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CSE - A.
21PD03 - Operating Systems

CIA - II

① External fragmentation:

Memory allocation in embedded systems.
Memory paging.
Performance optimization

② Round Robin Scheduling: A time shared operating system is designed to support multiple user simultaneously by sharing the CPU time among them.

③

Sno	user level thread	Kernel level thread
1)	user thread are implemented by user.	Kernel thread are implemented by operating system.
2)	The operating system doesn't recognize user threads.	The kernel threads are recognize by operating system.
3)	context switch time is less.	context switch time is more.
4)	no hardware support.	Hardware support is needed.

4) Semaphore:

Semaphore is a Synchronization mechanism that is used to coordinate Access to shared resources in a Concurrent program. A semaphore is a variable that is represented as an integer value and has two primary Operation wait and signal.

5) Shortest Job first Scheduling because it is a Scheduling algorithm that priorities tasks based on their runtime. The task with shortest runtime given highest priority and is executed first, which minimizes the average waiting time and maximizes the throughput.

6)

S.NO	Paging	Segmentation
1)	In paging, the program is divided into fixed (or) mained size pages.	In Segmentation, the Program is divided into variable size Section.
2)	For paging Operating System is accountable.	For Segmentation compiler is accountable.
3)	It is faster in comparison to Segmentation.	It is low.

7) Purpose of paging the Page tables:

In paging process, page table stores definition of each pages. when an active process requests data, Paging reduces external fragmentation.

(8) A condition variable is a synchronization mechanism that allows threads to block until a certain condition is satisfied. The operations on a condition variable are.

wait
Signal
Broadcast.

Condition variable are an important tool for thread synchronization and can help prevent race condition, deadlocks and other synchronization issues in multi thread programs.

(9) Address binding refers to mapping of computer instruction and data to physical memory location.

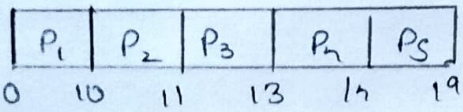
Compile time Address binding.
Load time Address binding
Execution time Address binding.

(10) Dispatch latency is amount of time is takes for operating system to switch from one process to another. It is time between when operating system decides to switch from the currently running process to a different process when new process actually starts executing on CPU.

P-B

11. i) FCFS (first come first serve)

Gr ante chat.



Process	waiting time	Turnaround time	Completion time
P_1	0	10	10
P_2	10	11	11
P_3	11	13	13
P_4	13	14	14
P_5	14	19	19
	48	67	67

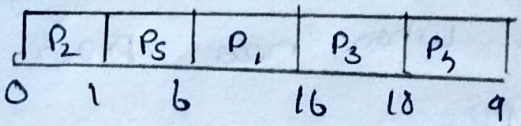
waiting time = Completion time - Burst time (total waiting time) => 48 ms.

Turnaround time = waiting time + Burst time (total Turnaround time) => 67 ms

Average waiting Time = 48/5 = 9.6 ms

ii) Shortest Job first Scheduling (SJF):

Granta chart



Process	waiting time	Turnaround time	Completion time
P_1	6 9	16	16
P_2	0	1	1
P_3	9	4	4
P_4	1	2	2
P_5	4, 16	9 35	9 35

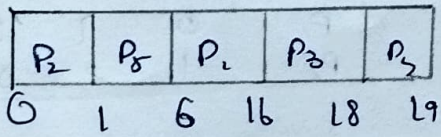
Total turnaround time => 35ms

Total waiting time => 16 ms

Average waiting time = 16/5 = 3.2 ms

Priority Scheduling algorithm:

Gannt Chart.



Process	waiting time	Turnaround time	Completion time
P_1	6	16	16
P_2	0	1	1
P_3	16	18	18
P_4	18	19	19
P_5	1	6	6
	41	60	60

Turn around time = 60ms

Total waiting time = 41 ms

Average waiting time = 41/5 = 8.2 ms

iii) Shortest Job First Scheduling algorithm results is minimum average waiting time = 3.2 ms. It moving short process before a long one decreases the waiting time of the short process more than it increases the waiting time of the long process.

(13) i) P_2 will finish LAST. because A single processor system has three resource types X, Y, Z which are shared by the three processes. There are 5 units of each resource type.

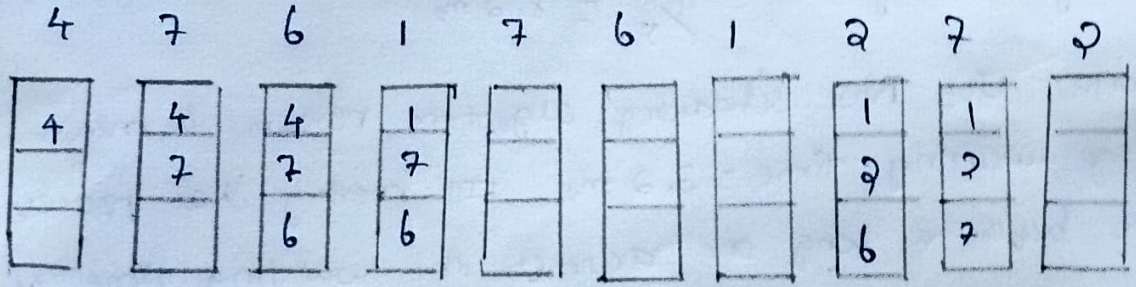
Alloc	X	Y	Z
P_0	1	2	1
P_1	2	0	1
P_2	2	2	1
Total	5	4	3

Request	X	Y	Z
P_0	1	0	3
P_1	0	1	2
P_2	1	2	0

P_1 on finish its execution first. once P_1 is done it release 2, 0, and 1 units of X, Y, Z. Now among P_0 and P_2 needs of process only be satisfied. So, P_0 finishes its execution. once P_2 is done it release 2, 2 and 1 units of X, Y, Z ... Now finally P_2 finishes its execution so P_2 is the one which finishes the one. P_2 process will finish LAST.

(13) ii) 3 page Frames (queue) 4, 7, 6, 1, 7, 6, 1, 2, 7, 2

FIFO First in First out (FIFO)



Total number of Page faults are = 6.

Hit ratio = number of hits / total number of Page references

$= 4/10 = 0.4$

miss ratio = number of Page faults / total number of Page references

$= 6/10$

$= 0.6$