Indian Institute of Information Technology, Sri City, Chittoor

COMPUTER PROGRAMMING IN C   DURATION: 180 MINUTES. MAX MARKS: 60.

ROLL NO.: _____   ROOM NO.: _____   SEAT NO.: _____

NAME: _____   INVIGILATOR'S SIGNATURE: _____

Instructions

- This is an open book test. You may carry printed material with you. Borrowing books or any printed material from another student is strictly prohibited.
- You are not allowed to carry any hand written notes.
- Please switch off your mobile phones and any other digital equipment you may have (like smart watches, calculators).
- A negative mark of -1 applies to all questions in Part 3 only when answered incorrectly or partially.
- Write all answers correct up to two decimal places.
- Put down your final answer in this sheet.
- Assume int and pointers are 4 bytes long.
- Assume all the necessary include directives are added by the IDE. Also, you may assume that we use Code::Blocks configured with gcc 6.4 on a Windows 10 64-bit Intel Core i5 3230M CPU unless mentioned otherwise. This is same as your instructor's laptop configuration.

Part 1: 5 Questions. Each question carries 1 marks. No negative marks.

Question 1. What is the output?

```c
int main()
{
    int n=5;
    printf("%d", n*n+2*n-2);
}
```

Answer:

Question 2. Does this code get into an infinite loop?

```c
int f(int j)
{
  static int i = 50;
  int k;
  if (i == j)
  {
    printf("something");
    k = f(i);
```

```
        return 0;
    }
    else return 0;
}

int main() {
    printf("%d",f(50));
}
```
Answer:

Question 3. What is the output?
```
int main(){
    char *institute =  "IIITS";
    char *city = "is near Chennai";
    printf("%s %s", institute, city);
}
```
Answer:

Question 4. What is the output?
```
int main()
{
    int x = 2;
    switch (x)
    {
        case 1: printf("I");
        case 2: printf("I");
        case 3: printf("I"); break;
        default: printf("T");
    }
    return 0;
}
```
Answer:

Question 5.   What is the output?

```c
int main() {
    for(int i=0; i<=3; i=10) {
        printf("%d", i);
    }
}
```

Answer:

Part 2: 5 Questions. Each question carries 2 marks. No negative marks.

Question 6.   What is the output? Assume the input for n is 4.

```c
#include <stdio.h>
int main()
{
    int n, i;
    unsigned long long x = 1;

    scanf("%d",&n);

    for(i=1; i<=n; ++i)
    {
        x *= i;
    }
    printf("%llu", x);

    return 0;
}
```

Answer:

Question 7.   What is the output?

```c
int main()
{
    int i = 0;
    for(; ; ++i) {
        if (i == 10) break;
        printf("%d", i+1);
    }
}
```

Answer:

Question 8.   What is the output?

```c
#define HYD "Hyderabad"

int main()
{
    int hyd = 10;
    printf("%s ", HYD);
    return 0;
}
```
Answer:

Question 9. What is the output?

```c
#include <stdio.h>
typedef char* ptr;
#define PTR char*
int main()
{
    ptr a;
    printf("%u", sizeof(a));
    return 0;
}
```
Answer:

Question 10. What is the output?

```c
int main() {
    int i[] = {2017,2018};
    int *p;
    p = i+1;
    printf("%d\n", *(p-1));
}
```
Answer:

Part 3: 15 Questions. Each question carries 3 marks. -1 for incorrect or partial answer.

Question 11. What is the output?

```c
struct Point
{
    int x, y;
};
```

```
int main ()
{
    struct Point p1 = {0, 1};
    p1.x = 20;
    printf ("x = %d, y = %d", p1.x, p1.y);
    return 0;
}
```

Answer:

Question 12. What is the output?

```
# include <stdio.h>
void fun (int *ptr, int x)
{
    *ptr = 30 * x;
}

int main ()
{
  int x = 20;
  fun (&x, x--);
  printf ("%d", x);
  return 0;
}
```

Answer:

Question 13. What is the output?

```
void f (int *p, int *q)
{
  p = q;
 *p = 2;
}

int main ()
{
  int i = 0, j = 1;
  f (&i, &j);
  printf ("%d %d \n", i, j);
  return 0;
}
```

Answer:

Question 14. If the input is your roll number, what is the output?

```c
#include <stdio.h>

int main()
{
    char s[1000], r[1000];
    int begin, end, count = 0;

    gets(s);

    while (s[count] != '\0')
        count++;

    end = count - 1;

    for (begin = 0; begin < count; begin++) {
        r[begin] = s[end];
        end--;
    }

    r[begin] = '\0';

    printf("%s", r);

    return 0;
}
```

Answer:

Question 15. What is the output?

```c
#include <stdio.h>

int main()
{
    int old_array[6] = {2,1,3,5,8,9};
    int new_array[7];

    int position=3, value = 5;
```

```
    for (int c = 5; c >= position - 1; c--)
        new_array[c+1] = old_array[c];

    new_array[position-1] = 4;

    for (int c = 0; c < position - 1; c++)
        new_array[c] = old_array[c];

    for (int c = 0; c < 7; c++)
        printf("%d ", new_array[c]);

    return 0;
}
```

Answer:

Question 16. What is the value of fun(5,4)?

```
int fun(int x, int y)
{
    if (y != 0)
        return (x*fun(x-1, y-1));
    else
        return 1;
    fun(x,y);
}
int main() {
    printf("%d", fun(5,5));
}
```

Answer:

Question 17. What is the output?

```
int fun(int a[], int size)
{
    int max_so_far = -100, max_ending_here = 0;

    for (int i = 0; i < size; i++)
    {
        max_ending_here = max_ending_here + a[i];
        if (max_so_far < max_ending_here)
            max_so_far = max_ending_here;
```

```
        if (max_ending_here < 0)
            max_ending_here = 0;
    }
    return max_so_far;
}

int main()
{
    int a[] = {-1, -3, 3, -1, -2, 2, 6, -3};
    int n = sizeof(a)/sizeof(a[0]);
    int max_sum = fun(a, n);
    printf("%d", max_sum);
    return 0;
}
```
Answer:

Question 18. What is the output?

```
int main(void)
{
unsigned int i1 = 10;
int b1 = (i1 & (i1-1)) && (i1 > 0);
unsigned int i2 = 5;
int b2 = !(i2 & (i2-1)) && (i2 > 0);
printf("%d%d", b1,b2);
}
```
Answer:

Question 19. What is the output?

```
#include <stdarg.h>

int fun(int arg_count, ...)
{
  int i;
  int fun, a;

  va_list ap;

  va_start(ap, arg_count);
```

```
  fun = va_arg(ap, int);

  for(i = 2; i <= arg_count; i++) {
    if((a = va_arg(ap, int)) < fun)
      fun = a;
  }
  va_end(ap);

  return fun;
}

int main()
{
   printf("%d", fun(5, 8, 67, 6, 23, 94));
   printf("%d", fun(4, 1, 2, 3, 23));
   printf("%d", fun(3, 8, 9, 16));
   getchar();
   return 0;
}
```

Answer:

Question 20.   What is the output?

```
int fun ( int n, int *fp )
{
    int t, f;

    if ( n <= 1 )
    {
        *fp = 1;
        return 1;
    }
    t = fun ( n-1, fp );
    f = t + *fp;
    *fp = t;
    return f;
}

int main()
{
    int x = 15;
    printf("%d\n",fun(5, &x));
```

```
        return 0;
}
```

Answer:

Question 21. What is the output?

```c
int fun(int x, int *py, int **ppz)
{
    int y, z;
    **ppz += 1;
    z = **ppz;
    *py += 2;
    y = *py;
    x += 3;
    return x + y + z;
}
void main()
{
    int x, *y, **z;
    x = 41;
    y = &x;
    z = &y;
    printf( "%d", fun(x,y,z));
    getchar();
}
```

Answer:

Question 22. What is the output?

```c
#include<stdio.h>
#include<string.h>
int main()
{
    char s[] = {'I','I','I', 'T'};
    char t[] = ''IIIT";

    printf("%s %s %d", s, t, strcmp(s,t));

    return 0;
}
```

Answer:

Question 23. How many bytes will you need to store the string, "IIITS is Great"?
Answer:

Question 24. What is the output?

```c
#include <stdio.h>
int main( void )
{
  int a = 1;
  int b = 2;

  {
    int b = 3;
    int c = 4;
    printf("%d%d%d", a, b, c );
  }

  {
    int a = 4;
    printf("%d%d", a, b );
  }

  return 0;
}
```

Answer:

Question 25. Can a 3D array be declared like this? Answer 'Yes' if it is valid. Answer 'No' if the following code will generate compilation errors.

```c
int test[2][3][4] = {
    { {3, 4, 2, 3}, {0, -3, 9, 11}, {23, 12, 23, 2} },
    { {13, 4, 56, 3}, {5, 9, 3, 5}, {3, 1, 4, 9} }
 };
```

Answer:

Left blank for rough work.