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OS Assignment

Q-1] Explain CPU scheduling and explain CPU scheduling criteria.

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Different CPU scheduling algorithms have different properties and the choice of a particular algorithm depends on the various factors.

Many criteria have been suggested for comparing CPU scheduling algorithms.

The criteria include:

- 1) CPU utilisation: The main objective of any CPU scheduling algorithm is to keep the CPU as busy as possible. Theoretically CPU utilisation can range between 0 to 100% but in a real time system.
- 2) Throughput: A measure of the work done by the CPU is the number of processes being executed and completed for unit of time.
- 3) Turnaround time: For a particular process, the time elapsed from the time of submission of a process to the time of completion is known as turnaround time.
- 4) Waiting Time: The time spent by a process waiting in ready queue is called as waiting time.
- 5) Response Time: In an interactive system, turnaround time is not the best criteria. A process may produce some output fairly early and continue computing new results while previous results are being output to the user.

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a) Completion Time: This is the time when the process completes its execution.

Q.2] Explain FCFS and find the average waiting time of process.

→ First come first serve (FCFS) scheduling algorithm simply schedules the jobs according to their arrival time. The job which comes first in the ready queue will get the CPU first. FCFS scheduling may cause the problem of starvation if the burst time of the first process is the longest among all the jobs.

Process	Burst Time	Arrival time
P ₁	6	2
P ₂	2	5
P ₃	8	1
P ₄	3	0
P ₅	4	4

P ₄	P ₃	P ₁	P ₅	P ₂
0	3	11	17	21

$$\text{Average waiting Time} = \frac{40}{5} = 8$$

Q-3] Explain shortest job first scheduling algorithm and find average waiting time for processes.

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In SJF scheduling, the process with the lowest burst time, among the list of available processes in the ready queue, is going to be scheduled next.

Processes	Burst Time	Waiting Time
P ₁	7	0
P ₂	3	7
P ₃	2	2
P ₄	10	14
P ₅	8	4

$$\text{Average (W.T.)} = \frac{27}{5} = 5.4$$

Q-4] Explain priority scheduling algorithm and find average waiting time for process.

→ Priority scheduling is non-preemptive algorithm and one of the most common scheduling algorithms in batch system. Each process is assigned a priority. Process with the highest priority is to be executed first and so on. Process with same priority are executed on first come first serve basis.

Process	Burst Time	Priority	Waiting Time
P ₀	5	1	0
P ₁	3	2	10
P ₂	8	1	12
P ₃	6	3	2

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∴ Average waiting time = $\frac{24}{4} = 6$

Q.5) Explain round robin algorithm and find average waiting time for processes.

Round robin is the preemptive process scheduling algorithm. Each process is provided a fix time to execute, it is called quantum. Once a process is executed for a given time period, it is preempted and other process executes for a given time period.

Quantum = 3

P ₀	P ₁	P ₂	P ₃	P ₀	P ₂	P ₃	P ₂
0	3	6	9	12	15	18	21

Process	Waiting Time
P ₀	9
P ₁	2
P ₂	12
P ₃	11

∴ Average Waiting Time = 8.5

Q.6] Explain inter-process communication

→ Inter process communication is a type of mechanism usually provided by the operating system. The main aim of this mechanism is to provide communications in between several processes. In short, the intercommunication allows a process letting another process know that some event has occurred.

Inter-process communication is used for exchanging useful information between numerous threads in one or more processes.

There are following methods that are used to provide the synchronization

1) Mutual exclusion

2) Semaphore

3) Barrier

4) Spinlock