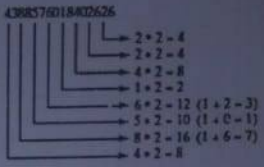
COMSATS University, Islamabad
Terminal Examination, Fall 2021
Department of Computer Science

Course Code – Title:	CSC101 – Introduction to ICT	**Dated:**	January, 2022
Time Allowed:	3hrs	**Marks:**	50

1. Double every second digit from right to left. If doubling of a digit results in a two-digit number, add up the two digits to get a single-digit number.
2. Now add all single-digit numbers from Step 1.
   4 + 4 + 8 + 2 + 3 + 1 + 7 + 8 = 37
3. Add all digits in the odd places from right to left in the card number.
   6 + 6 + 0 + 8 + 0 + 7 + 8 + 3 = 38
4. Sum the results from Steps 2 and 3.
   37 + 38 = 75
5. If the result from Step 4 is divisible by 10, the card number is valid; otherwise, it is invalid. For example, the number 4388576018402626 is invalid, but the number 4388576018410707 is valid.



Write a program that prompts the user to enter a credit card number as an integer. Display whether the number is valid or invalid. Design your program to use the following functions:

```
# Return true if the card number is valid
def isValid(number):

# Get the result from Step 2
def sumOfDoubleEvenPlace(number):

# Return this number if it is a single digit, otherwise, return the sum of the two digits
def getDigit(number):

# Return sum of odd place digits in number
def sumOfOddPlace(number):

# Return true if the digit d is a prefix for number
def prefixMatched(number, d):

# Return the number of digits in d
def getSize(d):

# Return the first k number of digits from number. If the number of digits in number is less than k, return number.
def getPrefix(number, k):
```

Good Luck ☺

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Q6. Mr. Jones, a history instructor, would like to know the percentage increase in the population of the United States per decade given the first decade and the last decade. Other given data include the population at the beginning of each decade. Draw the flowchart for this problem. (5 marks)
*(Hint: Percentage = (present decade population - previous decade population)/ present population * 100.)*

PART 3

(Question 7-9 in Part3 are mapped to CLO4)

Q7. Suppose you want to develop a program to play a lottery. The program randomly generates a three-digit lottery number. The program prompts the user to enter a three-digit number and determines whether the user wins according to the following rules: (5 marks)

1. If the user input matches the lottery number in the exact order, the award is $10,000.
2. If all the digits in the user input match all the digits in the lottery number, the award is $3,000.
3. If one digit in the user input matches a digit in the lottery number, the award is $1,000.

Q8. Twin primes are a pair of prime numbers that differ by 2. For example, 3 and 5, 5 and 7, and 11 and 13 are twin primes. Write a function to find all twin primes less than 1,000. Display the output as follows: (5 marks)
(3, 5)
(5, 7)...

Q9. Credit card numbers follow certain patterns: It must have between 13 and 16 digits, and the number must start with: (10 marks)

- 4 for Visa cards
- 5 for MasterCard credit cards
- 37 for American Express cards
- 6 for Discover cards

The Luhn's algorithm is useful to determine whether a card number is entered correctly or whether a credit card is scanned correctly by a scanner. Credit card numbers are generated following this validity check, which can be described as follows (for illustration consider the card number 4388576018402626):

FA21-BSE-037

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PART 1

(All the questions in Part1 are mapped to CLO1)

Q1. **a.** A student entered a math problem, 100*48. Explain how it will be processed in the memory with respect to the machine cycle. Support your answer with the diagram. (2.5 marks)
b. Now a student wants to solve multiple math problems. Explain how it will be processed using pipelining. (2.5 marks)

Q2. **a.** Explain the function of memory subsystem considering the windows booting process. Support your answer with the diagram. (2.5 marks)
b. Explain the difference between circuit switching, packet switching and broad casting using diagram. (2.5 marks)

Q3. **a.** Describe Cyber-Crime? (2.5 marks)
b. Explain different types of cybercrimes performed to steal information from a compromised PC. (2.5 marks)

Q4. **a.** Draw the cloud computing architecture that will show the access mechanism and storage hierarchy of clouds resources. (2.5 marks)
b. What is the difference between cloud computing and edge computing. Explain the best possible application for both. (2.5 marks)

PART 2

(All the questions in Part2 are mapped to CLO3)

Q5. A company that issues check-cashing cards uses an algorithm to create card numbers. The algorithm adds the digits of a four-digit number, and then adds a fifth digit of 0 or 1 to make the sum of the digits even. The last digit in the number is called the check digit. Complete the six problem-solving steps to develop a solution that accepts a four-digit number into one variable, adds the check digit, and prints the original number and the new number. (5 marks)
Test your flowchart with the following data:
Original Number= 4737 (47371) and 4631 (46310).