a.

Consider the following statements.

    a=10

    b=--a;

- The first statement assign the value of 10 to variable a.
- In second statement first the value of a is decremented by 1 (i.e. a=9) and then assign to variable b (i.e. b=9).
- Therefore after the execution of above two statement value of a and b will be 9.

(ii)Postfix decrement:

- In prefix decrement the -- is follows its operand.

    For example a--.

Consider the following statement.

    a=10;

    b=a--;

- The first statement assign the value of 10 to variable a.
- In second statement first the value of a is assigned to variable b (i.e. b=10) and then the value a is decremented by 1 (i.e. =9).
- Therefore after the execution of above two statement, the variable b will have the value 10 and the variable a will have value 9.

OPERATOR PRECEDENCE:

The order of evaluation of operators in an expression is called operator precedence. Different operators have different precedence level. Table below lists the precedence of C operators from highest to lowest.

Operator	Precedence
! (logical NOT)	Highest
*, /, %	
+, -	
<, <=, >, >=	
= =, !=	
&&	
||	
=(assignment operator)	Lowest

MULTIPLE CHOICE QUESTIONS

(i)Which operator has the highest precedence?

   (a) !   (b) *

   (c) \|\| (d) &&

(ii)Increment operator increase the value of its operand by:

   (a) Two   (b) Three

   (c) Any   (d) One

(iii)Which of the following operator has the lowest precedence level?(MTN 2022) (DGK 2021)

   (a) !   (b) <

   (c) &&   (d) =

(iv)The decrement/increment operator is:

   (a) Assignment operator   (b) Unary operator

   (c) Ternary operator   (d) Binary operator

SHORT QUESTIONS

Q.1   **What are the use of increment operators?**   **(RWP 2022) (U.B)**

Ans: Increment operator increases the value its operand by one. It is denoted by ++.

     For example a++ where a is variable

     There are two types of increment operator.

- Prefix increment
- Postfix increment.

Q.2   **Rewrite the expression [N++;] without using the operator ++?**   **(SGD 2021) (A.B)**

Ans: N = N+1;

Q.3   **What is the prefix and postfix increment operators?**   **(K.B)**

Ans. **Prefix increment:**

The prefix increment operator increases the value of its operand by one. In prefix increment the ++ precedes its operand. It is donated by as ++a.

Postfix increment:

The postfix increment operator increases the value of its operand by one. In prefix increment the ++ is follows its operand. It is denoted by as a++;

Q.3 **What is decrement operator?**

Ans. Decrement operator:

Decrement operator deceases the value its operand one. It is denoted by --.

For example a-- where a is variable.

There are two types of decrement operator.

• Prefix decrement.

• Postfix decrement.

Q.5 **What is the meant by operator precedence?**

Ans. Operator precedence:

The order of evaluation of operators in an expression is called operator precedence. Different operators have different precedence level. Table below lists the precedence of C operators from highest to lowest.

REVISION LECTURE NOTES
CHAPTER NO.9

(ELEMENTS OF C)

PREVIEW OF TODAY'S TOPIC

G. Expression, Comments

EXPRESSION, COMMENTS

Q.1   Write a note on the following.

Arithmetic Expression

Comment is C.

SHORT QUESTIONS

(i)	**Define expression.**	**(RWP 2022) (SGD 2018) (SGD 2017) (MTN 2018) (K.B)**
(ii)	**What are comments?**	**(LHR 20222) (K.B)**
(iii)	**Write following arithmetic expression in 'C' a(b/3*4-6+7)**	**(U.B)**
(iv)	**Define arithmetic expression.**	**(LHR 2019)(K.B)**
(v)	**What is single line comments?**	**(K.B)**
(vi)	**What is multiple line comments?**	**(K.B)**

EXPRESSION

Expression is the combination of operators and operands. The operand may be a constant or a variable.

For example:

        c = a + b;
        d = 21 + m;

• **Data types of an expression**

The data type of an expression depends on the type of its operands in the expression.

For example: Consider the following expression:

        exp1 operator exp2

If the type of both operands are int the result will be evaluated to an int.

However, in mixed-type expression in which operands are of different for example if one operand is int and other is double then the expression will always have evaluated to double type.

Working with Division Operators

In C language working with division operation is slightly different like other arithmetic operation. for example, the value 9.0/2.0 is 4.5 but 9/2 is 3 its means to get floating point result one floating point number is used in division operation otherwise we will integer value.

COMMENTS:

1) Comments are important part of any program

2) They increase the readability of the source file.

3) The compiler ignores comments, so they do not add to the file size or execution time of the program.

There are two type of comments:

1) Single line comments

2) Multi line comments
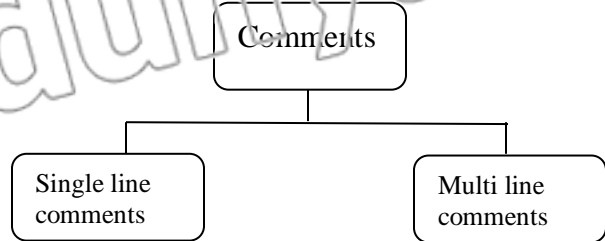
•Single Line comments:

1) To insert single line comments, type two forward slashes at the start of a line.

•For example:

//This program calculate the area of a triangle

//Dated: 12/5/2015

// Assignment # 12

•Multi-line comments:

1) Multi-line comments are used to add informative notes which extend to Multiple line.

2) Multi-line comments can be inserted to the code by placing /* characters at the beginning of comments and */ characters at the end of comments.

•For example:

/*This program calculate the area of a triangle

Dated:12/5/2015

Assignment # 12*/

MULTIPLE CHOICE QUESTIONS

(vii) Expression is a Combination of:

(a) Operators (b) Operands

(c) Comments (d) Both (a) & (b)

(viii) If type of operand is int and the type of operand is double then expression will have evaluated to a:

(a) int type (b) long type

(c) double type (d) float type

(ix) If the type of variable a is int then what will be the output of the expression $a = 5 * 0.5$.

(a) 2 (b) 2.5

(c) 3 (d) None of these

(x) How many types of comments?

(a) 2 (b) 3

(c) 4 (d) 5

(xi) Single line comments can be inserted by using _____.(LHR 2022)

(a) /* (b) //

(c) $ (d) ||

SHORT QUESTIONS

Q.1 Define expression. (RWP 2022) (SGD 2018) (SGD 2017) (MTN 2018) (K.B)

Ans: Expression is the combination of operators and operands. The operand may be a constant or a variable.

For example:

    c = a + b;
d = 21 + m;

Q.2   Define arithmetic expression.   (LHR 2019)(K.B)

Ans: An expression in which only arithmetic operators operate on operands is called arithmetic expression.

For example:

c = m + 5;

Q.3   Write following arithmetic expression in 'C' a(b/3*4-6+7)   (U.B)

Ans: a * b / 3 * 4–6+7

Q.4   What are comments?   (LHR 20222) (K.B)

Ans: Comments are important part of any program. The increase the readability of the source file. The compiler ignore comments, so they do not add to the file size or execution time of   the program.

> **There are two type of comments:**
> **(i)** Single line comments
> **(ii)** multiple line comments

Q.5   What is single line comments?   (K.B)

   To insert single line comments type two forward slashes at the start of the a line.

> **For example:**
> //This program calculate the area of a triangle
> //Dated: 12/5/2015
> // Assignment # 12

Q.6   What is multiple line comments?   (K.B)

Ans: Multiple -line comments are used to add informative notes which extend to multiple line. Multiple line comments can be inserted to the code by placing /* characters at the beginning   of comments and */ characters at the end of comments.

> **For example:**
> /*This program calculate the area of a triangle
> Dated:12/5/2015
> Assignment # 12*/

STUDENTS LEARNING OBJECTIVES (SLOs)
MULTIPLE CHOICE QUESTIONS

Knowledge Based Questions

(i)   The identifier that have special meaning in C language are called:

(a) User defined identifier   (b) Function identifier

(c) Standard identifier   (d) None of these

(ii)   How many keywords in C?

(a) 34   (b) 62

(c) 39   **(d) 32**

(iii) Numeric constant divided into _____ and floating point constant.

(a) Character   (b) String

(c) Integer   (d) Double

(iv) When two small number are manipulated, the result will be represented as zero this phenomenon is called.

(a) Cancellation error   **(b) Arithmetic underflow**

(c) Arithmetic overflow   (d) None of these

(v) Which are used to increase the readability of the program?

(a) Preprocessor   (b) Function

(c) Comments   (d) All of above

Understanding Based Questions

(i) The identifier that is defined by Programmer to store data is called.

(a) Programmer identifier   (b) Standard identifier

(c) User defined identifier   **(d) Both (a) & (c)**

(ii) A variable is declared by specifying its:

(a) Value   (b) Name

(c) Data type   **(d) Both (b) & (c)**

(iii) Which of the following is a valid initializing a variable statement?

(a) a = 10;   (b) int m;

(c) int d = 10;   (d) int p, q;

(iv) Relational operators always evaluate to produce _____ or _____.

(a) True/False   (b) 1/0

(c) 2/4   **(d) Both (a) & (b)**

(v) Which of the following operator has the lowest precedence level?

(a) !   (b) <

(c) &&   **(d) =**

Application Based Questions

(i) If type of operand is int and the type of operand is double then expression will evaluate to a:

(a) int type   (b) long type

(c) double type   (d) float type

(ii) If the type of variable a is int then what will be the output of the expression $a = 5*0.5$.

(a) 2   (b) 2.5

(c) 3   (d) None of these

(iii) If a variable is not initialized it store which data?

(a) Zero   **(b) Garbage**

(c) 1   (d) Nothing

(iv) $a + = b$ is equivalent to:

(a) $b+ = a$ (b) $a = +b$

(c) $a = a + b$ (d) $b = b + a$

(v) C is a strongly typed language, this means that:

(a) Every program must be compiled before execution

(b) Every variable must be declared before it is being used.

(c) The variable declaration also defines the variable

(d) Sufficient data types are available to manipulate each type of data

(vi) **The expression $p - = q$ is equivalent to.**

(a) p = q - p   (b) p = q - 1

(c) p = p - q   (d) q = p - q

(vii) **The number of bytes used by long double data type is:**

(a) 4   (b) 8

(c) 10   (d) 12

SHORT QUESTIONS

Knowledge Based Questions

Q.1   What is identifier?

Ans: The names used to represent variables, constants, types, functions and labels in the program are called identifiers. Identifiers in C can contain any number of characters but only 31 characters are significant to C compiler.

There are two types of identifiers in C.

    i. Standard Identifiers

    ii. User defined Identifiers

Q.2   What are Keywords? Give examples.

Ans: The words which have predefined meaning in C language are called keywords or reserved words.

Example:

    int, void etc.

Q.3   What is variable?

Ans: Variable are the named memory locations which are used to store program input data or computations result during program executions. The value of variable may change during the program execution. The variables are created in RAM.

Q.4   What is long data type.

Ans: The data type long represents larger integers. It takes four bytes in memory and can hold number ranging from -2^{31} through $2^{31}-1$. It means the value from -2147483648 to 2147483647

Q.5   What is the purpose of arithmetic operators?

Ans: Arithmetic operators are used to perform arithmetic operations of data (numbers). Following is the list of arithmetic operators.

Suppose a and b are two integers variables having values 8 and 5 respectively then.

Operation	Symbol	Expression	Evaluation
Addition	+	a + b	13
Subtraction	-	a – b	3
Multiplication	*	a * b	40
Division	/	a / b	1
Modulus(Remainder operator)	%	a % b	3

Understanding Based Questions

Q.1   Why comments are used in C program?

Ans: Comments are important part of any program. The increase the readability of the source file. The compiler ignores comments, so they do not add to the file size or execution time of   the program.

      There are two type of comments:

      (i) Single line comments

      (ii) multiple line comments

Q.2   Write the difference between declaring and defining a variable.

Ans: In a C program variable declaration tells the compiler the name of the variable to be used in the program and the type of data stored in it.

Example:

      (i) float area;

      (ii) int mark;

      A variable declaration does not set aside memory location for the data to be stored. While the definition of the variable that set aside the memory location for the variable.

Q.3   Differentiate between "area" and "Area" in C language.

      Ans: Both are different variables

Q.4 Differentiate between z = 'a' and z = a.

Ans: z = 'a' means assign character a to variale z

      z = a means assigns the value of a to variable z

Q.5   What happens when arithmetic over flow and arithmetic under flow occurs?

Ans: When two very small numbers are manipulated, the result may be too small to be represented accurately, so it will be represented as zero. This phenomenon is called arithmetic underflow.

      Similarly, manipulation of two very large numbers may result to a too large number to be represented. This phenomenon is call a arithmetic overflow.

Application Based Questions

Q.1   Write the output of the following code.

      int x = 9;

      x = x% 4;

      printf ("\n %d is result ", x);

Ans: 1 is result

Q.2   Trace the output of the following C program.

main()

```
    {
    int a,b;
    a = 77;
    b = 40;
    a + = b;
    printf(" a = %d", a);
    }
```

Ans: Output: a = 117

Q.3   Trace the error in the following code.

Int x=10   y=15;

x=x++

y=++y;

printf("%d%d", x,y)

Ans: Syntax error at first line i.e. int x=10, y=15;

Statement termination symbol missing i.e. x=x++:

Statement termination symbol missing i.e. printf("%d%d", x, y);

Q.4   Find the errors in the following code.

```
{
int n = 0 ;
n + + ,
Print f (" % d, n) ;
}
```

Ans: statement termination symbol is missing i.e. n++;

Syntax error at line i.e. printf("%d", n);