MINOR ASSIGNMENT-05

Practical Programming with C (CSE 3544)

Publish on: 06-12-2024 Course Outcome: CO₂

Program Outcome: PO3

Submission on: 08-12-2024 Learning Level: L₄

Problem Statement:

Experiment with pointers and dynamic memory allocation in C.

Assignment Objectives:

To learn how to manipulate arrays using pointers and to learn malloc, mcalloc, realloc & free to allocate and free dynamic memory.

Answer the followings:

1. Consider the following ANSI C program;

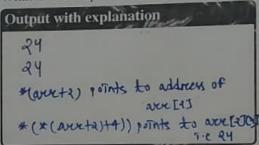
```
#include<stdio.h>
int main() {
  int arr[4][5],i,j;
  for(i=0;i<4;i++) {
    for(j=0;j<5;j++) (
        arr[i][j]=10*i+j;
    })
    printf("%d\n",arr[2][4]);
    printf("%d\n",*(*(arr+2)+4));
    return 0;}</pre>
```

2. Consider the following ANSI C program;

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

3. Consider the following C program

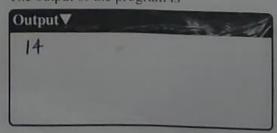
What is the output of the above program?



[GATE 2021] What is the output of the above program?

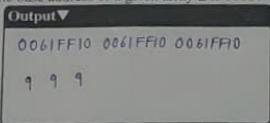
[GATE 2020]

The output of the program is



4. Write the output of the following program? Assume that the base address of a given array a is 1000?

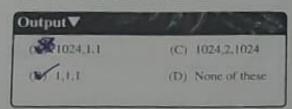
```
int main() {
  int a[3][3]=(4,5,6,7,8,9,1,2,3);
  printf("%p %p %p\n",a[1]+2,*(a+1)+2,6a[1][2])
  ;
  printf("%d %d %d\n",*(a[1]+2),*(*(a+1)+2), a
    [1][2]);
  return 0;
}
```



5. Select the output of the following program.

```
int main() {
  int a[][3]=(4,5,6,7,8,9,1,2,3);
  printf("%d,", *a[2]);
  printf("%d,", a[2][0]);
  printf("%d ", **(a+1+('b'-'a')));
  return 0;
}
```

ASCII value of a=97 and b=98



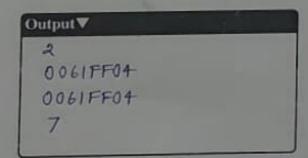
6. Find the output of the code snippet.

```
int main() {
  int a[][2][4]={5,6,7,8,9,11,12,1};
  printf("%d\n",*(*(*(a+0)+1)+2));
  return 0;
}
```

Output V

7. Describe the output for the following code snippet.

```
void fun(int arr[][3])(
  printf("%d\n",*(*(arr+2)+1));
  printf("%p\n",(*arr)+2);
  printf("%p\n",&arr[0][2]);
  printf("%d\n",*(((*arr)+1)+1));
}
int main()(
  int a[][3]=(5,6,7,8,9,4,3,2,1);
  fun(a);
  return 0;
}
```



8. Explain the below declaration(s).

```
(1) int process(int (*pf) (int a, int b));
(2) int (*fun(int, void (*ptr)()))();
(3) int *(*p) (int (*a)[]);
(4) int (*p)[10];
(5) float *p[20];
(6) int p(char *a);
(7) int (*p(char * a))[10];
(8) int * (*p [10]) (char *a);
```

Output♥

- 1) Pf is a pointere to function, intasint b are orguments.
- 2) fun is a function (it also acts a pointer to it), int and ptre are arguments.
- 3) P TE a printer to a function that takes a printer to an average of Tritegers
- 4) 9 Ts a grither to an away of 10 integers.
- 5) p is a pointer to 20 floats.
- 6) P is a function that takes a printer to char and returns int.
- 7) P TS a function that takes pointers to share and recturent a pointers to an averag of 10 integers.
- 8) p TE an average of 10 pointeres to functions.
- 9. What is printed by the following ANSI C program?

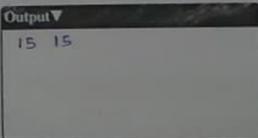
#include<stdio.h> int main (void) { int x = 1, $z[2] = \{10, 11\}$; int *p = NULL; p = 5x; •p = 10; p = &z[1]; *(6z[0] + 1) += 3; printf("%d, %d, %d\n", x, z[0], z[1]); return 0;)

[GATE 2022]

Output with explanation (C) 10, 14, 11 (A) 1, 10, 11 (\$0, 10, 10, 14 (B) 1 10, 14 * , prints to 7[1] (11)

Find the output and different types of pointer involved in the code snippet;

```
int main()(int *p=NULL;
 p=(int *)malloc(sizeof(int));
  *p=10;
  free(p);
 int .q;
 q=(int *)malloc(sizeof(int));
  *q=15;
 printf("%d %d\n", *p, *q);
  return 0; )
```



11. State the output of the following program. Assume the address of p is 1000 and q is 2000.

```
#include<stdio.h>
#include<stdib,h>
void fun(int **q);
int main() {
  int *p=(int *)malloc(sizeof(int));
  *p=55;
  fun(&p);
  printf("%d %p\n",*p,p);
  return 0;
```

```
void fun(int **q)(
   int r=20;
   **q=r;
   printf("*p\n",*q);
}
```

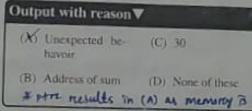
Output ▼

00 BA1518

20 00BA1598

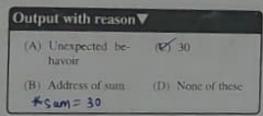
12. Select the desire output of the following code snippet with reason:

```
int *fun();
int main(void)(
  int a=10,b=20;
  int *ptr;
  int sum=0;
  ptr=fun();
  printf("%d\n",*ptr);
  return ∑
  return 0;
}
```



not referenced

13. Select the desire output of the following code snippet with reason;



14. Find the output of the following program.

```
int main()(int *ptr;
ptr=(int *)realloc(NULL, sizeof(int));
*ptr=100;
printf("%d\n", *ptr);
return 0;)
```

Output▼ 100

15. Write the output of the following program.

```
int main() (int *ptr;
ptr=(int *)calloc(1, sizeof(int));

*ptr=100;
printf("%d\n", *ptr);
ptr=(int *)realloc(ptr,0);
ptr=NULL;
printf("%p\n", ptr);
return 0;
}
```

```
Output V

Output at line-4: 100

Output at line-7: 000 000 00

Line number-6 can be treated as like free () to deallocate memory-YIN.
```

16. Consider the following code segment;

```
int main()(int b=65;
void p=b;
printf("%d",p);return 0;)
```

```
Observation V
variable can't be declared void
```

17. Select the output of the following program.

```
int main() {
  int b=65;
  void *p=6b;
  int *j=(int *)p;
  char *ch=(char *)p;
  printf("%d %c\n",*j,*ch);
  return 0;
}
```

```
Output V

(A) 65 65

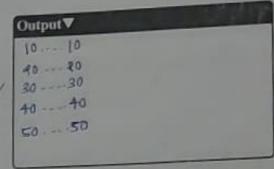
(C) Compile time error

(B) 65 A

(D) Run time error
```

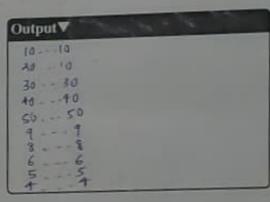
18. Write the output of the code snippet. Also show the stack and heap memory for this application.

```
int main()(int i;
  int *p=(int *)malloc(sizeof(int));
  *p=100;
  p=(int *)malloc(5*sizeof(int));
  for(i=0;i<5;i++)(
      scanf("%d",p+i); /* 10,20,30,40,50 */
      for(i=0;i<5;i++)(
      printf("%d...%d\n",p(i],*(p+i));
      )
  return 0;)</pre>
```



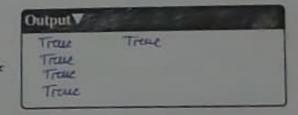
19. Write the output of the code snippet. Also show the stack and heap memory for this application.

```
int main() {
  int i,*p,*rp;
  p=(int *)malloc(5*sizeof(int));
  for(i=0;i<5;i++)
      scanf("%d",p+i); /* 10,20,30,40,50 */
  rp=(int *)realloc(p,10*sizeof(int));
  for(i=5;i<10;i++)
      scanf("%d",rp+i);/* 9,8,6,5,4 */
  for(i=0;i<10;i++)(
      printf("%d...%d\n",rp[i],*(rp+i));
)
  return 0;)</pre>
```

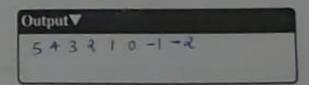


20. Which of the following statements are true?.

```
(1) (void *)0 is a void pointer
(2) (void *)0 is a NULL pointer
(3) int *p=(int *)0; p is a NULL pointer
(4) a[i]==i[a]
(5) a[i][j]== *(*(a+i)+j)
```



21. State the output of the code.



22. Which of the given statements about the following code snippet is/are correct?

```
void fun() {
   int *q=(int *)malloc(sizeof(int));
   *q=20;
}
int main() {
   int *p;
   int *r=NULL;
   fun();
   return 0;
}
```

- (i) p is a wild pointer (ii) r is a NULL pointer (iii) q is dangling pointer (iv) p is dangling pointer (v) fun() is making memory leak
- Output V

 i) II) III) V) Trave

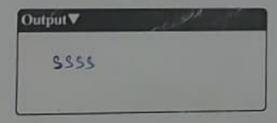
 TV) False
- 23. Check the error or output of the following program?

Compile erercore at line-5

24. Write the output of the given code snippet.

```
#include<stdio.h>
int main()(
   void demo();
   void (*fun)();
   fun=demo;
   (*) fun();
   fun();
   return 0;
}
#include<stdio.h>
#include<stdio.h

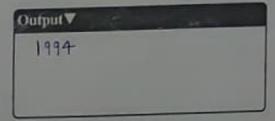
#include<st
```



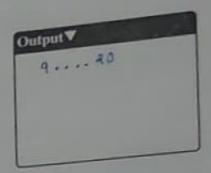
25. Write the output of the given code snippet that uses pointer to function or function pointer.

```
int fun(int x,int y)(
  int z=x+y+x*y;
  return z;
}

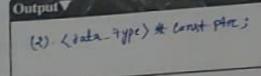
#include<stdio.h>
int main()(
  int (*fun_ptr)(int,int);
  fun_ptr=fun;
  int x=fun_ptr(34,56);
  printf("*d\n".x);
  return 0;
}
```



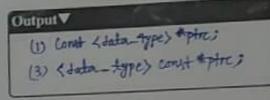
26. Mention the output of the following code snippet. [Array of pointers to function returning int type].



- Find out the correct syntal(s) for making a constant pointer (i.e. The value of the pointer is constant and pointer cannot be modified).
 - (1) const <data_type> ptr;
 (2) <data_type> const ptr;
 (3) <dat_type> const *ptr;
 (4) <data_type> const const fun_ptr
 (5) None of these



- 28. Find out the correct syntal(s) for a pointer to constant (i.e. The pointer cannot able to change the value of the variable/array that it points).
 - (1) const <data_type> ptr;
 (2) <data_type> const ptr;
 (3) <dat_type> const *ptr;
 (4) <data_type> const const fun_ptr
 (5) None of these



- 29. Select the correct way of declaring and initializing pointer to function (i.e. function pointer).
 - (Y) int (*ptr)(int,int,int)=funname;
 (2) int *ptr(int,int,int)=funname;
 (Y) int (*ptr)(int,int,int)=funname;
 (4) (int *) ptr(int,int,int)=funname;
 (5) None of these

MINOR ASSIGNMENT-06

Practical Programming with C (CSE 3544)

Publish on: 07-12-2024 Course Outcome: CO₄

Program Outcome: PO5

Submission on: 09-12-2024 Learning Level: L₅

Problem Statement:

Working with different storage classes and Experiment with one of the powerful tool, recursion, in problem solving and programming.

Assignment Objectives:

To learn about storage classes and get the idea of how function calls itself to solve computational problem.

Answer the followings:

1. Consider the following ANSI C program;

What is the output of the above program?

```
Output with explanation

0 0 0 0

reccursive call to main()

until T= £ 0. So, output 7s

0 0 0 0
```

2. Consider the following ANSI C program;

```
#include <stdio.h>
int a, b, c = 0;
void prtFun(void);
int main()
{
    static int a = 1; /* Line 1 */
    prtFun();
    a+=1;
    prtFun();
    printf("\n %d %d ", a, b);
    return(0);
}
void prtFun(void)
{
    static int a = 2; /* Line 2 */
    int b = 1;
    a + = ++b;
    printf(" \n %d %d ", a, b);
}
```

What is the output of the above program?

```
Output with explanation

42 { First call to protein()
62 } 6=1
6=2,a+=2,a=4
prointf(42)

Second call
prointf(62)

40(as 6 not assigned)
```

3. Consider the following ANSI C program:

4. What is printed by the following ANSI C program?

```
#include<stdio.h>
int f(int n, int k) {
    if(n==0) return 0;
    else if(n*2) return f(n/2, 2*k)+k;
    else return f(n/2, 2*k)-k;
}
int main() {
    printf( "*d", f(20,1));
    return 0;
}
```

5. What is printed by the following ANSI C program?

What is the output of the above program?

Output with explanation

This preogream will recult in a compilation erereare because a register variable cannot have its address taken.

[GATE 2005]

Output with explanation	
16	Output: 9
12	Fore each call, nss
10	halved and K B
9	multiplied by 2

Output with explanation \ 173 Torto Vinavey 10101101 F necuresively states in by 2,

6. Consider the following C function:

```
int f(int n)
{
    static int i = 1;
    if (n >=5) return n;
    n = n+1;
    i++;
    return f(n);
}
The value returned by f(1) is
(A) 5 (B) 6 (C) 7 (D) 8
```

7. Consider the following C program

```
#include<stdio.h>
int r()(
    static int num=7;
    return num--;
)
int main()
(
    for(r();r();r())
        printf("%d ", r());
    return 0;
```

Which one of the following values will be displayed on execution of the program? (A) 41 (B) 52 (C) 63 (D) 630 Show the execution pattern ∇ $f(1) \rightarrow f(2) \rightarrow f(3) \rightarrow f(4)$ Output

S

GATE-2019

```
Trace the execution and it's output

Output

43 & 1

rc() → 7

rc() → 6

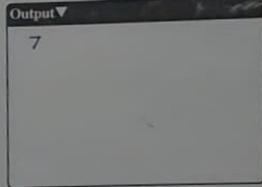
rc() → 5
```

8. The integer value printed by the ANSI-C program given below is ;

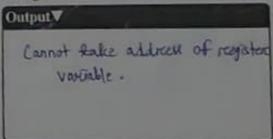
```
int funcp() (
    static int x = 1;
    x++;
    return x;
)
int main() (
    int x,y;
    x = funcp(); % = 2
    y = funcp()+x; y = 3+2=5
    printf("%d\n", (x+y)); 2+5=7
    return 0;
)
```

9. Consider the following C program

```
#include<stdio.h>
int main()(
    register int a =10;
    int *ptr = NULL;
    ptr = %a;
    *ptr = 5;
    printf("%d",*ptr);
    return(0);
}
```



Find the error in the program with proper reasoning



10. Consider the following C function:

```
file2.c

#include<stdio.h>
#include "file1.c"

int count = 5;

int main(){
    write_extern();
    write_extern();
    printf("%d\n", count);
    return(0);
}
```

Find the output if "file2.c" is compiled and executed:

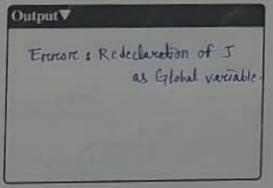
```
9
# Each call to write extern() Increments count by ?.
```

11. Write the output of the following program:

```
#include<stdio.h>
int i=5;
int main()
(
        extern int j;
        printf("\ni=\d \nj=\d",i,j);
        int j=10;

int j=10;

int j =10;
```



12. Write a program to find the sum of an array elements using recursion.

```
#Triclule (state-h)

Tht sum (Tht execci, Thtn) &

The sum (Thtn) &

The sum (Thtn)
```

 Write a program to print "n" Fibonacci numbers using recursion. [N.B: The program format should be as follows]

```
Program and Output▼
      Hinclude (Stato-h)
     votal praint_ Albo (int n) }
              Static int a = 0, b=1, next;
                 # (n/0) }
                      prant & ("+++", a);
                      nex+ = a+b;
                        a=6;
                        1 = next;
                        prant_fibbo (n-1);
                  Ę
       Int main () }
              en the
              pranto ("Enter numbers");
               scanf ("-1.3", 2n);
               pront- Atto (n) 3
                vecturen 0;
                       Output
                            Entere number: 5
                                     870 01133
```