

Q1. For the following set of process find the average waiting time using Gantt chart for

i> SJF

ii> Priority scheduling process

	Burst time	Priority
p1	5	5
p2	3	4
p3	8	3
p4	2	1
p5	1	2

The process has arrived in the order p2, p1, p4, p3 and p5.

Q2. What is the difference between a preemptive and non-preemptive scheduling algorithms?

Explain FCFS scheduling algorithm. Find the average turnaround time and average waiting time for the processes given in the table below.

Process	CPU burst time(in ms)
P1	24
P2	3
P3	3

Q3. Consider the following data with burst time given in milliseconds:

i> SJF process

ii> Priority scheduling

process	Burst time	Priority
p1	10	3
p2	1	1
p3	2	3
p4	1	4
p5	5	2

The process has arrived in the order p1, p2, p3, p4, p5 all at time 0.

a. Draw Gantt charts for the execution of these processes using FCFS, SJF, a nonpreemptive priority and RR (quantum=1) scheduling.

b. What is the turnaround time and waiting time of each process for each of the scheduling algorithm.

Q4. Suppose the following jobs arrive for processing at the times indicated, each job will run the listed amount of time.

Job	arrival time	burst time
1	0.0	8
2	0.4	4
3	1.0	1

i) Give a Gantt chart illustrating the execution of these jobs using the non preemptive FCFS and SJF scheduling algorithms.

- ii) what is turn around time and wait time of each job for the above algorithms?
- iii) compute average turn around time if the CPU is left idle for the first 1 unit and then SJF scheduling is used.(job 1 and job 2 will wait during this time)´

Q5. Consider the following set of processes with their arrival and burst times as shown

Process	A.T	B.T
P0	0	10HR
P1	0	05HR
P2	1	02HR
P3	2	01HR

Compute the turn around time and waiting time of each job using the following scheduling algorithms.

Q6. For the following set of processes, find the average waiting time & average turn around time using GANTT Chart for

I > FCA

II> SJF preemptive.

III> SJF non-preemptive.

Process	Arrival time (in sec)	Burst Time(in sec)
P1	0	4
P2	1	2
P3	2	5
P4	3	4

Q7. Five batch jobs A,B,C,D and E arrive at a computer centre at almost at the same time. They have estimated running times of 10,6,2,4 and 8 minutes. Their priorities are 3,5,2,1 and 4 respectively, with 5 being the highest priority. For each of the following scheduling algorithm determine the turn around time of each process and waiting time of each process. Ignore process switching overhead. Mention which algorithm results in minimal average waiting time.

1. Round Robin
2. Priority scheduling
3. First come first served
4. Shortest job first.

For case i) assume that system is multiprocessing and each job gets its fair share of the CPU.(time quantum 2 minutes. For cases (ii),(iii) and (iv) assume that only one job runs at a time, until it finishes. All jobs are completely CPU bound.

Q8. Consider the following set of rocesses, with the len of CPU burst in milliseconds.

Process	P1	P2	P3	P4	P5
Arrival time	00	02	03	06	30
Burst time	10	12	14	16	05

Draw a Gantt chart that illustrates the execution of these processes using the preemptive shortest job first (SJF) algorithm. Hence find the average waiting time. Draw a Gantt chart that illustrate the execution of these processes using preemptive priority scheduling algorithm. Given priority of each process is  $P1 = 4$ ,  $P2=3$ ,  $P3=5$ ,  $P4= 1$  and  $P5= 1$ . Also find the average waiting time

Q9. Given 3 processes A,B and C, three resources x,y and z and following events,

- i. A requests x
- ii. A requests y
- iii. B requests y
- iv. B requests z
- v. C requests z
- vi. C requests x
- vii. C requests y

Assume that requested resources should always be allocated to the request process if it is available. Draw the resource allocation graph for the sequences. And also mention whether it is a deadlock? If it is, how to recover the deadlock.

Q10. Memory partitions of 100kb,500 kb,200 kb,300kb,600 kb are available how would best ,worst, first fit algorithm to place processes 212,417,112,426 in order. Which is the best algorithm?

Q11. Consider the reference stream 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. How many page faults while using FCFS and LRU using 2 frames?

Q12. What is virtual memory? Explain Suppose we have a demand paged memory. The page table is held in registers. it takes 8ms to service a page fault if an empty page is available or the replaced page is not modified, and 20ms if the replaced page is modified. memory access time is 100ns. Assume that the page to be replaced is modified 70% of the time. what is the maximum acceptable page fault rate for an effective access time of no more than 200ns?

Q13. Consider a logical address space of 8 pages of 1024 words each, mapped on to a physical memory of 32 frames.

how many bits are there in the logical address?

How many bits are there in the physical address?

Q14. Describe the SSTF disk scheduling algorithm using the following data. The dist head is initially at position-cylinder 53.the cylinder sequence of requests is 98, 183, 37, 122, 14, 124, 65, 67. find the total head movement.

Q15. Describe the LRU page replacement algorithm, assuming there are 3 frames and the page reference string is 7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1. Find the number of page faults.

Q16. Consider the following page reference string 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 Find out the number of page faults if there are 4 page frames, using the following page replacement algorithm i) LRU ii) FIFO iii) Optimal

Q17. Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. the drive currently services a request at cylinder 143, and the previous request was at cylinder 125. the queue of pending request in FIFO order is 86,1470,913,1774,948,1509,1022,1750,130 Starting from the current position, what is the total distance(in cylinders) that the disk arm moves to satisfy all pending requests, for each of the following algorithms i)FCFS ii) SSFT iii) SCAN iv) LOOK v) C-SCAN.

Q18. The queue of requests in FIFO is 86,147,91,177,94,150,102,175,130 What is the total head movement needed to satisfy the requests for the following Scheduling algorithms FCFS, SJF, SCAN, LOOK, C-SCAN

Q19. The available space list of a computer memory is specified as follows:

Start address	block address in words
100	50
200	150
450	600
1200	400

Determine the available space list after allocating the space for the stream of requests consisting of the following block sizes: 25,100,250,200,100,150

Use

i) FIRST FIT

ii) BEST FIT and

iii) WORST FIT algorithms.

Q20. A virtual memory system has the following specification: Size of the virtual address space=64k Size of the physical address space=4k Page size=512

Virtual page#	physical frame#
0	0
3	1
7	2
4	3
10	4
12	5
30	6
31	7

i)find all the virtual addresses that will generate a page fault compute the main memory addresses for the following virtual addresses. 24,3784,10250,30780

Q21. A process references 5 pages A, B, C, D, E in the following order

A, B, C, D, A, E, B, C, E, D

Assuming that the replacement algorithm is LRU and FIFO, find out the number of page faults during the sequence of references, starting with an empty main memory With 3 frames.

Q22. Suppose that the head of moving head disk with 200 tracks numbered 0 to 199 is currently serving the request at track 143 and has just finished a request at track 125. If the queue request is kept in FIFO order, 86, 147, 91, 177, 94, 150, 102, 175, 130. What is the total head movement to satisfy these requests for i) FCFS II) SSTF disk scheduling algorithm.

Q23. Given memory partitions of 100 K, 500 K, 200 K, 300 K and 600 K (in order) how Would each of the first fit, best fit and worst fit algorithms work place processes of 212 K, 417K, 112 K and 426 K (in order)? Which algorithm makes the most efficient use of memory?