

CS & IT ENGINEERING

C Programming

Practice Session

Lecture No.- 01



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Recap of Previous Lecture



- Iterative Control statements

- do-while loop

- while loop

- for loop

- PYQ Practice



Topics to be Covered



- Jumping statements
- PYQ (GATE, ISRO, NIELIT...)





Topic : Jumping Statements



- 1) break : It Cause Control to go out of block. (Top to bottom) ↓
 - 2) Continue : It Cause Control to go to beginning of block (bottom to top) ↑
 - 3) goto : It Causes Control to move in both Directions. ⇕ ⇒ Bi-directional Control Stmt.
 - 4) return : It is Used in functions to return Value & Control to Caller function.
- } Uni-directional Control stmts


$$\begin{array}{r} 0 \\ 4 \overline{) 10} \\ \underline{8} \\ 20 \end{array}$$

$i=1$ $k=10$ $\frac{1==3}{\text{false}}$ $\frac{1 \neq 4}{\text{True}}$
 $F \vee T == \text{True}$

O/P: No output



Topic : Jumping Statements



Continue

```
void main()
{
    int i;
    for(i=1; i<=10; i+=2)
    {
        if((i==3) || (i/4==1))
            continue;
        printf("%d", i);
    }
}
```

o/p: 7

Execution trace for the 'Continue' statement:

- $i=1$: $1 \leq 10$ True, $\frac{1==3}{\text{False}} || \frac{1/4==1}{\text{True}} \Rightarrow \text{True}$ Continue
- $i=3$: $3 \leq 10$ True, $\frac{(3==3)}{\text{True}} || \frac{(3/4==1)}{\text{False}} \Rightarrow \text{True}$ Continue
- $i=5$: $5 \leq 10$ True, $\frac{(5==3)}{\text{F}} || \frac{(5/4==1)}{\text{T}} \Rightarrow \text{True}$ Continue
- $i=7$: $7 \leq 10$ True, $\frac{(7==3)}{\text{F}} || \frac{(7/4==1)}{\text{F}} \Rightarrow \text{False}$ Print 7
- $i=9$: $9 \leq 10$ True, $\frac{(9==3)}{\text{F}} || \frac{(9/4==1)}{\text{T}} \Rightarrow \text{True}$ Continue
- $i=11$: $11 \leq 10$ False.



Topic : Jumping Statements



goto Example

Syntax:

goto label;
Any valid identifier

j xyz...-10

```
void main()
{
    int i, j=1;
    scanf("%d", &i);

    xyz: printf("%d * %d = %d\n", i, j, (i*j));
        if (j < 10)
        {
            j++;
            goto xyz;
        }
}
```

Diagram showing a loop: An arrow from the 'goto xyz;' statement points back to the 'xyz:' label, indicating a jump to the start of the loop body.

input $\leftarrow 7 \Rightarrow i=7$

$$7 * 1 = 7$$

$$7 * 2 = 14$$

$$7 * 3 = 21$$

$$7 * 4 = 28$$

$$7 * 5 = 35$$

$$7 * 6 = 42$$

$$7 * 7 = 49$$

$$7 * 8 = 56$$

$$7 * 9 = 63$$

$$7 * 10 = 70$$



Topic : Practice Session



$$i = 15 \Rightarrow num \ll i = 2 \ll 15 = 2 \times 2^{15} = 2^{16} = 65536$$

+ve whole number = 65536

#Q. What does the following program do when the input is unsigned 16 bit integer?

```
#include<stdio.h>
```

```
main(){
```

```
    unsigned int num;
```

```
    int i;
```

```
    scanf("%u", &num);
```

```
    for(i=0;i<16;i++){
```

```
        printf("%d", (num<<i&(1<<15)) ? 1:0);
```

```
    }
```

```
}
```

A. It prints all even bits from num

B. It prints all odd bits from num

☒ C. It prints binary equivalent of num

D. None of above

op: 0000 0000 0000 0010

$$A \ll n \Rightarrow A * 2^n$$

$$i=0$$

$$2 \ll 0 \Rightarrow 2 * 2^0 = 2 * 1 = 2$$

$$2 * 2^2 = 8$$

$$32768$$

$$i=0$$

$$1000 \ 0000 \ 0000 \ 0000$$

$$i=1$$

$$1000 \ 0000 \ 0000 \ 0000$$

$$i=2$$

$$1000 \ 0000 \ 0000 \ 0000$$

$$i=15$$

$$1000 \ 0000 \ 0000 \ 0000$$

$$10000 \ 0000 \ 0000 \ 0000$$

$$000000 \ 000000 = 0$$

$$0000 \ 0000 \ 0000 \ 0010 (2) = 6$$

$$0000 \ 0000 \ 0000 \ 0100 (4) = 6$$

$$0000 \ 0000 \ 0000 \ 1000 (8) = 6$$

$$(16)$$

$$(32)$$

$$(64)$$

$$(128)$$

$$(256)$$

$$(512)$$

$$(1024)$$

$$32768 = 1$$



Topic : Practice Session



#Q. Consider the following C program, It produces _____

```
main()
{
    float sum=0.0, j=1.0, i=2.0;
    while(i/j > 0.001){
        j=j+1;
        sum=sum+i/j;
        printf("%f/n", sum);
    }
}
```

- A. 0 – 9 lines of output
- B. 10 – 19 lines of output
- C. 20 – 29 lines of output
- ✓ D. More than 29 lines of output

$$\frac{2.0}{j} == 10^{-3}$$

$$\Rightarrow j = 2.0 \times 10^3 = 2000.00$$

$$\frac{i}{j} : 2.0/1.0 = 2.0 > 0.001$$

Print

$$2.0/2.0 = 1.0 > 0.001$$

Print

$$2.0/3.0 = 0.66 > 0.001$$

Print

$$\frac{2.0}{j} = 0.001$$

$$\Rightarrow j = \frac{2.0}{0.001} = \frac{2.0}{1 \times 10^{-3}}$$

$$= 2.0 \times 10^3$$

$$= 2.0 \times 1000$$

$$= 2000.00$$

1998 lines of output

$$j=1.0$$

$$j=2.0$$

$$j=3.0$$

$$j=4.0$$

1999 Increments

1998 True

last 1999th loop False.

$$j = 2000.000 \text{ False}$$



Topic : Practice Session

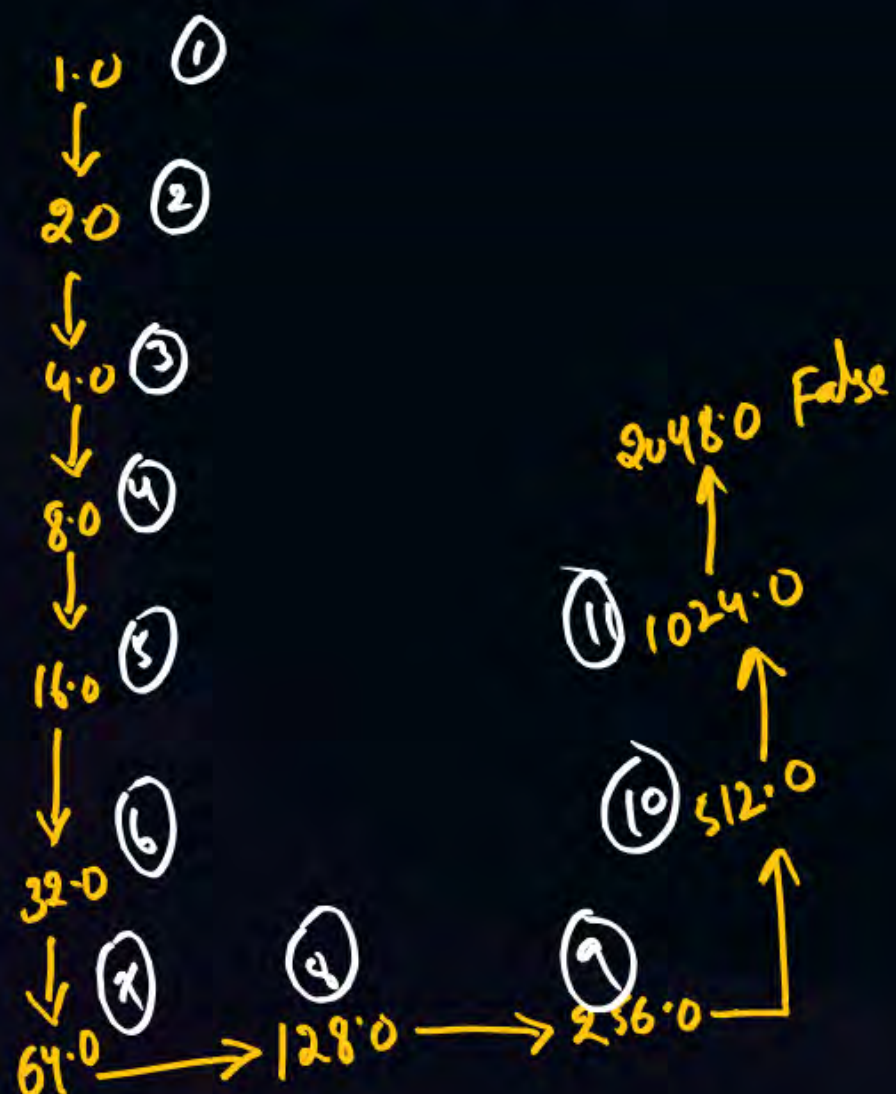


#Q. How many lines of output does the following C code produce?

```
float i=2.0;
float j=1.0;
float sum = 0.0;
main(){
    while (i/j > 0.001) {
        j+=j;
        sum=sum+(i/j);
        printf("%f\n", sum);
    }
}
```

- A. 8 C. 9
B. 10 ~~D. 11~~

From $j=1.0$ Till $j \geq 2000.0$
Condition will be True





Topic : Practice Session



#Q. What is the output of the following C program?

Shift (Bitwise operator)

```
#include<stdio.h>
```

```
void main(void){
```

```
    int shifty;
```

```
    shifty=0570;
```

```
    shifty=shifty>>4;
```

```
    shifty=shifty<<6;
```

```
    printf("The value of shifty is %o\n",shifty);
```

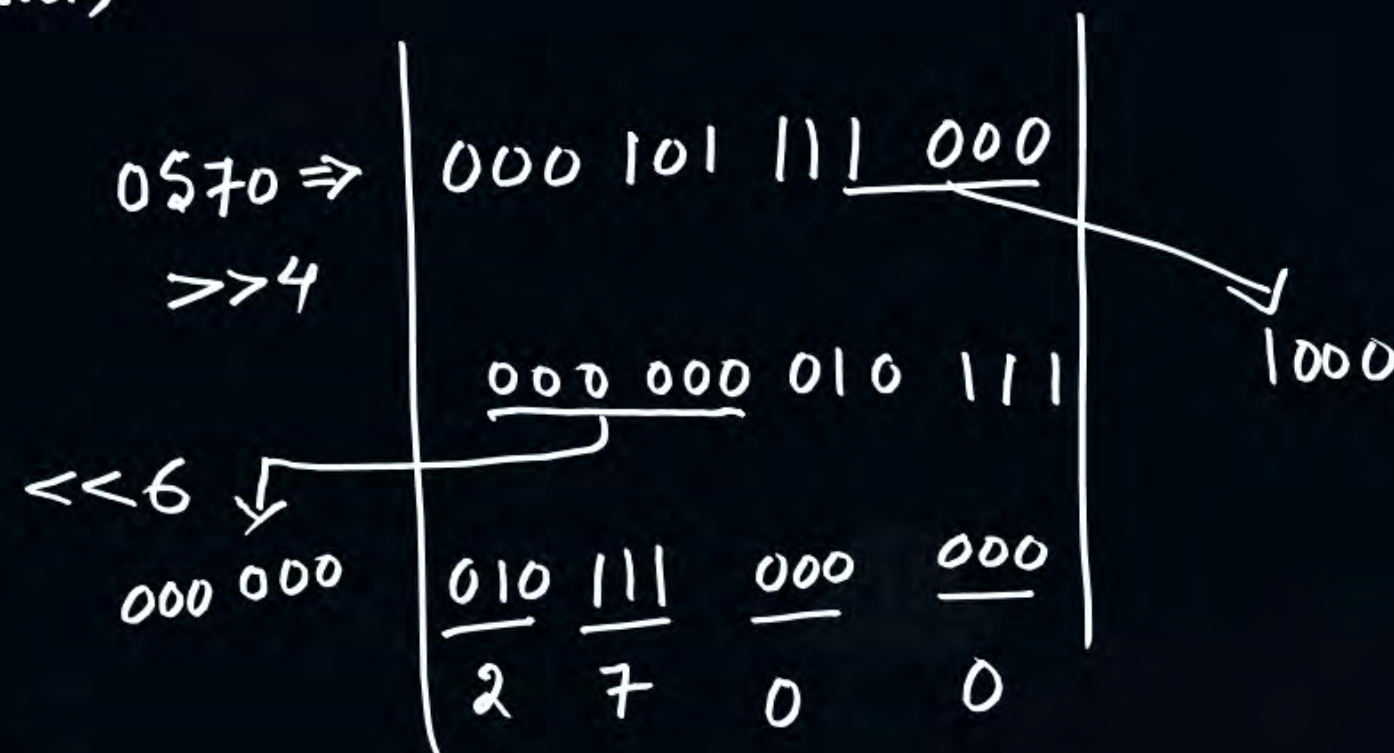
```
}
```

A. The value of shifty is 15c0

B. The value of shifty is 4300

C. The value of shifty is 5700

D. The value of shifty is 2700





Topic : Practice Session



#Q. The for loop

```
for (i=0; i<10; ++i)  
printf("%d", i&1);
```

prints

i =	0	1	2	3	4	5	6	7	8	9
i & 1 =	0	1	0	1	0	1	0	1	0	1

A. 0101010101

B. 0111111111

C. 0000000000

D. 1111111111

$$\begin{array}{r} X = \text{xxxx xxxx xxxx xxx} \\ 1 = 0000 0000 0000 0001 \\ \hline 0000 0000 0000 0001 \end{array}$$

LSB 1 For odd numbers
LSB 0 For Even numbers



Topic : Practice Session

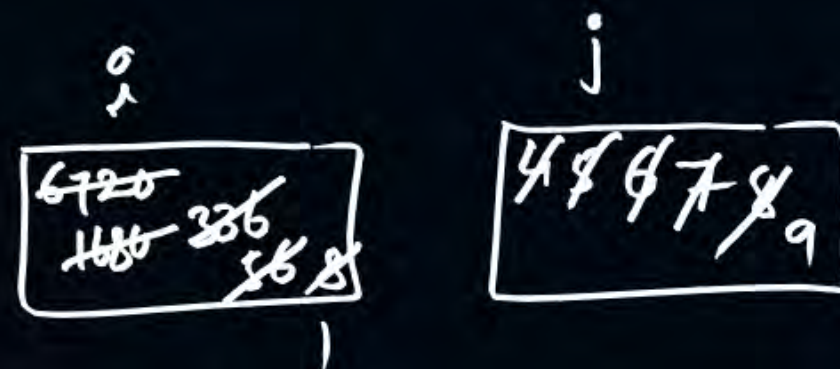


#Q. Consider the following program fragment

```
i=6720; j=4;  
while (i%j)==0  
{  
    i=i/j;  
    j=j+1;  
}
```

On termination, j will have the value

- A. 4
- B. 8
- ☒ C. 9
- D. 6720



$$i=6720, j=4 \Rightarrow 6720 \div 4 = 0 \text{ True}$$

$$i=1680, j=5$$

$$1680 \div 5 \neq 0 \text{ True}$$

$$i=336, j=6$$

$$336 \div 6 = 0 \text{ True}$$

$$i=56, j=7$$

$$56 \div 7 = 0 \text{ True}$$

$$i=8, j=8$$

$$8 \div 8 = 0 \text{ True}$$

$$i=1, j=9$$

$$1 \div 9 \neq 0$$

False

$$9 \overline{) 0} = \text{Remainder}$$



Topic : Practice Session



#Q. Consider the following C function definition

```
int f (int x, int y) {
    for (int i = 0; i < y; i++) {
        x = x + x + y;
    }
    return x;
}
```

- A) $i < 10$ 10 times $\Rightarrow 2^{10} \times 20 + (y)$
- B) $i < 20$ 20 times $\Rightarrow 2^{20} \times 20 + (y)$
- C) $i < 10$ 10 times $\Rightarrow 2^{10} \times 20 + (y)$
- D) $i < 20$ 20 times $\Rightarrow 2^{20} \times 10 + (y)$

$$x = x + x + (y) \text{ ignore}$$

$$\text{1st} \Rightarrow x = 2x \Rightarrow 2^1 \times x$$

$$\text{2nd} \Rightarrow x = 2(2x) \Rightarrow 2^2 \times x$$

Which of the following statements is/are TRUE about the above function?

- (A) If the inputs are $x = 20$, $y = 10$, then the return value is greater than 2^{20} ✗
- (B) If the inputs are $x = 20$, $y = 20$, then the return value is greater than 2^{20} ✓
- (C) If the inputs are $x = 20$, $y = 10$, then the return value is less than 2^{10} ✗
- (D) If the inputs are $x = 10$, $y = 20$, then the return value is greater than 2^{20} ✓

MSQ, GATE 2024 SET-1



#Q. The following function computes XY for positive integers X and Y .

GATE 2016

```
int exp(int X, int Y) {  
    int res = 1, a = X, b = Y;  
    while ( b != 0 ) {  
        if ( b%2 == 0 ) {  
            a = a*a;  
            b = b/2;    }  
        else {  
            res = res*a;  
            b = b-1;    }  
    }  
    return res;  
}
```

H/W

(A) $X^Y = a^b$

(B) $(res * a)^Y = (res * X)^b$

(C) $X^Y = res * a^b$

(D) $X^Y = (res * a)^b$

Which one of the following conditions is TRUE before every iteration of the loop



#Q. Consider the following C program

GATE 2004

H/W

```
main() {  
    int x, y, m, n;  
    scanf ("%d %d", &x, &y);  
    /* Assume x > 0 and y > 0 */  
    m = x;  
    n = y;  
    while (m != n) {  
        if (m > n)  
            m = m - n;  
        else  
            n = n - m;  
    }  
    printf ("%d", n);  
}
```

The program computes

- (A) $x \div y$ using repeated subtraction
- (B) $x \bmod y$ using repeated subtraction
- (C) the greatest common divisor of x and y
- (D) the least common multiple of x and y



H/W

#Q. What will be the output of the following C code?

```
#include <stdio.h>
main() {
    int i;
    for(i=0;i<5;i++) {
        int i=10;
        printf("%d" , i);
        i++;
    }
    return 0;
}
```

- A. 10 11 12 13 14
- B. 10 10 10 10 10
- C. 0 1 2 3 4
- D. Compilation error



2 mins Summary



- Jumping statements
- PYQ Practice



THANK - YOU