Roll Number		Section	
Name			

Department of Computer Science and Engineering, IIT Kharagpur

Programming and Data Structure (CS10001)

Class Test I

Autumn Semester 2019-20 **Date: 28/08/2019**

Marks: 40 **Time: 1 hour**

Answer the questions in the spaces provided on the question booklet. For rough work, you may use the extra pages provided in this booklet for the purpose. No other supplementary sheets will be provided.

Question	Q1	Q2	Q3	Q4	TOTAL
Marks					

Q1. What will be the outputs of the following C programs? **(2.5 x 4 = 10 marks)**

(a)

```
#include <stdio.h>

int main()
{
      int c=5, b=2;
      float x, y;
      x = c/b;
      y = (c*1.0) / (b*1.0);
      printf ("%4.2f\n", x);
      printf ("%4.2f\n", y);
      printf ("%d\n", (int)(y+0.6));
      return 0;
}
```

1(a):

2.00 *[part mark: 0.5]*

2.50 *[part mark: 1]*

3 *[part mark: 1]*

(b)

```
#include <stdio.h>
int main()
{
      int a = 5, b = 10, c = -3, z;
      switch (a + b / c) {
        case 1: z = 10;
        case 2: z = 20;
        default: z = 30;
      }
      printf ("%d\n", z);
      return 0;
}
```

1(b):

30 *[no part marking]*

(c)

```
#include <stdio.h>
int main()
{
    int a, b = 5;
    char ch = 'a';
    a = (int)ch + b;
    printf (" %c\n", (char)a);
    return 0;
}
```

1(c):

f

[no part marking]

(d)

```
#include <stdio.h>
int main()
{
     int a = 15, b = 60, c, d;
     float p = 12.5, r = 3.6, z;
     c = (a / b) * 65.0;
     d = ((float) a / b) * 60.0;
     z = (a < b) * (p + r);
     printf ("%d %d %4.1f", c, d, z);
}
```

1(d):

0 15 16.1

[part marks for the three values: 0.5, 1, 1]

Q2. Answer the following.

(a) It is required to read an integer N and compute the sum of the series:

$S = 1.2^2 + 2.3^2 + 3.4^2 + 4.5^2 + \ldots$ to N terms

Fill up the blank spaces below, so that the code executes correctly. **(2+2+2=6 marks)**

```
#include <stdio.h>
int main()
{
      int i, N, sum;
      scanf (“%d”, &N);
      sum = 0;
      for (i=1; i<=N; i++) {
            sum = sum + i * (i+1) * (i+1);
      }
      printf (“\nSum of the series: %d”, sum);
}
```

2a:

2 marks for each blank

(b) What will be printed when the following code segments execute? **(2+2=4 marks)**

(i)

```
int x = 5;
while (x)
  printf ("X=%d \n", x--);
```

2b(i):

X=5
X=4
X=3
X=2
X=1

[part marks: give 1 if at least three outputs are correct]

(ii)

```
int a = -4;
if (a >= 5)
   a = a + 3;
else
  a = a + 2;
printf ("\n a = %d ", a);
```

2b(ii):

a = -2 *[no part mark]*

Q3. Answer the following. **(4+(2+2+2)=10 marks)**

(a) Consider the following function that expects a non-negative integer argument:

```
int doit (int n)
{
      int m;
      m = 0;
      while (n > 0) {
            m = (m*10) + (n%10);
            n = n/10;
      }
      return m;
}
```

3(a):

92429 *[no part mark]*

What does **doit(92429)** return?

(b) Fill up the blank spaces in the code below, so that the program executes correctly to compute the series sum **S = 1!/1 + 2!/2 + 3!/3 + 4!/4 + 5!/5**

```
#include <stdio.h>
int fact (int);
int main()
{
   int sum;
   sum = fact(1)/1 + fact(2)/2 + fact(3)/3 + fact(4)/4 + fact(5)/5;
   printf("The sum of the series is : %d\n", sum);
}

int fact (int n)
{
     int num = _(i)__0____, f = 1;
     while ( __(ii) num <= n-1)
     {
        f *= _(iii) (num+1);
        num++;
     }
      return f;
}
```

3b:

2 marks for each blank

Other possible solutions:

(i)	1 or 2
(ii)	num <= n
(iii)	num

Q4. Answer the following. **(4+6=10 marks)**

(a) What will be the output of the following program?

```
#include <stdio.h>
int a = 432, b = 318;
void func (int a) {
      a++ ;
      printf ("\n func: a is %d", a);
      printf ("\n func: b is %d", b);
}

int main( ) {
      int b = 20;
      b++;
      func(b);
      printf ("\n main: a is %d", a);
      printf ("\n main: b is %d", b);
      return 0;
}
```

4(a):

```
  func: a is 22
  func: b is 318
  main: a is 432
  main: b is 21
```

[part mark: 1 mark for each printf]

(b) Consider the two functions *func1* and *func2* as written below.

```
int func1(int x)
{
      if (x == 6) {
            return x;
      }
      return func1(x + 1) - func2(x - 1);
}

int func2(int y)
{
      if (y == 0) {
            return y;
      }
      return 1 + func1(y + 2);
}
```

What are the values returned by the following function calls? Write ERROR in case of infinite loop.

(i) `func1(4)`

(ii) `func2(1)`

4b(i)

```
  -1
```

[3 marks, no part marking]

4b(ii)

```
  0
```

[3 marks, no part marking]

ROUGH WORK

ROUGH WORK

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ROUGH WORK