Task 3

Waiting times:

RR Scheduling:

- Each task is assigned a fixed time in cyclic order.
- In the given scenario, each task is assigned a quantum of 3.

To calculate the waiting time for a process in Round Robin (RR) scheduling:

$$Waiting\ Time = Turnaround\ Time - Burst\ Time$$

Before we start, we need to determine the Turnaround Time and Burst Time for each task.

Burst Time (which is not directly given) is the actual time the process spends running on the CPU.

Turnaround Time for a process is the total time taken from the arrival of the process to its completion.

From the provided steps for RR:

- T1: Completes at T=1 (since it's not mentioned again). Thus, Turnaround Time = 1 - 0 = 1.
- T2: Starts at: 1. Completes at T=13. Turnaround Time = 13 - 1 = 12.
- T3: Starts at: 3. Completes at T=16 Turnaround Time = 16 - 3 = 13.
- T4: Starts at: 6. Completes at T=25 Turnaround Time = 25 - 6 = 19.
- T5: Starts at: 9. Completes at T=34 Turnaround Time = 34 - 9 = 25.
- T6: Starts at: 16. Completes at T=42 Turnaround Time = 42 - 16 = 26.
- T7: Starts at: 19. Completes at T=37 Turnaround Time = 37 - 19 = 18.
- T8: Starts at: 22. Completes at T=38 Turnaround Time = 38 - 22 = 16.
- T9: Starts at: 25. Completes at T=40 . Turnaround Time = 40 - 25 = 15.
- T10: Starts at: 27. Completes at T=41. Turnaround Time = 41 - 27 = 14.

For Burst Time, we can observe the time each task spent on the CPU:

- T1: 1 unit
- T2: 3 units (because of time quanta)
- T3: 3 units
- T4: 3 units
- T5: 3 units
- T6: 3 units
- T7: 3 units
- T8: 3 units
- T9: 2 units (observing the time from T=25 to T=27)
- T10: 1 unit

Now, using the formula:

- T1: 1 - 1 = 0
- T2: 12 - 3 = 9
- T3: 13 - 3 = 10
- T4: 19 - 3 = 16
- T5: 25 - 3 = 22
- T6: 26 - 3 = 23
- T7: 18 - 3 = 15
- T8: 16 - 3 = 13
- T9: 15 – 2 = 13
- T10: 14 -1 = 13

Results:

- Longest waiting time: Task T6: 23
- Shortest waiting time: Task T1: 0
- Average waiting time: 13,4

FCFS-scheduling

- The task that arrives first gets executed first.
- No pre-emption.

Use the formula: waiting_time[i]=burst_time[i-1]+waiting_time[i-1]

First we find the burst time:

- T1: Runs for 1 unit (T=0 to T=1), so burst time = 1
- T2: Runs for 2 units (T=1 to T=3), so burst time = 2
- T3: Runs for 4 units (T=3 to T=7), so burst time = 4
- T4: Runs for 6 units (T=7 to T=13), so burst time = 6
- T5: Runs for 8 units (T=13 to T=21), so burst time = 8
- T6: Runs for 8 units (T=21 to T=29), so burst time = 8
- T7: Runs for 6 units (T=29 to T=35), so burst time = 6
- T8: Runs for 4 units (T=35 to T=39), so burst time = 4
- T9: Runs for 2 units (T=39 to T=41), so burst time = 2
- T10: Since it runs until the end, we don't have an explicit burst time.

Using the burst times and the formula:

- T1: Waiting time = 0
- T2: Waiting time = 1 (from T1's burst time)
- T3: Waiting time = 1 + 2 = 3 (from T2's burst time + T2's waiting time)
- T4: Waiting time = 3 + 4 = 7
- T5: Waiting time = 7 + 6 = 13
- T6: Waiting time = 13 + 8 = 21
- T7: Waiting time = 21 + 8 = 29
- T8: Waiting time = 29 + 6 = 35

- T9: Waiting time = 35 + 4 = 39
- T10: Waiting time = 39 + 2 = 41

Results:

- Longest waiting time: T10: 41
- Shortest waiting time: T1: 0
- Average waiting time: 18,9