4. Write a Program to Sort a given set of numbers using selection sort algorithm. Repeat the experiment for different values of n, the number of elements in the list to be sorted and plot a graph of the time taken versus n. The elements can be read from a file or can be generated using the random number generator.

```
import timeit
import random
import matplotlib.pyplot as plt


def Input(arr,n):
    for i in range(0,n):
        ele=random.randrange(1,50)
        arr.append(ele)


def selection_sort(arr,size):
    for i in range(size):
        min_index=i
        for j in range(i+1,size):
            if arr[j]<arr[min_index]:
                min_index=j
        (arr[i],arr[min_index])=(arr[min_index],arr[i])


N=[]
CPU=[]
r=int(input("Enter the number of runs:"))
for i in range(0,r):
    arr=[]
    print("RUN NO : ",i+1)
    n=int(input("Enter the number of elements:"))
    Input(arr,n)
    print(arr)
    start=timeit.default_timer()
```

```
    selection_sort(arr,n)
    times=timeit.default_timer()-start
    print("Sorted Array")
    print(arr)
    N.append(n)
    CPU.append(round(float(times)*1000000,2))
print("N CPU")
for i in range(0,r):
    print(N[i],CPU[i])
plt.figure()
plt.plot(N,CPU,'o-')
plt.xlabel('Number of elements (n)')
plt.ylabel('Time taken (milli seconds)')
plt.title('Selection Sort Time Complexity')
plt.grid(True)
plt.show()
```

Output

```
Enter the number of runs:5
RUN NO :  1
Enter the number of elements:5
[21, 45, 27, 44, 44]
Sorted Array
[21, 27, 44, 44, 45]
RUN NO :  2
Enter the number of elements:10
[15, 2, 32, 9, 29, 31, 30, 23, 35, 45]
Sorted Array
[2, 9, 15, 23, 29, 30, 31, 32, 35, 45]
RUN NO :  3
Enter the number of elements:15
[44, 7, 19, 39, 19, 29, 45, 18, 20, 39, 29, 12, 43, 42, 17]
Sorted Array
[7, 12, 17, 18, 19, 19, 20, 29, 29, 39, 39, 42, 43, 44, 45]
RUN NO :  4
Enter the number of elements:20
[31, 12, 34, 5, 37, 26, 20, 28, 46, 34, 31, 38, 43, 5, 34, 6, 11, 33, 22, 25]
```

Sorted Array
[5, 5, 6, 11, 12, 20, 22, 25, 26, 28, 31, 31, 33, 34, 34, 34, 37, 38, 43, 46]
RUN NO : 5
Enter the number of elements:25
[42, 46, 28, 31, 31, 9, 4, 26, 49, 36, 1, 2, 1, 41, 3, 39, 33, 49, 16, 6, 8, 16, 37, 17, 46]
Sorted Array
[1, 1, 2, 3, 4, 6, 8, 9, 16, 16, 17, 26, 28, 31, 31, 33, 36, 37, 39, 41, 42, 46, 46, 49, 49]

N	CPU
5	13.2
10	28.4
15	47.0
20	74.5
25	42.4