ESC 101: Fundamentals of Computing				**Major Quiz I** (29 – August - 2018)		
Name	**ANSWER KEY**					**B**
Roll No.		Dept.		Section		

Instructions:

Total **50 Marks**

1. This question paper contains a total of **3** pages (**6** sides of paper). Please verify.
2. Write your name, roll number, department, and section on **every sheet** of this booklet
3. Write final answers neatly with a blue/black pen in the given boxes.

Q. 1: Write **T** or **F** in the box for **True** and **False** respectively **(1 x 10 = 10 marks)**

For the questions given below, `a = 5, b = 4, c = 3, d = 2, e = 1` are variables of **int** type and `f = 1,000,000,000,000` is a variable of **long** type.

1.	**F**	`printf("%d", a++);` will print **6**
2.	**F**	The value of the expression `a / 2 * b * c * d * e * 2` is **48**
3.	**F**	The values of the expressions `a < b < c` and `c < a < b` are different
4.	**F**	We cannot use `%ld` in the format string for printing the value of the variable f
5.	**T**	`!(a || b)` and `((!a) && (!b))` will produce the same value for `a=5, b=4`
6.	**T**	`!(a || b)` and `((!a) || (!b))` will produce the same value for `a=5, b=4`
7.	**F**	It is necessary to have a **default** case in every **switch** statement
8.	**T**	It is necessary to write an **if** statement before writing an **else** statement.
9.	**F**	The value of the expression `(b % 2) + (c % 2) + (d % 2)` is equal to **2**.
10.	**F**	The value of the expression `c = ((a = 2)? 5:3)` is **3**.

Q. 2.1: Write the output of the following program in the box provided. **(2 x 1 = 2 marks)**

```
#include <stdio.h>
int main() {
    int temp = 100;
    if(102 >= (temp >= 98))
          printf("FEVER");
    else if((98 <= temp) <= 102)
          printf("HEALTHY");
    else printf("UNSURE");
    return 0;
}
```

FEVER

Q. 2.2: ONLY ONE CHOICE is correct. (**Fill in the circle next to correct option**)

2.2.1. Read the following statements and answer the following question: **(2 x 4 = 8 marks)**

Given: `p = 0, q = 0, r = 5, s = 5` are integer variables

Statement ONE: after executing the statement `p = r++;` the value of `p` is **6** and `r` is **6**.

Statement TWO: after executing the statement `q = ++s;` the value of `q` is **6** and `s` is **6**.

A.	Statement **ONE** is **TRUE**, statement **TWO** is **FALSE**	○
B.	Statement **ONE** is **FALSE**, statement **TWO** is **TRUE**	●
C.	Both statements are **TRUE**	○
D.	Both statements are **FALSE**	○

2.2.2. The following programs will result in what outcome (printed output/error)?

i

```
#include <stdio.h>
int main(){
   int n = 2;
   switch(n){
      case 1: printf("one");
      case 2: printf("two");
      case 3: printf("three");
      default: printf("default"); break;
   }
   return 0;
}
```

A.	twothreedefault	●
B.	Compilation Error	○
C.	two	○
D.	twothree	○

ii

```
#include <stdio.h>
int main(){
     int a = 2, b = 0;
     if(b = 0) a += 2;
     printf("%d", a);
     return 0;
}
```

A.	2	●
B.	3	○
C.	4	○
D.	None of these	○

iii

```
#include <stdio.h>
int main(){
     int a = 2000000000;
     int b = 2000000000;
     printf("%ld", (long)(a + b));
     return 0;
}
```

A.	4000000000000000000	○
B.	4000000000	○
C.	4000000000000	○
D.	-294967296	●

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Q. 3 MANY CHOICES may be correct. **(Fill circles next to all correct options) (3 x 2 = 6 marks)**

3.1. Mark all the correct options by filling in the circles next to all correct options

A.	-1 is considered as TRUE	●
B.	2 is considered as TRUE	●
C.	0 is considered as FALSE	●
D.	Any negative value is considered as FALSE	○

3.2. Which of the following variable names are valid in C language. Mark all that are correct.

A.	_esc101	●
B.	Esc_101	●
C.	101_esc	○
D.	_101eSc	●
E.	esc__101?	○
F.	+esc__101	○

Q. 4: Correct the program. **(5 x 2 = 10 marks)**

4.1. Find the lines which will result in COMPILATION errors. For such line(s), write the line no. and also a correct version in the respective columns. The corrected program should compile.

```
1:    #include<stdio.h>
2:    int main(){
3:          long int a;
4:          float c = 3.0;
5:          a = c % 10;
6:          printf("%ld", b);
7:          return 0;
8:    }
```

Line No.	Correct Version
5	a = (int) c % 10;
6	printf("%ld", a);

DO NOT SUGGEST CORRECTIONS TO MORE THAN 3 LINES

4.2. Mr. C wrote a program to calculate the slope of a line joining the two points in the X-Y plane with non-integer coordinates. However, for some pairs of points he is not able to get the correct output. Find all LOGICAL and COMPILATION errors in the program given below and write the line number as well as a correct version of the line in the table provided below. The corrected program must compile and give correct output on all test cases (e.g. vertical/horizontal lines etc).

```
1: #include <stdio.h>
2: #include <math.h>
3: int main(){
4:    int x1, x2, y1, y2;
5:    double slope, eps = 0.00001;
6:    scanf("%d %d", &x1, &y1);
7:    scanf("%d %d", &x2, &y2);
8:    if(fabs(x2 - x1) > eps){
9:        slope = (y2 - y1)/(x2 - x1);
10:       printf("Slope: %.4lf\n", slope);
11:   }else{
12:       if(fabs(y2 - y1) > eps)
13:           printf("Points are same\n");
14:       else
15:           printf("Infinite slope\n");
16:   }
17:   return 0;
18: }
```

Line No.	Correct Version
4	**double x1, x2, y1, y2;**
6	**scanf("%lf %lf", &x1, &y1);**
7	**scanf("%lf %lf", &x2, &y2);**
12	**if(fabs(y2 – y1) < eps)**

DO NOT SUGGEST CORRECTIONS TO MORE THAN 5 LINES

DO NOT SUGGEST CORRECTIONS TO MORE THAN 5 LINES

DO NOT SUGGEST CORRECTIONS TO MORE THAN 5 LINES

Q. 5: Fill in the blanks. **(6 + 2 + 4 + 2 = 14 marks)**

5.1. Recall the problem THE IMPOSSIBLE SWAP where we swapped the values of two integer variables **a** and **b**, i.e. at the end of the program, the value of **a** should be in **b** and vice-versa. In this question we have 3 variables **a, b, c**. We want to change their values so that final value of **a** should be initial value of **b**, final value of **b** should be initial value of **c** and final value of **c** should be initial value of **a**.

For e.g.: If initially **a** = 1, **b** = 2, **c** = 3 then final values must be **a** = 2, **b** = 3, **c** = 1.

```
#include <stdio.h>
int main() {
    int a = 1, b = 2, c = 3, temp;
    temp = a;
    a = b;
    b = c;
    c = temp;
    printf("%d %d %d", a, b, c);
    return 0;
}
```

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5.2. Fill in the blanks to print the output in the format given here. There is one space between a and =, = and 1, 1 and //, // and b and so on. There are no extra spaces after 2 and 4. There is a newline after 2.

```
a = 1 // b = 2
c = 3 // d = 4
```

```
#include <stdio.h>
int main(){
int a = 1, b = 2, c = 3, d = 4;
printf("a = %d // b = %d\n c = %d // d = %d",a,b,c,d);
return 0;
}
```

5.3. Fill in the blank table to print the output of the following program. If your output is in multiple lines, use a different row of the table to fill in different lines of the output.

```
#include<stdio.h>
int main(){
     int a = 2, b = 0;
     if(b++) printf("ALL IS WELL\n");
     else printf("OLD IS GOLD\n");
     switch(a){
          case 0: printf("IRONMAN"); break;
          case 1: printf("DR STRANGE"); break;
          case 2: printf("MS MARVEL"); break;
     }
     return 0;
}
```

Output:

OLD IS GOLD
MS MARVEL

5.4. Mr. B wrote the program **(A).** Mr. C being very smart decided to write a program **(B)** which does the same thing but using logical operators. Recall that **&&, || and !** are logical operators. Complete the following program by filling the blank in the **if** statement such that the outputs of both the programs are same for various values of **a, b, c.** For example,

Input # 1: **a** = 1, **b** = 0, **c** = 1 Output # 1: THIS QUIZ ROCKS!!

Input # 2: **a** = 0, **b** = 1, **c** = 1 Output # 2: <NO OUTPUT>

Input # 3: **a** = 0, **b** = 0, **c** = 1 Output # 3: <NO OUTPUT>

A

```
#include<stdio.h>
int main(){
    int a, b, c;
    scanf("%d %d %d", &a, &b, &c);
    if(b){
         ;
    }
    else if (c) {
        if (a) {
            printf("THIS QUIZ ROCKS!!");
         }
    }
    return 0;
}
```

B

```
#include<stdio.h>
int main(){
    int a, b, c;
    scanf("%d %d %d", &a, &b, &c);

    if(!b && c && a){
         printf("THIS QUIZ ROCKS!!");
    }
    return 0;
}
```

Also write the output of the above program **(A)** for the following inputs. Write <NO OUTPUT> if there is no output for a given set of inputs.

INPUT	OUTPUT
a = 1, **b** = 2, **c** = -4	**<NO OUTPUT>**
a = -1, **b** = 0, **c** = 3	**THIS QUIZ ROCKS!!**

END OF QUIZ

SPACE FOR ROUGH WORK