CS1002 Programming Fundamentals

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Course Instructor

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Roll No	Section	Signature

DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.
Instructions:

1. Verify at the start of the exam that you have a total of four (4) questions printed on eight (08) pages including this title page.
2. Attempt all questions on the question-book and in the given order.
3. The exam is closed books, closed notes. Please see that the area in your threshold is free of any material classified as 'useful in the paper' or else there may a charge of cheating.
4. Read the questions carefully for clarity of context and understanding of meaning and make assumptions wherever required, for neither the invigilator will address your queries, nor the teacher/examiner will come to the examination hall for any assistance.
5. Fit in all your answers in the provided space. You may use extra space on the last page if required. If you do so, clearly mark question/part number on that page to avoid confusion.
6. **Calculators are not Allowed.**
7. Use only your own stationery.
8. Use only permanent ink-pens. Only the questions attempted with permanent ink-pens will be considered. Any part of paper done in lead pencil cannot be claimed for checking/rechecking.

	Q-1	Q-2	Q-3	Q-4	Total
Total Marks	5	12	8	15	**40**
Marks Obtained					

University Answer Sheet Required:		**No**		**Yes**

Q1		2 + 3 = 5

Write the output of the given code and results of the expressions in the space provided.

Sr.	Code	Answer

a.	```cpp
	#include <iostream>
	using namespace std;
	int main()
	{
	    int x = 3;
	    int y = 32;
	    int z = 50;
	    z = y;
	    y = x;
	    x = z;
	    cout << "x: " << x << " y: " ;
	    cout << y << " z: " << z;
	    return 0;
	}```
		Output:
		
		x: 32 y: 3 z: 32

b.	```
	consider the value of n = 5
	
	1: Start
	2: Declare variable a,b,c,n,i
	3: Initialize variable a=1, b=1, i=2
	4: Read n from user
	5: Print a and b
	6: WHILE i<=n
	     6.1 c=a+b
	     6.2 print c
	     6.3 a=b, b=c
	     6.4 i=i+1
	7: Stop```
		Output:
		
		112358

Q2	4 x 3 = 12

Suppose that we have three integer variables: num1, num2 and num3. Write pseudocode for each of the following cases using selection statements that fulfills the given conditions.
Note: You cannot use logical operators (AND, OR) for any purpose. You do not have to write unnecessary statements (for example, taking inputs from user). Only write statements for the given situation.

a. num2 greater than num3 and less than num1 then print "hello" or num2 equals 2 then print "world"

```
if num2 > num3
    if num2 < num1
        print "hello"
    else if num2 == 2
        print "world"
    endif
endif
```

b. num1 is a nonzero positive number and num2 is two greater than num1 then print "I like CS 1002"

```
if num1 > 0
    if num2 > num1 + 2
        print "I like CS 1002"
    endif
endif
```

c. Either num3 or num1 is an even number, and num2 is not a multiple of 4 then print "I enjoy programming"

```
if num3 % 2 == 0
    if num2 % 4 != 0
        print "I enjoy programming"
    endif
else if num1 % 2 == 0
    if num2 % 4 != 0
        print "I enjoy programming"
    endif
endif
```

d. num2 is at-least a three digits number (positive/negative) and ends in a zero (for example: 960, -410, 8750, etc.) then print "`Happy Coding!`"
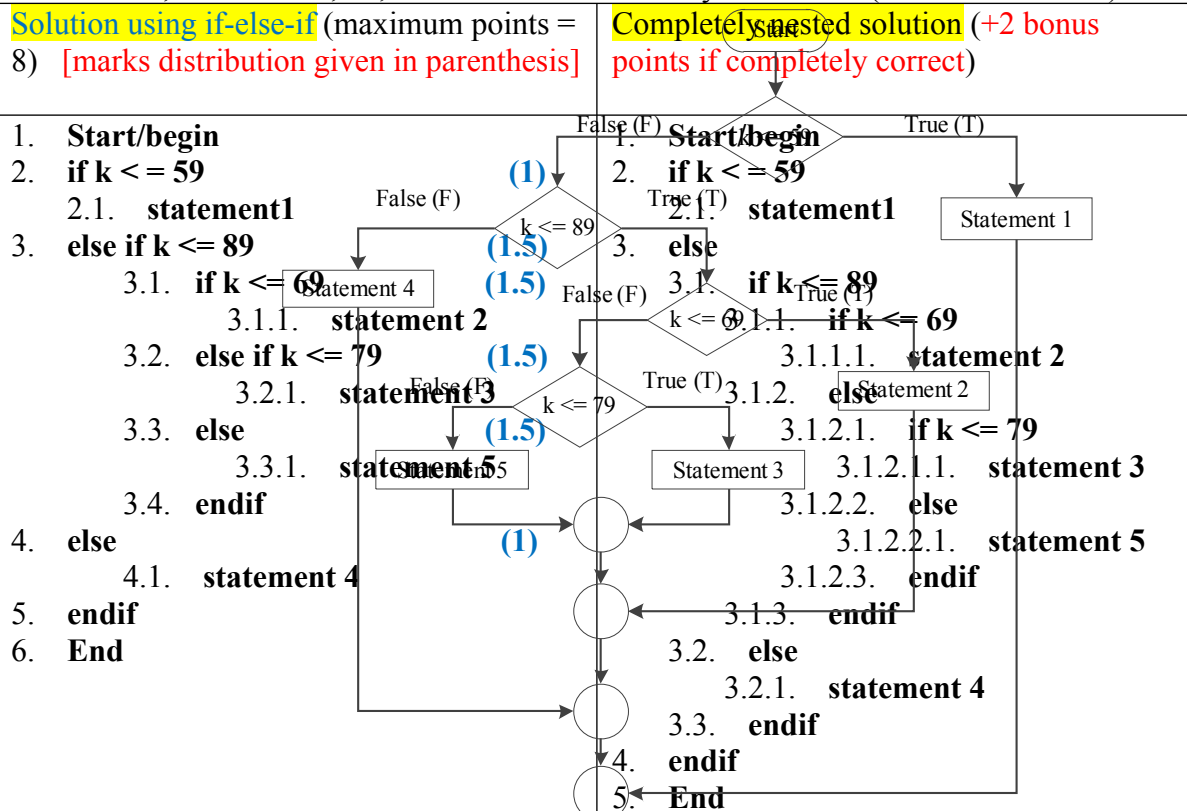
```
if num2 >= 100
     if num2 % 10 == 0
          print "Happy programming!"
     endif
else if num2 <= -100
     if num2 % 10 == 0
          print "Happy programming!"
     endif
endif
```

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Q3	8

Write pseudo-codes for the following flow chart. Use **nested structure for multiple selection** (you may use if-else-if where necessary; **2 bonus points will be given for writing a correct and completely nested structure**). Clearly assign appropriate number to each statement to show the correct order of execution to get full credit.

Statement 1, Statement 2, …, Statement 5 could be any statements (write these as it is).

Solution using if-else-if (maximum points = 8) [marks distribution given in parenthesis]	Completely nested solution (+2 bonus points if completely correct)

Solution using if-else-if:

1. **Start/begin**
2. **if k <= 59**
   2.1. **statement1**
3. **else if k <= 89**   (1.5)
   3.1. **if k <= 69**   (1.5)
      3.1.1. **statement 2**
   3.2. **else if k <= 79**   (1.5)
      3.2.1. **statement3**
   3.3. **else**   (1.5)
      3.3.1. **statement5**
   3.4. **endif**
4. **else**
   4.1. **statement 4**
5. **endif**
6. **End**

Completely nested solution:

1. **Start/begin**
2. **if k <= 59**
   2.1. **statement1**
3. **else**
   3.1. **if k <= 89**
      3.1.1. **if k <= 69**
         3.1.1.1. **statement 2**
      3.1.2. **else**
         3.1.2.1. **if k <= 79**
            3.1.2.1.1. **statement 3**
         3.1.2.2. **else**
            3.1.2.2.1. **statement 5**
         3.1.2.3. **endif**
      3.1.3. **endif**
   3.2. **else**
      3.2.1. **statement 4**
   3.3. **endif**
4. **endif**
5. **End**

Q4	15

A person goes to a store to purchase a grocery with 2000 rupees in his loyalty card of the store. It is a modern store having automated shopping carts. Whenever an item is put into the cart its price is automatically deducted from the card, and remaining balance and total spent amount is shown to the customer on screen. He keeps on adding items to the cart until his balance goes below 300 rupees.

The grocery store sells only three items given below in the table along with their price and item code.

In the end a proper bill is displayed to the customer with each **item name, its quantity, unit price and amount**. The bill also shows total **items bought and total amount spent**. **If an item is not purchased it should not be there in the final bill**. If the amount spent is above 1000 rupees, he is given a surprise discount of 5% and the amount is added back to his balance.

Item code	Item Name	Unit Price
100	Bread	150
200	Jam	215
300	Jelly	65
000	Stop purchasing	

You are required to write down a pseudocode to simulate the above given scenario. The Item number of the product is automatically detected when it is put into the cart. He can select to stop purchasing any time by giving code 000.

Hint: Use loops appropriately. (Forget about the formatting of the output, there should be a single space between two values in a row)

Sample Bill in the end

```
Item Qty Price Amount
Bread 3 150 300
Jam 2 215 430
-------------------
Total 5 --- 730
```

1. Start
2. Declare Balance=2000, Purchase=0, breadCount=0, JamCount=0, JellyCount=0, ItemNo =-1   *(2 marks)*
3. WHILE Balance > 300 AND ItemNo ≠ 000 THEN   *(2 marks)*
   - 3.1. Read/input ItemNo
   - 3.2. If ItemNo = 100 then   *(2 marks)*
     - 3.2.1. Balance ← Balance – 150
     - 3.2.2. Purchase ← Purchase + 150
     - 3.2.3. breadCount ← breadCount + 1
   - 3.3. Else if ItemNo = 200 then   *(2 marks)*
     - 3.3.1. Balance ← Balance – 215
     - 3.3.2. Purchase ← Purchase + 215
     - 3.3.3. jamCount ← jamCount + 1
   - 3.4. ItemNo = 100 then   *(2 marks)*
     - 3.4.1. Balance ← Balance – 65
     - 3.4.2. Purchase ← Purchase + 65
     - 3.4.3. jellyCount ← jellyCount + 1
   - 3.5. endif
4. ENDWHILE
5. Print "Item Qty Price Amount"
6. If breadCount ≠ 0 then
   - 6.1. Print "Bread", ' ' , breadCount, ' ' , 150, breadCount * 150
7. Endif
8. If JamCount ≠ 0 then   *(3 marks)*
   - 8.1. Print "Jam", ' ' , jamCount, ' ' , 215, jamCount * 215
9. Endif
10. If jellyCount ≠ 0 then
    - 10.1. Print "Jelly", ' ' , jellyCount, ' ' , 65, jellyCount * 65
11. Endif
12. Print "Total", ' ' , breadCount + jamCount + jellyCount, ' --- ' , Purchase
13. If Purchase ≥ 1000 then   *(2 marks)*
    - 13.1. Print "Discount = " , (Balance * 5 /100)
    - 13.2. Print "Payable = ", Purchase - (Balance * 5 /100)
    - 13.3. Balance ← Balance + (Balance * 5 /100)
14. Endif
15. End