

ESC 101: Fundamentals of Computing				Mid-Sem Exam (22 Feb 2019)			
Name						B	
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] = {8, 7, 45, 17, 9, 1, 18, 5, 6, 34};

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/2;
    printf("%d\n", c);
}

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

<b>A</b>	!('q' + '3' - 's' - '1')    12/('q' + '3' - 's' - '1')	
<b>B</b>	'x'++	
<b>C</b>	1 - (((('a' - 'z' > 'b' - 'y') ? 1 : 0) - 1) ? 1 : 0)	
<b>D</b>	var = 3 /*var 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.

<b>A</b>	<pre>int main() {     printf("%d", sizeof(printf("Mid-Semester")));     return 0; }</pre>	
<b>B</b>	<pre>int main() {     int i = 4;     printf("%d", (float) i);     return 0; }</pre>	
<b>C</b>	<pre>int main() {     int a = 100, b = 20, c = 30;     if (c &gt; b &gt; a) printf("TRUE");     else          printf("FALSE");     return 0; }</pre>	
<b>D</b>	<pre>int main() {     int x = 2, y = 7;     x += (y = 20);     printf("%d\n", x);     return 0; }</pre>	
<b>E</b>	<pre>int main(){     int x = 4, y = 0;     int z = (y++) ? 2 : y == 1 &amp;&amp; x;     printf("%d\n", z);     return 0; }</pre>	

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F	<pre> int main() {     int y;     y= (printf("XX")  printf("YY"));     printf("%d\n",y);     y= (printf("XX")&amp;&amp;printf("YY"));     printf("%d",y);     return 0; } </pre>	
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**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 = 2;

int func1(int a, int b) {
    static int x = 3;
    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 = 1;
    int y = 2;
    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)

<pre>double k = 0; for (k = 0.0; k &lt; 2.0; k++); printf("%lf ", k);</pre>	<b>A</b>	3.000000	<input type="radio"/>
	<b>B</b>	0.000000 1.000000 2.000000 3.000000	<input type="radio"/>
	<b>C</b>	0.000000 1.000000 2.000000	<input type="radio"/>
	<b>D</b>	2.000000	<input type="radio"/>

<pre>int j = 0; for (int i=(0,1); i&lt;=3; i++,j++) {     printf("%d %d", i++, j); }</pre>	<b>A</b>	1 03 1	<input type="radio"/>
	<b>B</b>	2 03 14 2	<input type="radio"/>
	<b>C</b>	2 04 1	<input type="radio"/>
	<b>D</b>	2 0	<input type="radio"/>

**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)

<pre>int i = 1, j = 2; while((i, j) &lt; 31) {     int temp = i;     i = j;     j = i + temp;     printf("%d %d\n", i, j); }</pre>	<b>A</b>	<pre>int i = 1, j = _____; do{     int temp = i;     i = j;     j = _____ + temp;     printf("%d %d\n", i, j); } while(_____);</pre>
	<b>B</b>	<pre>for(int i = 1, j = 2; _____){     int temp = i;     i = j;     j = temp + _____;     printf("%d %d\n", i, j); }</pre>

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**Q 4.3** What is the output of the following program:

**(2 Marks)**

```
int i = 6;
printf("%d",i);
for(int i = 3;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(i_____1 || j==_____ || _____==rows){
                printf("_____");
            }
            else{
                printf("_____");
            }
        }
        printf("\n");
    }
    return 0;
}
```

**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 <b>continue</b> statement to skip the execution of part of the body of an <b>if</b> statement.	
2.	The condition for a <b>switch</b> statement can consist of <b>char</b> variables.	
3.	The condition <b>(0.0==0)</b> will always be evaluated to <b>True</b> .	

**Q 5.2** Choose the correct output of the following program:

(0.5 Marks)

<pre>int i; if (i=1&gt;1?1:-1) {     printf("a"); } else {     printf("b"); }</pre>	<b>A</b>	a	<input type="radio"/>
	<b>B</b>	b	<input type="radio"/>
	<b>C</b>	Compilation error	<input type="radio"/>
	<b>D</b>	Run-time error	<input type="radio"/>

**Q 5.3** Which of the following data types are valid as conditions for switch statements.

Mark **ALL** that are correct

(2 Marks)

<b>A</b>	integer literals	<input type="radio"/>
<b>B</b>	character literals	<input type="radio"/>
<b>C</b>	floating point literals	<input type="radio"/>
<b>D</b>	string literals	<input type="radio"/>

**Q 5.4** What is the output of the following program for the following inputs:

(3 Marks)

<pre>char c; switch(c){     case 'a': printf("a");     case 'b': printf("b");     default: printf("z");     case 'c': printf("c"); break;     case 'd': printf("d");     case 'e': printf("e"); }</pre>
---

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 = 15;
if (i % 3 == 0) {
    printf("line 1\n");
} else if (i % 5 == 0) {
    printf("line 2\n");
}
if (i % 15 == 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 = 3.7;
    printf("%d %03d\n", a, a);
    float b = (float) a;
    printf("%5.3f %07.3f\n", b, b + 0.3);
    return 0;
}
```

**OUTPUT**

**B**

```
#define forab(a, b) for (int i = a; i <= b; i++)
#define forba(a, b) for (int i = b; i >= a; i -= 3)

int main() {
    forab(0, 1) {
        forba(0, 3) {
            printf("%d ", i);
        }
    }
    return 0;
}
```

**OUTPUT**

C

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

int main() {
    int a = 19, b = 17;
    printf("%d", sum(a, b) / product(a, b));
    return 0;
}
```

OUTPUT

D

```
#define L1 3
#define L2 3

int main() {
    #if (L2 == 3)
        printf("L2");
    #elif (L1 == 3)
        printf("L1");
    #else
        printf("NA");
    #endif

    return 0;
}
```

OUTPUT

E

```
int main() {
    int a1, a2;
    float x = 3.9, y = -3.9;

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

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

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

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

    return 0;
}
```

OUTPUT