ESC 101: Fundamentals of Computing				**Mid-Sem Exam** (22 Feb 2019)		A
Name						
Roll No		Dept.		Section		

TOTAL: 60 MARKS

Instructions:

1. This question paper contains 4 pages (8 sides of paper). Please verify.
2. Write your name, roll number, department and section **on every sheet** of this booklet.
3. Write your final answers neatly **with a blue/black pen**. Pencil marks may get smudged.
4. **Answers written outside the box will NOT be graded.**

Q 1 Write the output of the following program (Partial marks will be provided, but marks division cannot be shown here as that may reveal answers): **(10 Marks)**

```
#include<stdio.h>
#define N 10
int arr[N] = {12, 3, 34, 9, 8, 1, 45, 6, 17, 19};

void func(int k) {
    static int c = 0;
    if(2*k+2 < N) {
        int tmp;
        tmp = arr[2*k+1];
        arr[2*k+1] = arr[2*k+2];
        arr[2*k+2] = tmp;
        func(2*k+1);
        func(2*k+2);
    }
    c += k;
    printf("%d ", c);
}

int main() {
    func(1);
    printf("\n");
    for(int i=0; i<N; ++i) {
        printf("%d ", arr[i]);
    }
    return 0;
}
```

OUTPUT

Q 2.1 What does each of the following, when interpreted as Boolean expressions, evaluate to/result in? **True / False / Error**? **(4 x 1 = 4)**

A	!('a' +'2' - 'b' - '1') || 2/('a' +'2' - 'b' - '1')	
B	'a'++	
C	1 - ((('a' - 'z' > 'b' - 'y') ? 1 : 0) - 1) ? 1 : 0)	
D	n = 0 /*n has been already declared*/	

Q 2.2 What is the output of each of the following programs**? In case you expect an "error" or a "garbage value", please report the same.** **(6 x 1 = 6)**

Assume:

- sizeof **character** is **1** byte and sizeof **integer** is **4** bytes
- **#include<stdio.h>** is included in all the program**.**

A	`int main() {`
	`  printf("%d", sizeof(printf("GeeksQuiz")));`
	`  return 0;`
	`}`	

B	`int main() {`
	`  int i = 3;`
	`  printf("%d", (float) i);`
	`  return 0;`
	`}`	

C	`int main()  {`
	`  int a = 10, b = 20, c = 30;`
	`  if (c > b > a)  printf("TRUE");`
	`  else  printf("FALSE");`
	`  return 0;`
	`}`	

D	`int main() {`
	`  int x = 2, y = 0;`
	`  x += (y = 10);`
	`  printf("%d\n", x);`
	`  return 0;`
	`}`	

E	`int main() {`
	`  int x = 2, y = 0;`
	`  int z = (y++) ? 2 : y == 1 && x;`
	`  printf("%d\n", z);`
	`  return 0;`
	`}`	

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F	**int main() {** **int x;** **x = (printf("AA")||printf("BB"));** **printf("%d\n",x);** **x = (printf("AA")&&printf("BB"));** **printf("%d",x);** **return 0;** **}**	

Q 3 Write the output of the following program (Partial marks will be provided, but marks division cannot be shown here as that may reveal answers): **(10 Marks)**

```
#include <stdio.h>

int x = 4;

int func1(int a, int b){
    static int x = 2;
    a *= x;
    x += b;
    printf("x in f1 = %d\n", x);
    return x-a;
}

int func2(int a){
    x = func1(x+a, a);
    x++;
    printf("x in f2 = %d\n", x);
    return x;
}

int main(){
    int x = 5;
    int y = 4;
    y = func2(func1(x, y));
    printf("V = %d\n", func1(y, x));
    return 0;
}
```

OUTPUT

Q 4.1 Choose the correct option according to the output of the following programs: **(1 x 2 = 2)**

```
double k = 0;
for (k = 0.0; k < 3.0; k++);
printf("%lf ", k);
```

A	3.000000
B	0.000000 1.000000 2.000000 3.000000
C	0.000000 1.000000 2.000000
D	2.000000

```
int j = 0;
for (int i=(0,1); i<=3; i++,j++) {
    printf("%d %d", i++, j);
}
```

A	0 02 1
B	1 02 13 2
C	1 03 1
D	1 0

Q 4.2 Fill in the blanks to convert this **while** loop into **do-while** loop (A) and into **for** loop (B) such that they produce **same** output as **while** loop. (0.5 + 0. 5 + 1) + (1.5 + 0.5) = **(4 Marks)**

```
int i = 1,j = 1;
while((i, j)<21) {
    int temp = i;
    i = j;
    j = i + temp;
    printf("%d %d\n", i, j);
}
```

A

```
int i = 1,j = _____;
do{
    int temp = i;
    i = j;
    j = _____ + temp;
    printf("%d %d\n", i, j);
} while(_____);
```

B

```
for(int i = 1,j = 1; _____) {
  int temp = i;
  i = j;
  j = temp + _____;
  printf("%d %d\n", i, j);
}
```

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Q 4.3 What is the output of the following program: **(2 Marks)**

```
int i = 3;
printf("%d",i);
for(int i = 4;i<=6;i++){
     int i = 7;
     i++;
     printf("%d",i);
}
printf("%d",i);
```

Q 4.4 Fill in the blanks so that the program gives following output. **(8 x 0.25 = 2)**

```
#include <stdio.h>
int main() {
  int i, j, rows=__________;
  for(i=1; i<=rows; i++){
    for(j=__________; j__________; j++){
      if(j__________1 || j==__________ || __________==rows) {
        printf("__________");
      }
      else{
        printf("__________");
      }
    }
    printf("\n");
  }
```

OUTPUT
*
**
+
++
*****

Q 5.1 Write **T** or **F** for True/False (write **only in the box on the right hand side**) **(3 x 0.5 = 1.5)**

1.	We can always use a **break** statement to stop the execution of the body of an **if** statement.	
2.	The cases for a **switch** statement can consist of **integer** variables.	
3.	The condition (1.0==1) will always be evaluated to **True**.	

Q 5.2 Choose the correct output of the following program: **(0.5 Marks)**

```
int i;
if (i=1>0?0:1) {
    printf("a");
} else {
    printf("b");
}
```

A	a	◯
B	b	◯
C	Compilation error	◯
D	Run-time error	◯

Q 5.3 Which of the following data types are valid as conditions for switch statements.
Mark **ALL** that are correct **(2 Marks)**

A	int	◯
B	float	◯
C	char	◯
D	string	◯

Q 5.4 What is the output of the following program for the following inputs: **(3 Marks)**

```
int n;
switch(n){
     case 1: printf("1");
     case 3: printf("3");
     default: printf("0");
     case 2: printf("2"); break;
     case 4: printf("4");
}
```

INPUT	OUTPUT
3	
5	
4	

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Q 5.5 What is the output of the following code snippet: **(3 Marks)**

```
int i = 6;
if (i % 2 == 0) {
     printf("line 1\n");
} else if (i % 3 == 0) {
     printf("line 2\n");
}
if (i % 6 == 0)
     printf("line 3\n");
     if (i % 4 == 0)
          printf("line 4\n");
else
     printf("line 5\n");
```

OUTPUT

Q 6 Find the output of the following program (Assume appropriate includes):

(2 + 2 + 2 + 2 + 2 = 10)

A

```
int main() {
     int a = 8.8;
     printf("%d %03d\n", a, a);

     float b = (float) a;
     printf("%5.3f %07.3f\n", b, b + 0.2);
}
```

OUTPUT

B

```
#define forab(a, b) for (int i = a; i <= b; i++)
#define forba(a, b) for (int i = b; i >= a; i -= 2)

int main() {
     forab(0, 1) {
          forba(0, 2) {
               printf("%d ", i);
          }
     }
}
```

OUTPUT

C

```
#define sum(a, b) a + b
#define product(a, b) a * b

int main() {
     int a = 10, b = 8;
     printf("%d", sum(a, b) / product(a, b));
     return 0;
}
```

OUTPUT

D

```
#define L1 1
#define L2 1

int main() {
#if (L1 == 1)
     printf("L1");
#elif (L2 == 1)
     printf("L2");
#else
     printf("NA");
#endif

     return 0;
}
```

OUTPUT

E

```
int main() {
     int a1, a2;
     float x = 0.9, y = -0.9;

     a1 = round(x), a2 = round(y);
     printf("%d %d\n", a1, a2);

     a1 = floor(x), a2 = floor(y);
     printf("%d %d\n", a1, a2);

     a1 = ceil(x), a2 = ceil(y);
     printf("%d %d\n", a1, a2);

     a1 = x, a2 = y;
     printf("%d %d\n", a1, a2);

     return 0;
}
```

OUTPUT