CS & IT ENGINEERING

[redacted]

'C' PROGRAMMING

Practice Session

Lecture No.- 02

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Recap of Previous Lecture

- Macro Substitution as function
- Conditional Compilation Directives
- File Handling

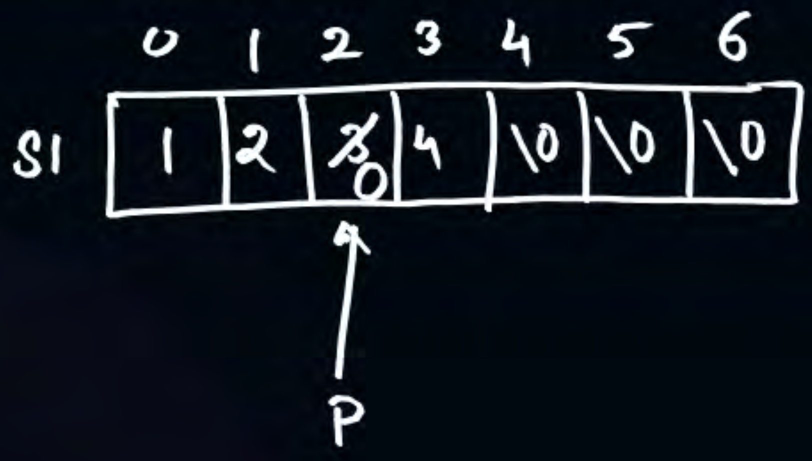
Topics to be Covered

: Practice Session - GATE 2015

Topic : Practice Session - GATE 2015

#Q. Consider the following C program segment.

```
# include <stdio.h>
int main()
{
char s1[7] = "1234", *p;
p = s1 + 2;
*p = '0';
printf("%s", s1);
}
```



	0	1	2	3	4	5	6
s1	1	2	~~3~~ 0	4	\0	\0	\0

What will be printed by the program?

A. 12

B. 120400

C. 1204 ✓

D. 1034

Topic : Practice Session – GATE 2021

#Q. Consider the following program.

```
#include <stdio.h>
int main()
{
int arr[4][5];
int i, j;
for (i=0; i<4; i++) {
for (j=0; j<5; j++) {
arr[i][j] = 10 * i + j;
}
}
printf("%d", *(arr[1]+9));
return 0;
}
```

What is the output of the above program?

A. 14

B. 20

C. 24 ✓

D. 30

arr	j= 0	1	2	3	4
i= 0	0 $\boxed{0}$	1 $\boxed{4}$	2 $\boxed{8}$	3 $\boxed{12}$	4 $\boxed{16}$
1	10 $\boxed{20}$	11 $\boxed{24}$	12 $\boxed{28}$	13 $\boxed{32}$	14 $\boxed{36}$
2	20 $\boxed{40}$	21 $\boxed{44}$	22 $\boxed{48}$	23 $\boxed{52}$	24 $\boxed{56}$ ✓
3	30 $\boxed{60}$	31 $\boxed{64}$	32 $\boxed{68}$	33 $\boxed{72}$	34 $\boxed{76}$

Row 1

Row1 + 9*4 (scale factor)

$20 + 9 \times 4 = 20 + 36$

$= 56$

*(56) Value at address 56

Topic : Practice Session – GATE 2004

#Q. there is blank an in the program which indicates some missing statements. Choose the correct option to replace in the program. To Print Transpose of a Matrix

```
#include<stdio.h>
#define ROW 4
#define COL 4
int M[ROW][COL] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16};
main(){
int i, j, t;
for (i = 0; i < 4; ++i)
{
X
}
for (i = 0; i < 4; ++i)
for (j = 0; j < 4; ++j)
printf ("%d", M[i][j]);
}
```

Topic : Practice Session

$(M^T)^T = M$

```
A. for(j = 0; j < 4; ++j){
t = M[i][j]; =7
M[i][j] = M[j][i];
M[j][i] = t;
}
```

$t = M[1][0] \quad t = 2$

$M[1][0] = M[0][1]$

$M[0][1] = 2$

$$\begin{array}{c|cccc} & j=0 & 1 & 2 & 3 \\ \hline i=0 & 1 & \cancel{5}2 & \cancel{9}3 & \cancel{13}4 \\ i=1 & \cancel{2}5 & 6 & \cancel{10}7 & \cancel{14}8 \\ i=2 & \cancel{3}9 & \cancel{7}10 & 11 & \cancel{15}12 \\ i=3 & \cancel{4}13 & \cancel{8}14 & \cancel{12}15 & 16 \end{array}$$

```
B. for(j = 0; j < 4; ++j){
M[i][j] = t;
t = M[j][i];
M[j][i] = M[i][j];
}
```

$$M = \begin{array}{c|cccc} & 0 & 1 & 2 & 3 \\ \hline 0 & 1 & 2 & 3 & 4 \\ 1 & 5 & 6 & 7 & 8 \\ 2 & 9 & 10 & 11 & 12 \\ 3 & 13 & 14 & 15 & 16 \end{array} \Rightarrow M^T = \begin{bmatrix} 1 & 5 & 9 & 13 \\ 2 & 6 & 10 & 14 \\ 3 & 7 & 11 & 15 \\ 4 & 8 & 12 & 16 \end{bmatrix}$$

```
C. for(j = i; j < 4; ++j){
t = M[i][j];
M[i][j] = M[j][i];
M[j][i] = t;
}
```

i=0	j=0, 1, 2, 3
i=1	j=1, 2, 3
i=2	j= 2, 3
i=3	j=3

```
D. for(j = i; j < 4; ++j){
M[i][j] = t;
t = M[j][i];
M[j][i] = M[i][j]; }
```

Topic : Practice Session – GATE 2008

#Q. What is the output printed by the following C code?

```
# include <stdio.h>
int main ()
{
char a [6] = "world";
int i, j;
for (i = 0, j = 5; i < j; a [i++] = a [j--]);
printf ("%s\n", a);
}
```

⇒ Empty Loop

	0	1	2	3	4	5
a	~~w~~	~~o~~	~~r~~	l	d	\0
	\0	d	l			

First char is NULL

$i = \cancel{0}\,\cancel{1}\,\cancel{2}\,3, \quad j = \cancel{5}\,\cancel{4}\,\cancel{3}\,2$

0<5 True

a [0] = a [5]

1<4 True

a [1] = a [4]

2<3 True

a [2] = a [3]

3<2 False

$\boxed{\text{Nothing Printed}}$

A. dlrow

B. Null string ✓

C. dlrld

D. worow

Topic : Practice Session – GATE 2008

#Q. Consider the C program given below. What does it print?

```
#include <stdio.h>
int main () {
int i, j;
int a [8] = {1, 2, 3, 4, 5, 6, 7, 8};
for(i = 0; i < 3; i++) {
a[i] = a[i] + 1;
i++;                    }
i--;
for (j = 7; j > 4; j--) {
int i = j/2;
a[i] = a[i] - 1;        }
printf ("%d, %d", i, a[i]);
}
```

A. 2, 3

B. 2, 4

C. 3, 2 ✓

D. 3, 3

	0	1	2	3	4	5	6	7
a	~~1~~	2	~~3~~	~~4~~	5	6	7	8
	2		~~4~~ 3	~~3~~ 2				

i: ~~0~~ ~~1~~ ~~2~~ ~~3~~ ~~4~~ 3

0<3 True
a[0]=a[0]+1
a[0]=1+1=2
i=1, i=2

2<3 True
a[2]=a[2]+1
=3+1
a[2]=4
i=3, i=4

4<3 False

i=3

i: ~~3~~ ~~3~~ 2

j=7 7>4 True
int i=7/2=3
a[3]=a[3]-1
=4-1=3
j=6

6>4 True
i=6/2=3
a[3]=a[3]-1
=3-1
a[3]=2
j=5

5>4 True
i=5/2=2
a[2]=a[2]-1
=4-1
a[2]=3
j=4

4>4 False

3 a[3]

3,2

Topic : Practice Session – GATE 2008

#Q. C program is given below:

```
# include <stdio.h>
int main ()
{
int i, j;
char a [2] [3] = {{'a', 'b', 'c'}, {'d', 'e', 'f'}};
char b [3] [2];
char *p = *b;
for (i = 0; i < 2; i++) {
for (j = 0; j < 3; j++) {
*(p + 2*j + i) = a [i] [j];
}
}
}
```

What should be the contents of the array b at the end of the program?

a	0	1	2
0	a	b	c
1	d	e	f

A.
a b
c d
e f

B.✓
a d
b e
c f

C.
a c
e b
d f

D.
a e
d c
b f

$i=0$ $\quad j=0$ $\quad *(p+0+0) = *(p) = a[0][0]$

$j=1$ $\quad *(p+2+0) = *(p+2) = a[0][1]$

$j=2$ $\quad *(p+4+0) = a[0][2] \Rightarrow$

$i=1$ $\quad j=0$ $\quad *(p+0+1) = *(p+1) = a[1][0]$

$j=1$ $\quad *(p+2+1) = *(p+3) = a[1][1]$

$j=2$ $\quad *(p+4+1) = *(p+5) = a[1][2]$

p → b

b	0	1
0	a p+0	d p+1
1	b p+2	e p+3
2	c p+4	f p+5

Topic : Practice Session – GATE 2017

#Q. Consider the following snippet of a C program. Assume that swap (&x, &y)exchanges the content of x and y :

```
int main () {
int array[] = {3, 5, 1, 4, 6, 2};
int done =0;
int i;
while (done==0) {
done =1;✓
for (i=0; i<=4; i++) {
if (array[i] < array[i+1]) {
swap(&array[i], &array[i+1]);
done=0;
} //End of if
} // End of for
```

int done = ~~0~~; ~~0~~ ~~0~~ 1

0	1	2	3	4	5
~~3~~	~~5~~	~~1~~	~~4~~	~~6~~	~~2~~
~~5~~	~~3~~	~~4~~	~~1~~	~~1~~	1
6	~~6~~	~~6~~	~~6~~	2	
	5	~~3~~	~~4~~		
		4	3		

3rd while

done = 1

for( ) No change

for( ) No change

i=0 a[0]<a[1] 3<5 True Swap

i=1 a[1]<a[2] 3<1 False

i=2 a[2]<a[3] 1<4 True swap

i=3 a[3]<a[4] 1<6 True

i=4 a[4]<a[5] Swap Swap

2nd iteration of while

2nd for Execution

a[i]<a[i+1]

False

i=2 a[2]<a[3] True

```
for (i=5; i>=1; i--) {
if (array[i] > array[i-1]) {
swap(&array[i], &array[i-1]);
done =0;
} // End of if
} // End of for
} // End of while
printf("%d", array[3]);
}
```

2nd while

for( ) No change.

i=5 a[5]>a[4] 1>2 F

i=4 a[4]>a[3] 2>6 F

i=3 a[3]>a[2] 6>4 True. Swap

i=2 a[2]>a[1] 6>3 True, Swap

i=1 a[1]>a[0] 6>5 True, Swap

done=0

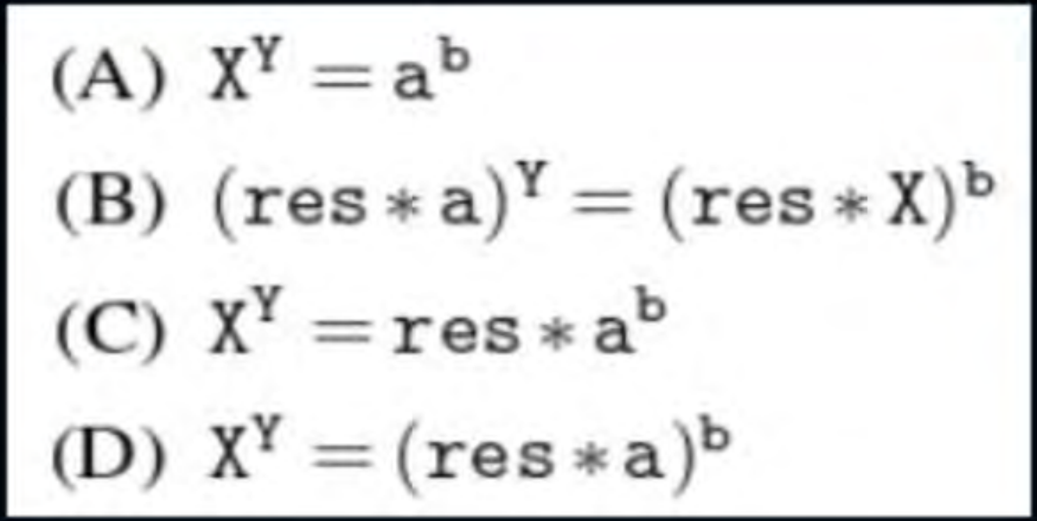
The output of the program is 3

Topic : Practice Session – GATE 2016

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

H/W

```
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;
}
```



(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

Topic : Practice Session – GATE 2004

#Q. Consider the following C program

HW

```
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;    }
    print f ("% d", n);
}
```

The program computes

(A) x ÷ y using repeated subtraction

(B) x mod y using repeated subtraction

(C) the greatest common divisor of x and y

(D) the least common multiple of x and y

Topic : Practice Session – GATE 2001

#Q. What is printed by the print statements in the program assuming call by reference parameter passing?

H/W

```
Program P1() {
x = 10;
y = 3;
func1(y,x,x);
print x;
print y;  }
func1(x,y,z) {
y = y + 4;
z = x + y + z }
```

A. 10, 3

B. 31, 3

C. 27, 7

D. None of the above

Topic : Practice Session – GATE 2001

#Q. The following program fragment is written in a programming language that allows global variables and does not allow nested declarations of functions.

HW

```
global int i=100, j=5;
void P(x) {
int i=10;
print(x+10);
i=200;
j=20;
print (x);
}
main() {P(i+j);}
```

If the programming language uses static scoping and call by need parameter passing mechanism, the values printed by the above program are:

A. 115, 220

B. 25, 220

C. 25, 15

D. 115, 105

2 mins Summary

Practice Session - GATE 2015

THANK - YOU