Chapter 2: Instructions & Operators

A C program is a set of Instructions. Just like a recipe which contains Instructions to prepare a particular dish.

\t → New tab

Date
Page

Types of Instructions

1) Type declaration Instruction
2) Arithmetic Instruction
3) Control Instruction

Type declaration Instruction

```
int a;
float b;
```

Other Variation:

```
int i=10; int j=i; int a=z
int j=a+j-i;
```

✓ Order should be correct

```
float b = a+3;
float a=1.1;
```

✗ First value of a should be specified

```
int a, b, c, d;
a=b=c=d=30;
```

⇒ value of a, b, c & d will be 30 each.

Arithmetic Instructions

```
int i = (3*2) +1
```

Operators

Operands

Operands can be int / float etc.
+ - * are arithmetic operators

```
int b=2, c=3;
int z; z=b*c;   ✓ Legal
int z; b*c=z;   ✗ Not allowed
```

%

Modular Division Operator (%)

→ Returns the remainder
→ Cannot be applied on float
→ Sign is same as of numerator (-5%2 = -1)

5%2=1 -5%2=-1

Note:-

1) No operator can be assumed to be present

```
int i=ab     → Invalid
int i=a*b    → Valid
```

2) There is no operator to perform exponentiation in C.
However we can use pow(x,y) from <math.h>

Type Conversion

In arithmetic operation

int and int → int
int and Float → Float

Float & Float → Float

5/2 → 2 5.0/2 → 2.5 } important

2/5 → 0 2.0/5 → 0.4 }

Note:-
Int a = 3.5; In this case 3.5 (float) will be demoted to 3 (int) because a is not able to store 5 floats

float a = 8; a will store 8.0
8 → 8.0 (promotion to float)

Operator precedence in C

3*x - 8*y is (3x) - (8y) or 3(x - 8y)

In C language simple mathematical rules like BODMAS, no longer applicable

The answer to this question is provided by operator precedence & associativity

Operator precedence

Priority	Operators
1st	* / %
2nd	+ -
3rd	=

Operators of higher priority are evaluated first in the absence of parentheses

Date
Page

Operator Associativity

When operators of equal priority are present in an expression, the tie is taken care of by associativity.

$x * y / z \Rightarrow (x * y) / z$

$x / y * z \Rightarrow (x / y) * z$

*, / follows left to right associativity

Control Instructions

Determines the flow of control in a program, four types of control instructions in C are:

→ Sequence control instruction
→ Decision control instruction
→ Loop control instruction
→ Case control instruction

Practice Problems

Q1 Which of the following is invalid in C?

(i) `int a; b=a;`

(ii) `int V = 3 ^ 3;`

(iii) `char dt = '21 Dec 2020';`

Date
Page

~~Code:~~ Ans: (i) int a; b=a;
↗ ✗
Invalid

∴ int a; int b=a; → Valid ✓

(ii) int v = 3^3
This is valid but won't ~~return~~ print 9

(iii) Invalid

Q2 What data type will 3.0/8 - 2 return?

-1.625

A real no. is obtained & Data type is double

Q3 Write a program to check whether a number is divisible by 97 or not?

Code

```
#include <stdio.h>

int main()
{
    int num;
    printf("Enter the number \n");
    scanf("%d", &num);
    printf("Divisibility test returns: %d\n",
           num%97);

    return 0;
}
```

Ans:

Enter the number

☐ for eg: 111

Divisibility test returns: ☐ 14

Q.4 Explain step by step evaluation of

$3*x/y - z + k$, where $x=2, y=3, z=3, k=1$

Code:

```
#include <stdio.h>

int main()
{
    int x=2, y=2, z=3, k=1;
    int result = 3*x/y-z+k;
    printf("The value of result is %d", result);
    return 0;
}
```

Ans:

The value of result is 0

Q.5 3.0+1 will be:

(a) Integers

(b) Floating point numbers

(c) Characters

∴ Float + Int = Float