**ASSIGNMENT 4**

**AIM:** Write a program to show the demonstration of Scheduling Algorithms:

1) First Come First Serve (FCFS)

2) Shortest Job First (SJF)

3) Round Robin

**THEORY:**

1. **What is a scheduling?**

Process scheduling is the activity of the process manager that handles the removal of the running process from the CPU and the selection of another process on the basis of a particular strategy. Process scheduling is an essential part of a Multiprogramming operating systems. Such operating systems allow more than one process to be loaded into the executable memory at a time and the loaded process shares the CPU using time multiplexing.

A typical process involves both I/O time and CPU time. In a uni programming system like MS-DOS, time spent waiting for I/O is wasted and CPU is free during this time. In multi programming systems, one process can use CPU while another is waiting for I/O. This is possible only with process scheduling.

1. **What is Preemptive and Non-Preemptive scheduling?**

* **Preemptive Scheduling**

Preemptive scheduling is used when a process switches from running state to ready state or from waiting state to ready state. The resources (mainly CPU cycles) are allocated to the process for the limited amount of time and then is taken away, and the process is again placed back in the ready queue if that process still has CPU burst time remaining. That process stays in ready queue till it gets next chance to execute.

Examples of Preemptive Scheduling Algorithms are Round Robin and Shortest Remaining Time First.

* **Non-Preemptive Scheduling**

Non-preemptive Scheduling is used when a process terminates, or a process switches from running to waiting state. In this scheduling, once the resources (CPU cycles) is allocated to a process, the process holds the CPU till it gets terminated or it reaches a waiting state. In case of non-preemptive scheduling does not interrupt a process running CPU in middle of the execution. Instead, it waits till the process complete its CPU burst time and then it can allocate the CPU to another process.

Examples of Non-Preemptive Scheduling Algorithms are First Come First Serve (FCFS) and Shortest Job First (SJF).

1. **Explain the First Come First Serve (FCFS), Shortest Job First (SJF) and Round Robin scheduling algorithms.**

* **First Come First Serve (FCFS)**

First Come First Serve (FCFS) is an operating system scheduling algorithm that automatically executes queued requests and processes in order of their arrival. It is the easiest and simplest CPU scheduling algorithm. In this type of algorithm, processes which request the CPU first get the CPU allocation first. This is managed with a First In First Out (FIFO) queue.

As the process enters the ready queue, its PCB (Process Control Block) is linked with the tail of the queue and, when the CPU becomes free, it should be assigned to the process at the beginning of the queue.

A real-life example of the FCFS method is buying a movie ticket on the ticket counter. In this scheduling algorithm, a person is served according to the queue manner. The person who arrives first in the queue first buys the ticket and then the next one. This will continue until the last person in the queue purchases the ticket. Using this algorithm, the CPU process works in a similar manner.

* **Shortest Job First (SJF)**

Shortest Job First (SJF) is an algorithm in which the process having the smallest execution time is chosen for the next execution. This scheduling method can be preemptive or non-preemptive. It significantly reduces the average waiting time for other processes awaiting execution. To successfully implement it, the burst time/duration time of the processes should be known to the processor in advance, which is practically not feasible all the time. This scheduling algorithm is optimal if all the jobs/processes are available at the same time. (either Arrival time is 0 for all, or Arrival time is same for all)

* **Non-Preemptive SJF:**

In non-preemptive scheduling, once the CPU cycle is allocated to process, the process holds it till it reaches a waiting state or terminated.

* **Preemptive SJF:**

In Preemptive SJF Scheduling, jobs are put into the ready queue as they come. A process with shortest burst time begins execution. If a process with a shorter burst time arrives, the current process is removed or preempted from execution, and the shorter job is allocated CPU cycle.

* **Round Robin**

The name of this algorithm comes from the round-robin principle, where each person gets an equal share of something in turns. It is the oldest, simplest scheduling algorithm, which is mostly used for multitasking.

In Round-robin scheduling, each ready task runs turn by turn only in a cyclic queue for a limited time slice. This algorithm also offers starvation free execution of processes. A fixed time is allotted to each process for execution, called a quantum.

It is preemptive as processes are assigned CPU only for a fixed slice of time at most. The disadvantage of it is more overhead of context switching.