Question 1

a)

```
str1 = “Fundamentals of Programming (CS-114) is a ”
credits = 3
str2 = “ credit hours course and I earned ”
gps = 10.5
str3 = “ GPs in the course.”
print(f’{str1}{credits:d}{str2}{gps:.1f}{str3}’)
```

Points = 0.5 + 0.3 x 5 = 2

b)

Variable Name	Data Type
credit_hours	int
duration	float
weeks	int

Points = 0.5 x 6 = 3

c)

```
For benzene molecule:
Number of Atoms = 12
Number of Bonds = 12
C-C Bond Energy = 912.9000 kcal/mol
C-H Bond Energy =   112.5000 kcal/mol
```

Points = 1 x 5 = 5

Question 2

and Operator

Boolean Variable	Logical Operator	Boolean Variable	Output
True	and	True	True
True	and	False	False
False	and	True	False
False	and	False	False

Points = 1 x 4 = 4

or Operator

Boolean Variable	Logical Operator	Boolean Variable	Output
True	or	True	True
True	or	False	True
False	or	True	True
False	or	False	False

Points = 1 x 4 = 4

not Operator

Logical Operator	Boolean Value	Output
not	True	False
not	False	True

Points = 1 x 2 = 2

Question 3

```
import math as m → 2

m_init = 100 → 0.5
time = 5 → 0.5
decay_const = 0.322 → 0.5
m_time = m_init*m.exp(-decay_const*time) → 2
print(f'Amount, N(t), left after {time:d} s = {m_time:.3f} grams')
```

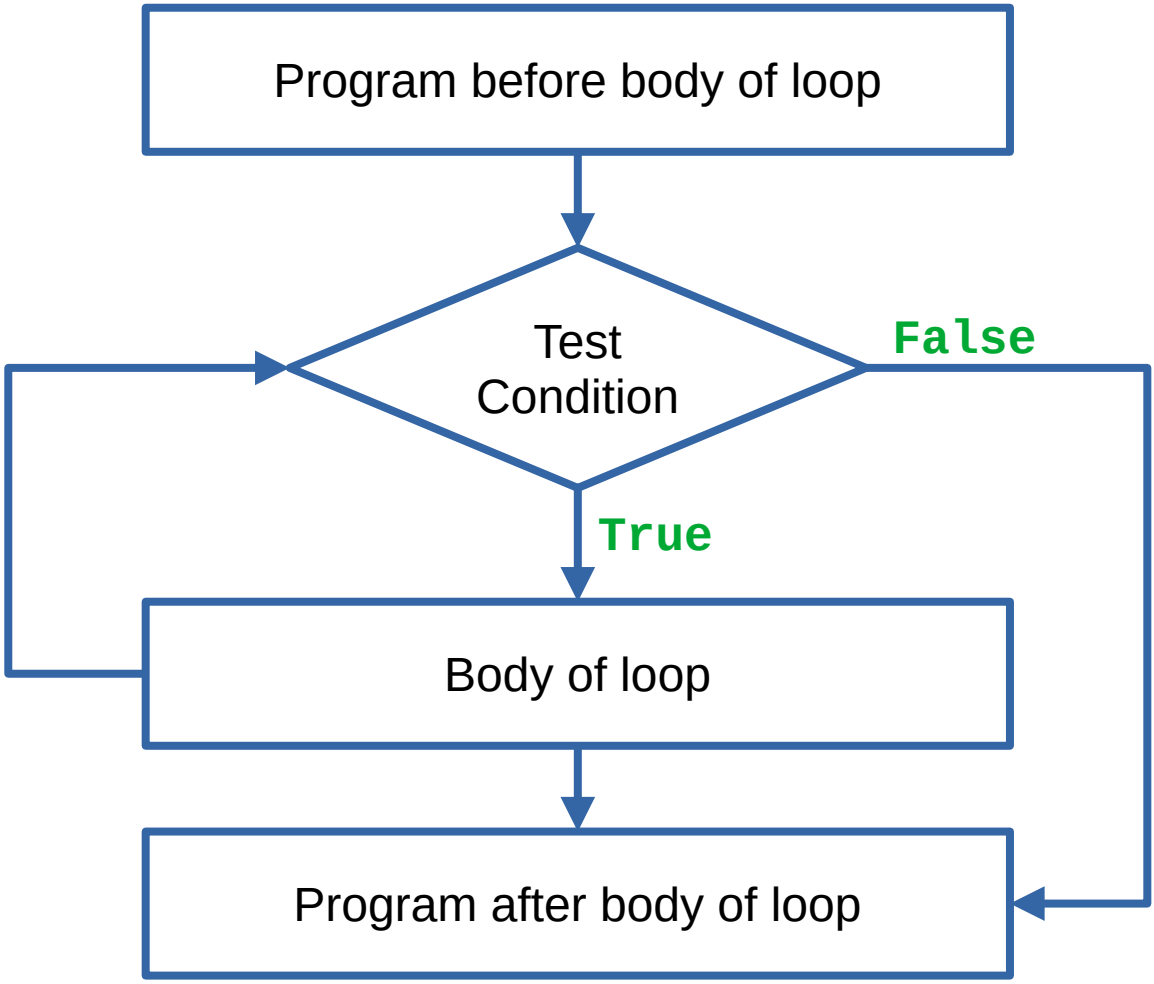
Breakdown of print

```
print(f'') → 0.5
Amount, → 0.5
N(t), → 0.5
left after → 0.5
{time:d} → 0.5
s → 0.5
= → 0.5
{m_time:.3f} → 0.5
grams → 0.5
```

Points = 2 + 0.5 x 3 + 2 + 0.5 x 9 = 10

Question 4

a) Algorithmic Flowchart



Points = 5

b) Python program

```
cp = float(input("Enter the specific heat of water: ")) → 0.5
init_temp = float(input("Enter initial temperature: ")) → 0.5
mass = 3 # kg → 1
final_temp = 25 # celcius → 1
counter = 1 → 1
print("Sr. No.    Ti (Celcius)    Q (kJ)") → 0.5
print("=======    ============    =========") → 0.5
while final_temp <= 95: → 1
    heat = mass*cp*(final_temp - init_temp) → 1
    print(f'{counter:<7d}    {final_temp:<12.0f}    {heat:<7.4f}') → 1
    final_temp += 10 → 1
    counter += 1 → 1
```

Points = 10

c) Explanation of program

Line #	Description
1	Prompt the user to enter the value of specific heat and assign it to the variable cp.
2	Prompt the user to enter the initial temperature and assign it to the variable init_temp.
3	Assign 3 to the variable mass.
4	Assign 25 to the variable final_temp.
5	Assign 1 to the variable counter.
6	Initialize conditional loop with the condition that the loop continues unless the final temperature is less than or equal to 95.
7	Use print function to print heading to the standard output display device. There is a space of four characters between headings.
8	Use print function to print line below headings to the standard output display device. There is a space of four characters between the lines.
9	Compute the value of heat using the defined variables and assign it to the variable heat.
10	Print serial number, final temperature, and heat to the standard output display device. Serial number is printed in left aligned in seven reserved spaces, final temperature is printed left aligned with zero decimal places in twelve reserved spaces, and heat is printed left aligned with three decimal places in seven reserved spaces. There is a space of four spaces between the variables.
11	Increment the variable final_temp by 10.
12	Increment the variable counter by 1.

Points = 2.5

d) Program output

```
Enter the specific heat of water: 4.2
Enter initial temperature: 0
Sr. No.    Ti (Celcius)    Q (kJ)
=======    ============    =========
1          25              315.0000
2          35              441.0000
3          45              567.0000
4          55              693.0000
5          65              819.0000
6          75              945.0000
7          85              1071.0000
8          95              1197.0000
```

Points = 0.25 x 10