Divya S R, Assistant Professor,
Department of Computer Applications,
AES National Degree College, Gauribidanur.

PART - A

1. Check if a number belongs to the Fibonacci Sequence

```
n = int(input("Enter the number you want to check: "))
# variables for generating fibonacci sequence
f3 = 0
f1 = 1
f2 = 1
# 0 and 1 both are fibonacci numbers
if n == 0 or n == 1:
    print("Given number is fibonacci number")
else:
# generating the fibonacci numbers until the generated number is less than  N
    while f3 < n:
        f3 = f1 + f2
        f2 = f1
        f1 = f3
    if f3 == n:
        print("Given number is fibonacci number")
    else:
        print("No it’s not a fibonacci number")
```

Output:

```
Enter the number you want to check: 5
Given number is fibonacci number
```

```
Enter the number you want to check: 6
No it’s not a fibonacci number
```

PART - A

2. Solve Quadratic Equations

```
import cmath
a = float(input('Enter a: '))
b = float(input('Enter b: '))
c = float(input('Enter c: '))
  # calculate the discriminant
d = (b**2) - (4*a*c)
  # find two solutions
sol1 = (-b-cmath.sqrt(d))/(2*a)
sol2 = (-b+cmath.sqrt(d))/(2*a)
print('The solution are {0} and {1}'.format(sol1,sol2))
```

Output:

```
Enter a: 3
Enter b: 4
Enter c: 5
The solution are (-0.6666666666666666-1.1055415967851332j) and (-0.6666666666666666+1.1055415967851332j)
```

PART - A

3. Find the sum of n natural numbers

```
num = 20
sum_of_numbers = 0
while num > 0:
   sum_of_numbers += num
   num -= 1
print("The sum is", sum_of_numbers)
```

Output

```
The sum is 210
```

PART - A

4. Display Multiplication Tables

```
number = int(input("Enter a number: "))
# We are using "for loop" to iterate the multiplication 10 times
print("The Multiplication Table of: ", number)
for count in range(1, 11):
    print(number, 'x', count, '=', number * count)
```

Output

```
Enter a number: 18
The Multiplication Table of:  18
18 x 1 = 18
18 x 2 = 36
18 x 3 = 54
18 x 4 = 72
18 x 5 = 90
18 x 6 = 108
18 x 7 = 126
18 x 8 = 144
18 x 9 = 162
18 x 10 = 180
```

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PART - A

5. Check if a given number is a Prime Number or not

```
num = int(input("Enter a number="))
if num > 1:
   for i in range(2, num):
      if (num % i) == 0:
         print(num, "is not a prime number")
         break
   else:
      print(num, "is a prime number")
else:
   print(num, "is not a prime number")
```

Output:

```
Enter a number=13
13 is a prime number
```

```
Enter a number=12
12 is not a prime number
```

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PART - A

6. Implement a sequential search

```
print(end="Enter the Size: ")
arrSize = int(input())
print("Enter " + str(arrSize) + " Elements: ")
arr = []
for i in range(arrSize):
    arr.append(input())
print("Enter an Element to Search: ")
elem = input()
chk = 0
for i in range(arrSize):
  if elem == arr[i]:
    index = i
    chk = 1
    break
if chk == 1:
    print("\nElement Found at Index Number: " + str(index))
else:
    print("\nElement doesn't found!")
```

Output:

```
Enter the Size: 5
Enter 5 Elements:
1
2
3
4
5
Enter an Element to Search:
3

Element Found at Index Number: 2
```

```
Enter the Size: 5
Enter 5 Elements:
1
2
3
4
5
Enter an Element to Search:
7
```

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PART - A

7. Create a calculator program

```
def add(p, q):
    return p + q


def subtract(p, q):
    return p - q


def multiply(p, q):
    # This function is used for multiplying two numbers
    return p * q


def divide(p, q):
    # This function is used for dividing two numbers
    return p / q


print("Please select the operation.")
print("a. Add")
print("b. Subtract")
print("c. Multiply")
print("d. Divide")
choice = input("Please enter choice (a/ b/ c/ d): ")
num_1 = int(input("Please enter the first number: "))
num_2 = int(input("Please enter the second number: "))

if choice == 'a':
    print(num_1, " + ", num_2, " = ", add(num_1, num_2))

elif choice == 'b':
    print(num_1, " - ", num_2, " = ", subtract(num_1, num_2))
elif choice == 'c':
    print(num_1, " * ", num_2, " = ", multiply(num_1, num_2))
elif choice == 'd':
    print(num_1, " / ", num_2, " = ", divide(num_1, num_2))
else:
    print("This is an invalid input")
```

PART - A

Output:

```
Please select the operation.
a. Add
b. Subtract
c. Multiply
d. Divide
Please enter choice (a/ b/ c/ d): q
Please enter the first number: 1
Please enter the second number: 2
This is an invalid input
```

```
Please select the operation.
a. Add
b. Subtract
c. Multiply
d. Divide
Please enter choice (a/ b/ c/ d): c
Please enter the first number: 5
Please enter the second number: 6
5  *  6  =  30
```

```
Please select the operation.
a. Add
b. Subtract
c. Multiply
d. Divide
Please enter choice (a/ b/ c/ d): a
Please enter the first number: 3
Please enter the second number: 4
3  +  4  =  7
```

```
Please select the operation.
a. Add
b. Subtract
c. Multiply
d. Divide
Please enter choice (a/ b/ c/ d): b
Please enter the first number: 5
Please enter the second number: 6
5  -  6  =  -1
```

```
Please select the operation.
a. Add
b. Subtract
c. Multiply
d. Divide
Please enter choice (a/ b/ c/ d): d
Please enter the first number: 4
Please enter the second number: 5
4  /  5  =  0.8
```

PART - A

8. Explore string functions

```
str1 = "aes national college"

# length of a string
print("Length of the string", len(str1))

# uppercase conversion
print("upper case of the string", str1.upper())

# Lower conversion
print("Lower case of the string", str1.lower())

# Capitalize the first letter
print("Lower case of the string", str1.capitalize())

# Replace a substring
print("Replace substring 'aes' with 'AES' :    ", str1.replace("aes","AES"))

# Given string is digit or not
print("Result=  ", str1.isdigit())

# Given string is alpha numeric or not
print("Result is=", str1.isalnum())

# index of a string
print("Result is=", str1.index("college"))
```

Output:

```
Length of the string 20
upper case of the string AES NATIONAL COLLEGE
Lower case of the string aes national college
Lower case of the string Aes national college
Replace substring 'aes' with 'AES' :     AES national college
Result=   False
Result is= False
Result is= 13
```

PART - A

9. Implement Selection Sort

```
def selection_sort(array):
    for i in range(0, len(array) - 1):
        smallest = i
        for j in range(i + 1, len(array)):
            if array[j] < array[smallest]:
                smallest = j
        array[i], array[smallest] = array[smallest], array[i]


array = input('Enter the list of numbers: ').split()
array = [int(x) for x in array]
selection_sort(array)
print('List after sorting is : ', end='')
print(array)
```

Output:

```
Enter the list of numbers: 4 3 8 9 1
List after sorting is :  [1, 3, 4, 8, 9]
```

PART - A

10. Implement Stack

```
list=[]
list.append(1) # append 1
print("push:", list)
list.append(2) # append 2
print("push:", list)
list.append(3) # append 3
print("push:", list)
list.pop() # pop 3
print("pop:", list)
print("peek:", list[-1]) # get top most element
list.pop() # pop 2
print("pop:", list)
print("peek:", list[-1]) # get top most element
```

Output:

```
push: [1]
push: [1, 2]
push: [1, 2, 3]
pop: [1, 2]
peek: 2
pop: [1]
peek: 1
```

PART - A

11. Read and write into a file

```
with open("computer.txt", "w") as file:
    file.write("Hello world!")
    with open("computer.txt", "r")as file:
        content = file.read()
        print(content)
```

Output:


```
Hello world!
```