B.Sc. Engg. CSE 1st Semester 04 October 2023 (Afternoon)

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ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)

ORGANISATION OF ISLAMIC COOPERATION (OIC)

Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION **WINTER SEMESTER, 2022-2023**

DURATION: 1 HOUR 30 MINUTES **FULL MARKS: 75**

CSE 4107: Structured Programming I

Programmable calculators are not allowed. Do not write anything on the question paper.

Answer **all 3 (three)** questions. Figures in the right margin indicate full marks of questions whereas corresponding CO and PO are written within parentheses.

1. a) In a cricket game, a batsman can score 0 to 6 runs in a single delivery of a ball. If a batsman scores 4 runs in a single delivery, it is called a "boundary", if the batsman scores 6 runs, it is called an "over-boundary". You will be given a sequence of runs scored by a batsman, your goal is to count how many boundaries and over-boundaries are scored by the batsman. A negative run indicates the end of the input. A sample input and output is given in Table 1. 15 (CO3) (PO1)

Table 1: Sample input and output for Question 1.a)

Sample Input	Sample Output
1 2 4 4 6 -1	Boundaries: 2 Over-boundaries: 1

b) An umpire makes important decisions during a cricket match. Sometimes the decision of an umpire can be changed by a reviewer with the help of a computer. A simplified rule for reviewing an LBW out is provided below: 10 (CO3) (PO1)

- An LBW out depends on 3 factors (pitch, impact, and hit)
- If the original decision by an umpire is "out", then the decision is changed to "not-out" if at least 2 of the factors are wrong.
- If the original decision of an umpire is "not-out", then the decision is changed to "out" if any of the 3 factors is correct.

You will be provided with the original decision of an umpire (O for out, N for not out) and the status of the three factors (1 means correct, 0 means wrong). You have to print the final decision (Out or Not-Out). You need to solve the problem for one input set only.
Some sample input and output pairs are given in Table 2.

Table 2: Sample input and output pairs for Question 1.b)

Sample Input	Sample Output
O 1 0 1	Out
O 0 0 1	Not-Out
N 1 1 1	Out
N 0 0 1	Out
N 0 0 0	Not-Out

2. a) Mr. Y was asked to write a program that reads at most 100 integer values from the user. The program stops reading numbers if the user provides a negative number as input. The program then prints all the numbers (except the negative number) in the reverse order of their input sequence. For example: If the user provides "5 10 4 -2" as input, then the program will print "4 10 5". An attempt to solve the problem is given in Code Snippet 1: 10 (CO2) (PO2)

```
#include<stdio.h>
int main(){
    int ar[100], i;
    while(i<=100){
        scanf("%d",&ar[i]);
            if(ar[i] < 0)
                break;
    }
    while(i>0){
        printf("%d ",&ar[i]);
        i--;
    }
    return 0;
}
```

Code Snippet 1: A C program for Question 2.a)

Due to some errors, the program is not behaving the way it was expected to behave. Fix the errors and rewrite the program, so that it produces the desired output.

b) Consider the program given in Code Snippet 2: 9 (CO2) (PO2)

```
#include<stdio.h>
int main(){
{
int size = 5, i, j;
for(j = 0; j <= i; j++)
for(j = 0; j <= i; j++)
for(i = 0; i < size; i++)
for(j = i; j < size-1; j++)
for(j = i; j < size; j++)
printf(" ");
printf(" ");
printf("*");
printf("*");
printf("\n");
printf("\n");
return 0;
}
}
```

Code Snippet 2: A C program for Question 2.b)

Rearrange the given lines of codes, so that it prints the shape given in Figure 1. *Do not add, remove or modify any given lines of codes.*

```
*         *
**       **
***     ***
****   ****
***** *****
```

Figure 1: Expected shape to print for Question 2.b)

c) For each of the following cases, consider the variables are initialized as below: 4×1.5

`[int a = 0, b = 1, c = 1;]` (CO1)

i. `if(a = 1 || (b=10) && (c=12))` (PO1)
ii. `if(a == 1 || (b=10) && (c=12))`
iii. `if( ++a && -b || -c)`
iv. `if( ++a || -b && -c)`

Find whether each of the conditions are true or false. Also, find the updated values of the variable after evaluating the expression.

3. a) Imagine a cricket game where the number of balls to be bowled in an over is not fixed. The N^{th} over requires N balls to be bowled (For example, 1^{st} over needs 1 ball, 2^{nd} over needs 2 balls, 3^{rd} over needs 3 balls, etc.). Given the total number of balls bowled in a match, you have to print the number of complete overs bowled and the number of balls bowled in the last incomplete over. 15 (CO3) (PO2)

For example: If a total of 8 balls are bowled, then 3 complete overs require (1+2+3) 6 balls and 2 balls are bowled for the last incomplete over. So the output will be "Over: 3.2". Some sample input and output pairs are given in Table 3.

Table 3: Sample input and output pairs for Question 3.a)

Sample Input	Sample Output
8	Over: 3.2
10	Over: 4.0
20	Over: 5.5

b) A digital scoreboard in a cricket field is used to display various information about a game including information about each player. Assume for a cricket match, we only have the birth date of each player, but we want to display their current age on the current date. Given the birth date of a player in the format: day-month-year (e.g., 12-04-1988), your goal is to print his/her age (including days and months) on the current date. Consider that a year always consists of 365 days. 10 (CO3) (PO2)

For example: if a player's date of birth is 12-04-1988, then on 4^{th} October 2023 (04-10-2023), his/her age will be 35 years, 5 months, and 22 days. Some sample input and output pairs are given in Table 4.

Table 4: Sample input and output for Question 3.b)

Sample Input	Sample Output
12-4-1988	Age: 35 years, 5 months, 22 days
28-9-2023	Age: 0 years, 0 months, 6 days
4-9-2023	Age: 0 years, 1 months, 6 days