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No. Of Questions : Four
Examiner : Dr. Emad Elsamahy

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CS143 Introduction to Problem Solving and Programming (Final Exam)

(40 Points)

Question One (ILO: G1,I1, I3, K1, K4)

(10 Points)

Mark (✓) or (X) for each of the following sentences:

1. Standard identifier is not allowed to be used as a variable name in C. () ✓
2. All types of loops in C (for, while, and do-while) can be implemented using while loop. () ✓
3. Integer division can be a source of logical error in some C programs. () ✓
4. For each function prototype there must exist a function definition in any C program. () ✓
5. To increment a variable (i) by (1), all the following commands are valid:
i=i+1, i=+1, and i++ () ✓
6. While and do-while loops are equivalent to each other except that while loop will be executed at least one time even its condition is not satisfied. () X
7. The loop in the shown program will be repeated for 5 times. () ✓

```
#include <stdio.h>
int main()
{
    int i;
    while (i<=5)
        printf("Hello\n");
    return 0;
}
```

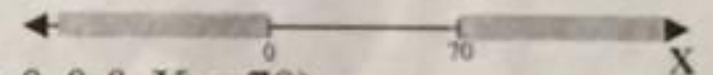
8. Recursion is used as a replacement of looping in C programs. () ✓
9. Linear search is suitable for small unsorted amount data items, while binary search is suitable for large sorted amount data items. () X
10. Elements in a Stack can be saved or retrieved using: push and get. () X

Question Two (ILO: G1,I1, I3, K1, K4)

(10 Points)

Choose the correct answer (a, b, c, or d):

1. The shaded range on the right can be described using:



- a. $(X \geq 0 \parallel X \leq 70)$
 - b. $(X \leq 0 \&\& X \geq 70)$
 - c. $(X \leq 0 \parallel X \geq 70)$
 - d. $(X \geq 0 \&\& X \leq 70)$
2. To use a variable named (Z) in calling a function (Sum), it should be written as:
 - a. Sum(a, b, &Z);
 - b. Sum(a, b, *Z);
 - c. Sum(&a, &b, Z);
 - d. (a) and (b).
 3. After execution of (status=scanf("%lf", &a);), and the user input (a) as 'c'. (status) should return the value of:
 - a. 0. ✓
 - b. 1.
 - c. 2.
 - d. -1.
 4. To use an array variable (List) as a READ ONLY variable in a function header, the following function header can be used:
 - a. get_max(const int List[], int n); ✓
 - b. get_max(int *List[], int n);
 - c. get_max(const int List, int n);
 - d. get_max(int *List, int n);
 5. To increment the content of an array element (e.g. element 6), the following statement can be used:
 - a. X[5]++; ✓
 - b. X[5]+1=X[5];
 - c. X[5]+=1; ✓
 - d. (a) and (c). ✓
 6. Any string in C must be ended with a termination character which is:
 - a. '\0' ✓
 - b. NULL ✓
 - c. '/0'
 - d. (a) or (b).

7. To swap the contents of two variables, without the use of a third variable, the following C code can be used:

a. $y=x+y;$
 $x=y-x;$
 $y=y-x;$
 c. $y=x-y;$
 $x=x-y;$
 $y=x+y;$

b. $x=x+y;$
 $y=x-y;$
 $x=x-y;$
 d. (a), (b), and (c). ✓

8. Stack can be named as:

a. LIFO. ✓
 c. LILO.

b. FIFO.
 d. (a) and (c).

9. For a string variable named (str[15]) which equals to "Mohamed Amr", running the following C code will change the (str) content to:

a. "mOHAMED aMR".
 c. "mohamed amr". ✓

```
for (int i = 0; i < strlen(str); ++i)
    if (islower(str[i]))
        str[i] = toupper(str[i]);
```

b. "MOHAMED AMR".
 d. "Mohamed Amr".

10. function can be used to search for a sub-string in a string.

a. strcat.
 c. strtok.

b. strncat.
 d. strcpy.

Question Three (ILO:G2, G7, I1, I10, I11, K3)

(10 Points)

Trace the following C programs.

1 (4 Points)

```
#include<stdio.h>
#include<string.h>

int main()
{
    char s[35];
    char *a;
    int i=1;

    strcpy(s,"Introduction to problem solving");
    printf("%s\n",s);

    a=strtok(s," ");
    printf("%s.\n",a);
    while (i<=3)
    {
        a=strtok(NULL," ");
        printf("%s.\n",a);
        i++;
    }
}
```

2 (3 Points)

```
#include<stdio.h>

int main()
{
    int a[]={10,3,4,7,2,1};
    int i;

    for (i=0;i<5;i=i+2)
    {
        a[i]=a[i]+a[i+1];
        a[i+1]=a[i+1]*a[i+1];
    }

    for (i=0;i<=5;i++)
        printf("%d\n",a[i]);
}
```

0	10
1	3
2	4
3	7
4	2
5	1

3 (3 Points)

```
#include <stdio.h>
int main()
{
    int d=83;
    if (d>=50)
        printf("The Student Grade is Sufficient");
    else if (d>=65)
        printf("The Student Grade is Good");
    else if (d>=75)
        printf("The Student Garde is Very Good");
    else if (d>=85)
        printf("the Student Grade is Excellent");
    return 0;
}
```


Question Four (ILO: G7, I10, I11, K2)

(10 Points)

Write C program to solve the following problems.

1. It is required to ask the user to enter the following data items for 10 students:

(5 Points)

- Student Name.
- Student GPA.

Then, it is required to print these data sorted in a descending order as follows:

Student Name	(2 tabs)	GPA
Ahmed Foad		3.95
Ali Hassan		3.84

Your solution should contain the following functions:

- A function to accept the student ID and the GPA, which will be stored in a *parallel array*.
- A function to sort the data using any sorting technique (e.g. bubble sort).
- A function to display the data as previously mentioned.

(5 Points)

2. Write a program that accept a series of numbers (with unknown count) ended by zero, then compute and display the following:
- Sum and average of even numbers.
 - Sum and average of odd numbers.

Best Wishes

names
string [10];
int [10] GPA;

```
for(int i=0; i<10; i++){  
    if(x%2==0 && x!=0)  
        printf("enter name of student");  
    scanf("%s", &names[i]);  
    printf("enter GPA");  
    scanf("%d", &GPA[i]);  
}
```