101, 102, 108, 103, 109, 117, 120, 120, 128, 138

101, 102, 108, 103, 109, 117, 120, 120, 128, 138

101, 102, 108, 103, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138
                                                    s

4th iteration :

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138
                                                    s

5th iteration:

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138
                                                    s

Bubble Sort :

[102, 108, 101, 109, 117, 103, 120, 138, 128, 120]

1ˢᵗ iteration :

102, 108, 101, 109, 117, 103, 120, 138, 128, 120

102, 108, 101, 109, 117, 103, 120, 138, 128, 120

102, 101, 108, 109, 117, 103, 120, 138, 128, 120

102, 101, 108, 109, 117, 103, 120, 138, 128, 120

102, 101, 108, 109, 117, 103, 120, 138, 128, 120

102, 101, 108, 109, 103, 117, 120, 138, 128, 120

102, 101, 108, 109, 103, 117, 120, 138, 128, 120

102, 101, 108, 109, 103, 117, 120, 138, 128, 120

102, 101, 108, 109, 103, 117, 120, 128, 138, 120

102, 101, 108, 109, 103, 117, 120, 128, 120, 138
                                                    s

2ⁿᵈ iteration :

102, 101, 108, 109, 103, 117, 120, 128, 120, 138

101, 102, 108, 109, 103, 117, 120, 128, 120, 138

101, 102, 108, 109, 103, 117, 120, 128, 120, 138

101, 102, 108, 109, 103, 117, 120, 128, 120, 138

101, 102, 108, 103, 109, 117, 120, 128, 120, 138

101, 102, 108, 103, 109, 117, 120, 128, 120, 138

101, 102, 108, 103, 109, 117, 120, 128, 120, 138

101, 102, 108, 103, 109, 117, 120, 128, 120, 138

101, 102, 108, 103, 109, 117, 120, 120, 128, 138
                                                    s

3ʳᵈ iteration :

5ᵗʰ iteration

28, 35, 9, 18, 42, 46, 50, 65, 76

28, 35, 9, 18, 42, 46, 50, 65, 76

28, 9, 35, 18, 42, 46, 50, 65, 76

28, 9, 18, 35, 42, 46, 50, 65, 76

28, 9, 18, 35, 42, 46, 50, 65, 76
                           S

ᵗʰ iteration :

28, 9, 18, 35, 42, 46, 50, 65, 76

9, 28, 18, 35, 42, 46, 50, 65, 76

9, 18, 28, 35, 42, 46, 50, 65, 76

9, 18, 28, 35, 42, 46, 50, 65, 76
                           S

7ᵗʰ iteration :

9, 18, 28, 35, 42, 46, 50, 65, 76

9, 18, 28, 35, 42, 46, 50, 65, 76

9, 18, 28, 35, 42, 46, 50, 65, 76
                           S

ᵗʰ iteration :

9, 18, 28, 35, 42, 46, 50, 65, 76

9, 18, 28, 35, 42, 46, 50, 65, 76
                           S

[9, 18, 28, 35, 42, 46, 50, 65, 76] ⇒ sorted

Question 05 :-

[102, 108, 101, 109, 117, 103, 120, 138, 128, 12

Insertion Sort :-

102, 108, 101, 107, 117, 103, 120, 138, 128, 120
_s_   _us_

     current 108

102, 108, 101, 109, 117, 103, 120, 138, 128, 120   current 101
_s_   _us_

101, 102, 108, 109, 117, 103, 120, 138, 128, 120   current 101
_s_   _us_

101, 102, 108, 109, 117, 103, 120, 138, 128, 120   current 117
_s_   _us_

101, 102, 108, 109, 117, 103, 120, 138, 123, 128   current 103
_s_   _us_

101, 102, 103, 108, 109, 117, 120, 138, 128, 120   current 120
_s_   _us_

101, 102, 103, 108, 109, 117, 120, 138, 128, 120   current 138
_s_   _us_

101, 102, 103, 108, 109, 117, 120, 138, 128, 120   current 123
_s_   _us_

101, 102, 103, 108, 109, 117, 120, 128, 138, 120   current 120
_s_   _us_

101, 102, 103, 108, 109, 117, 120, 120, 128, 138 → sorted

Selection Sorting :

102, 108, 101, 107, 117, 103, 120, 138, 128, 120   exchange 101 with 102
        _us_

101, 108, 102, 109, 117, 103, 120, 138, 128, 120   exchange 102 with 108
_s_   _us_

101, 102, 108, 109, 117, 103, 120, 138, 128, 120   exchange 103 with 108
_s_   _us_

101, 102, 103, 109, 117, 108, 120, 138, 128, 120   exchange 108 with 109
_s_   _us_

101, 102, 103, 108, 117, 109, 120, 138, 128, 120   exchange 109 with 117
_s_   _us_

101, 102, 103, 108, 109, 117, 120, 138, 128, 120   no exchange
_s_   _us_

101, 102, 103, 108, 109, 117, 120, 138, 128, 120
_s_   _us_

101, 102, 103, 108, 109, 117, 120, 138, 128, 120   exchange 120 with 138
_s_   _us_

101, 102, 103, 108, 109, 117, 120, 120, 128, 138
_s_   _us_

6ᵗʰ iteration :

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138
                                          s

7ᵗʰ iteration :

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138
                                      s

8ᵗʰ iteration :

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138

101, 102, 103, 108, 109, 117, 120, 120, 128, 138
                                  s

9ᵗʰ iteration :

101, 102, 103, 108, 109, 117, 120, 120, 128, 128

101, 102, 103, 108, 109, 117, 120, 120, 128, 138
                              s

[101, 102, 103, 108, 109, 117, 120, 120, 128, 138] sort

2nd iteration :

46, 35, 28, 50, 65, 9, 18, 42, 76

35, 46, 28, 50, 65, 9, 18, 42, 76

35, 28, 46, 50, 65, 9, 18, 42, 76

35, 28, 46, 50, 65, 9, 18, 42, 76

35, 28, 46, 50, 65, 9, 18, 42, 76

35, 28, 46, 50, 9, 65, 18, 42, 76

35, 28, 46, 50, 9, 18, 65, 42, 76

35, 28, 46, 50, 9, 18, 42, 65, 76
S

3rd iteration :

35, 28, 46, 50, 9, 18, 42, 65, 76

28, 35, 46, 50, 9, 18, 42, 65, 76

28, 35, 46, 50, 9, 18, 42, 65, 76

28, 35, 46, 50, 9, 18, 42, 65, 76

28, 35, 46, 9, 50, 18, 42, 65, 76

28, 35, 46, 9, 18, 50, 42, 65, 76

28, 35, 46, 9, 18, 42, 50, 65, 76
S

4th iteration :

28, 35, 46, 9, 18, 42, 50, 65, 76

28, 35, 46, 9, 18, 42, 50, 65, 76

28, 35, 46, 9, 18, 42, 50, 65, 76

28, 35, 9, 46, 18, 42, 50, 65, 76

28, 35, 9, 18, 46, 42, 50, 65, 76

28, 35, 9, 18, 42, 46, 50, 65, 76

Selection Sort :

50, 46, 35, 28, 65, 76, 9, 18, 42   exchange

9, 46, 35, 28, 65, 76, 50, 18, 42   exchange 18 with

9, 18, 35, 28, 65, 76, 50, 46, 42   exchange 28 with

9, 18, 28, 35, 65, 76, 50, 46, 42   no exchanging

9, 18, 28, 35, 65, 76, 50, 46, 42   exchanging 42

9, 18, 28, 35, 42, 76, 50, 46, 65   exchange 46

9, 18, 28, 35, 42, 46, 50, 76, 65   no exchange

9, 18, 28, 35, 42, 46, 50, 76, 65   exchange 65 with

9, 18, 28, 35, 42, 46, 50, 65, 76

9, 18, 28, 35, 42, 46, 50, 65, 76   → sorting

Buble Sorting :-

50, 46, 35, 28, 65, 76, 9, 18, 42

1ˢᵗ iteration :

50, 46, 35, 28, 65, 76, 9, 18, 42

46, 50, 35, 28, 65, 76, 9, 18, 42

46, 35, 50, 28, 65, 76, 9, 18, 42

46, 35, 28, 50, 65, 76, 9, 18, 42

46, 35, 28, 50, 65, 76, 9, 18, 42

46, 35, 28, 50, 65, 76, 9, 18, 42

46, 35, 28, 50, 65, 9, 76, 18, 42

46, 35, 28, 50, 65, 9, 18, 76, 42

46, 35, 28, 50, 65, 9, 18, 42, 76

31, 32, 33, 35, 36, 38, 39, 40

31, 32, 33, 35, 36, 38, 39, 40
                    s

5th iteration:

31, 32, 33, 35, 36, 38, 39, 40

31, 32, 33, 35, 36, 38, 39, 40

31, 32, 33, 35, 36, 38, 39, 40
              s

6th iteration:

31, 32, 33, 35, 36, 38, 39, 40

31, 32, 33, 35, 36, 38, 39, 40
                s

7th iteration:

Sorted ← [31, 32, 33, 35, 36, 38, 39, 40]

Question 4..

[50, 46, 35, 28, 65, 76, 9, 18, 42]

Insertion Sort:

[50, 46, 35, 28, 65, 76, 9, 18, 42]   current 46
  s   us

46, 50, 35, 28, 65, 76, 9, 18, 42   current 35
  s   us

35, 46, 50, 28, 65, 76, 9, 18, 42   current 28
  s

28, 35, 46, 50, 65, 76, 9, 18, 42   current 65
  s   un

28, 35, 46, 50, 65, 70, 9, 18, 42   current 70
        s   us

28, 35, 46, 50, 65, 70, 9, 18, 42   current 9
        s   us

9, 28, 35, 46, 50, 65, 70, 18, 42   current 18
        s

9, 18, 28, 35, 46, 50, 65, 70, 42   current 42
          s   un

9, 18, 28, 35, 42, 46, 65, 70 → sorted
                          un

35, 38, 32, 39, 31, 33, 36, 40

35, 38, 32, 39, 31, 33, 36, 40

35, 32, 38, 39, 31, 33, 36, 40

35, 32, 38, 39, 31, 33, 36, 40

35, 32, 38, 31, 39, 33, 36, 40

35, 32, 38, 31, 33, 39, 36, 40

35, 32, 38, 31, 33, 36, 39, 40
$$_S$$

2nd iteration :

35, 32, 38, 31, 33, 36, 39, 40

32, 35, 38, 31, 33, 36, 39, 40

32, 35, 38, 31, 33, 36, 39, 40

32, 35, 31, 38, 33, 36, 39, 40

32, 35, 31, 33, 38, 36, 39, 40

32, 35, 31, 33, 36, 38, 39, 40
$$_S$$

3rd iteration :

32, 35, 31, 33, 36, 38, 39, 40

32, 35, 31, 33, 36, 38, 39, 40

32, 31, 35, 33, 36, 38, 39, 40

32, 31, 33, 35, 36, 38, 39, 40

32, 31, 33, 35, 36, 38, 39, 40
$$_S$$

4th iteration:

32, 31, 33, 35, 36, 38, 39, 40

31, 32, 33, 35, 36, 38, 39, 40

Question 3:

[35, 38, 32, 39, 31, 33, 36, 40]

Insertion Sort:-

[35, 38, 32, 39, 31, 33, 36, 40]   current 38
   s   us

35, 38, 32, 39, 31, 33, 36, 40   current 32
   s   us

32, 35, 38, 39, 31, 33, 36, 40   current 39
   s   us

32, 35, 38, 39, 31, 33, 36, 40   current 31
   s   us

31, 32, 35, 38, 39, 33, 36, 40   current 33
   s   us

31, 32, 33, 35, 38, 39, 36, 40   current 36
   s   us

31, 32, 33, 35, 36, 38, 39, 40   ⇒ sorted
   s

Selection Sort:-

35, 38, 32, 39, 31, 33, 36, 40   31 exchange with 35
         un

31, 38, 32, 39, 35, 33, 36, 40   exchange 32 with 38
   s

31, 32, 38, 39, 35, 33, 36, 40   exchange 33 with 38
   s

31, 32, 33, 39, 35, 38, 36, 40   exchange 35 with 39
   s

31, 32, 33, 35, 39, 38, 36, 40   exchange 36 with 39
   s

31, 32, 33, 35, 36, 38, 39, 40   no exchanging
   s

31, 32, 33, 35, 36, 38, 39, 40
   s

31, 32, 33, 35, 36, 38, 39, 40   ⇒ sorted
   s

Bubble Sort:

[35, 38, 32, 39, 31, 33, 36, 40]

5th iteration :

[9, 10, 8, 12, 15, 18, 20]

[9, 10, 8, 12, 15, 18, 20]

[9, 8, 10, 12, 15, 18, 20]

6th iteration :

[9, 8, 10, 12, 15, 18, 20]

[8, 9, 10, 12, 15, 18, 20]

Instertion Sort :

[18, 12, 9, 20, 15, 10, 8]

[18, 12, 9, 20, 15, 10, 8]   current 12

[12, 18, 9, 20, 15, 10, 8]   current 9

[9, 12, 18, 20, 15, 10, 8]   current 20

[9, 12, 18, 20, 15, 10, 8]   current 15

[9, 12, 15, 18, 20, 10, 8]   current 10

[9, 10, 12, 15, 18, 20, 8]   current 8

[8, 9, 10, 12, 15, 18, 20] ⇒ sorted

Selection Sort :

[18, 12, 9, 20, 15, 10, 8]   exchange 8 with 18

[8, 12, 9, 20, 15, 10, 18]   exchange 9 with 12

[8, 9, 12, 20, 15, 10, 18]   exchange 10 with 12

[8, 9, 10, 20, 15, 12, 18]   exchange 12 with 20

[8, 9, 10, 12, 15, 20, 18]   No exchanging

[8, 9, 10, 12, 15, 20, 18]   exchange 18 with 20

[8, 9, 10, 12, 15, 18, 20] ⇒ sorted

Programming Fundamental

Question 1:.

→ (11,1,5,4,3,2)

(i) Insertion Sort :

11 . 1 . 5 . 4 . 3 . 2	current 1
1 , 11 . 5 . 4 , 3 , 2	current 5
1 , 5 , 11 , 4 , 3 , 2	current 4
1 , 4 , 5 , 11 , 3 , 2	current 3
1 , 3 , 4 , 5 , 11 , 2	current 2
1 , 2 , 3 , 4 , 5 , 11 . → Sorted	

(ii) Selection Sort :

11 , 1 , 5 , 4 , 3 , 2	change 1₅ with 11
[1 , 11 , 5 , 4 , 3 , 2]	chang 2 with 11
1 , 2 , 5 , 4 , 3 , 11	hang 3 with 5
1 , 2 , 3 , 4 , 5 , 11	no changing
1 , 2 , 3 , 4 , 5 , 11	
1 , 2 , 3 , 4 , 5 , 11	
1 , 2 , 3 , 4 , 5 , 11	⇒ Sorted

Bubble Sorting :

1ˢᵗ iter: 11 , 1 , 5 , 4 , 3 , 2

1 , 11 , 5 , 4 , 3 , 2

1 , 5 , 11 , 4 , 3 , 2

1 , 5 , 4 , 11 , 3 , 2

1 , 5 , 4 , 3 , 11 , 2

<div style="display:flex">

Left column:

[1,5,4,3,2,11] ₅

2nd iteration:

[1,5,4,3,2,11]

[1,5,4,3,2,11]

[1,4,5,3,2,11]

[1,4,3,5,2,11]

[1,4,3,2,5,11] s

3rd iteration:

[1,4,3,2,5,11]

[1,4,3,2,5,11]

[1,3,4,2,5,11]

[1,3,2,4,5,11] s

4th iteration:

[1,3,2,4,5,11]

[1,3,2,4,5,11]

[1,2,3,4,5,11] s

5th iteration

[1,2,3,4,5,11]

sorted = [1,2,3,4,5,11]

Question 02

[18,12,9,20,15,10,8]

(i) **Bubble Sorting:**

1st iteration:

[18,12,9,20,15,10,8]

Right column:

[12,18,9,20,15,10,8]

[12,9,18,20,15,10,8]

[12,9,18,20,15,10,8]

[12,9,18,15,20,10,8]

[12,9,18,15,10,20,8]

[12,9,18,15,10,8,20] ₅

2nd iteration:

[12,9,18,15,10,8,20]

[9,12,18,15,10,8,20]

[9,12,18,15,10,8,20]

[9,12,15,18,10,8,20]

[9,12,15,10,18,8,20]

[9,12,15,18,8,18,20] s

3rd iteration:

[9,12,15,18,8,18,20]

[9,12,15,10,8,18,20]

[9,12,15,10,8,18,2...]

[9,12,10,15,8,18,...]

[9,12,10,8,15,18...] s

4th iteration:

[9,12,10,8,15,18...]

[9,12,10,8,15,...]

[9,10,12,8,15,...]

[9,10,8,12,15,...] s

</div>