

- (Q3(a)) What is CPU scheduling give their types (Preemptive Scheduling)
- (b) Explain Scheduling Criterias & their types (Utilization, Throughput, Turn around time, Waiting time, Response time)

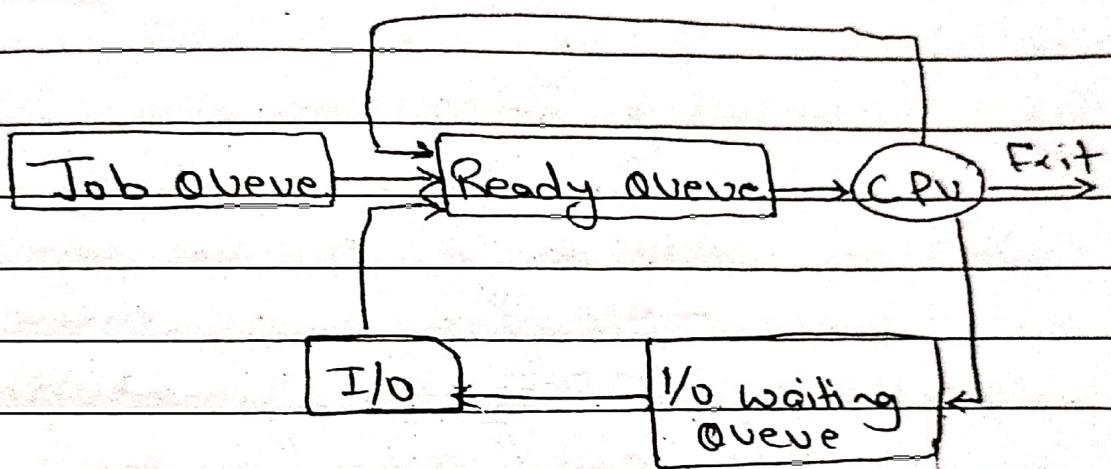
- (Q4) Explain Scheduling Algorithm & their types (FCFS, SJF, Priority, Round Robin, MLO)

Ans 3(a) CPU Scheduling

- # Defi \rightarrow Process Scheduling is called CPU Scheduling. It is used in multi programming. It loads one process at a time.
- # Process Scheduling Queues \rightarrow PCB maintains the CPU scheduling. It maintains the following queues:-
 - 1) Job Queue \rightarrow Using this all above will be maintained in system
 - 2) Ready Queue \rightarrow The process which

are in main memory in ready stage & wait to execute

- 3) Device Queue \rightarrow These are depends on Input Output devices & it can be block according to device



CPU Scheduling Process State \Rightarrow

- 1) Running State
- 2) Waiting State
- 3) Ready State
- 4) Terminate State

Types of CPU Scheduling

- 1) Preemptive
- 2) Non-Preemptive

- 1) Non-Premptive scheduling \rightarrow CPU allocates the process for this process switch after process termination. It can be used on any hardware. It can't change scheduling sequence due to Priority.
- 2) Premptive Scheduling \rightarrow It care about Priority. It can change process sequence according to Priority. Higher Priority Process can give interruption.

Aus(b) Scheduling Criteria

Introduction \rightarrow We use scheduling criteria to increase any computer performance. For this it requires scheduling designing.

Performance Criteria

- 1) CPU Utilization 4) Waiting Time
- 2) Throughput 5) Response Time
- 3) Turn around time

1) CPU Utilization \rightarrow When we want to make CPU more & more busy

Then it is called CPU utilization.

The CPU use should be up to 100%.

By default it takes 40% load.

maximum load can be 90%.

(d) Throughput \rightarrow If we access CPU then it can be busy for work. The processing time to complete task is called Throughput. The long process take more time which can be in hours but small process can be 10 in 1 sec.

(e) Turn Around Time \rightarrow The timing from submission of process to completion of any process is called turn around time. It include waiting time, process time (execution time).

(f) Waiting Time \rightarrow when we have to start any process then we include into job queue. It have to wait for process. It wait in ready state for process which is called waiting time. waiting time do not include throughput. It can be ready stage.

5) Response Time \rightarrow In turn around time every process have to sent request. Request have to wait for signal for completion. If any process take time to start or to give response then it is called response time.

Any Scheduling Algorithm :-

Definition \rightarrow When we use any specific sequence to give any process then it is called Scheduling Algorithm. It uses any specific rule for process which is called Scheduling Algorithm (Rules & Regulation).

Type

- 1) FCFS
- 2) SJF
- 3) RRS
- 4) PBS
- 5) MBS

1) FCFS (First Come First Serve) \rightarrow It works according to given request.

It complete the request according to one by one in sequence. It complete first request at first time.

It have two types:-

i) Premptive → When we use Priority & it can change the FCFS Sequence. It can use more Priority task without FCFS Concept.

ii) Non-Premptive → It can work only in FCFS. It can't change steps acc. to priority. It do not use Interruption.

Advantage :-

- It is useful for long process if it is found at front in sequence.
- In non-preemptive if one process is running then it can't give chance to the other process.

Disadvantage :-

- The small process have to wait if long process is found at front.
- It do not use priority in non-preemptive.

Process	Time	P ₁	P ₂	P ₃	P ₄
P ₁	8	0	8	15	21
P ₂	7				
P ₃	6	0 + 8 + 15 + 21	19		
P ₄	11			4	

(i) SJF → (Shortest Job First) → It runs the smallest process at first. It works in ascending order. If two processes have same length then it uses FCFS. It arranges the processes in sorting order. It has two types:-

(ii) Shortest Process Next → It is non-preemptive because it can't give chance to the long process if it has more maximum priority.

(iii) Shortest Remaining Time First → It is preemptive. If a new process takes less time than it runs first. In this starvation problem can occur.

Process	Time	P ₃	P ₂	P ₁	P ₄
P ₁	8	0	6	13	21
P ₂	7				
P ₃	6	0 + 6 + 13 + 21	21		
P ₄	11			4	

3) Round Robin Scheduling (RRS) \Rightarrow It work according to time sharing & multi user. In this we decided fix time for all process. If any process takes more time than it will be sent to the end of queue so that it can be run at next time. It follows FIFO rule. It depends no. of processes.

Time slicing = 5

$P_1 = 15$	10	5
$P_2 = 10$	5	0
$P_3 = 3$	0	0
$P_4 = 7$	2	0

$|P_1|P_2|P_3|P_4|P_1|P_2|P_3|P_4|P_1| \dots$

$$\frac{0+15+10+13+18+23+28+30}{8}$$

4) Priority scheduling \rightarrow It give priority to the any process high priority Pro Run first & then low priority process will run. If use FCFS method if Priority is same.

Types of Priority

- i) Internal
- ii) External

i) Internal \rightarrow It work acc. to times, memory & no. of files.

ii) External \rightarrow It work acc. to user

Types of Priority Scheduling

- i) Preemptive Priority
- ii) Non Preemptive

i) Preemptive Priority \rightarrow If any Process is running & more Priority Process Come then low Priority Process can't run it is called Aging.

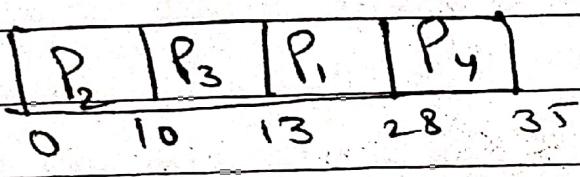
ii) Non-Preemptive \rightarrow In this the Process which Come First will run First.

It can't be effected by ^{new} Priority. Process -

Priority Number

P.N

$P_1 = 15$	3
$P_2 = 10$	1
$P_3 = 3$	2
$P_4 = 7$	4



$$0 + 10 + 13 + 28 \\ \hline 4$$

5) Multilevel Queuing Scheduling \rightarrow When more than one process is working then it can be handle by multilevel queuing scheduling. It use two types of Process:-

- i) Fore ground
- ii) Background

Both can use diff. types of scheduling which work acc. to size priority, & etc. In this we can decide

Scheduling

