* FIFO

FIFO page replacement algorithm with a page frame size of 3 and the reference string :- 1 3 3 2 3 0 9 7 0 1 3 3

Reference	Page Frame	Page Fault
1	1	yes
3	1 3	yes
3	1 3	No
2	1 3 2	yes
3	1 3 2	No
0	0 3 2	yes
9	0 9 2	yes
7	0 9 7	yes
0	0 9 7	No
1	1 9 7	yes
3	1 3 7	yes
3	1 3 7	No

Total page faults : 8 //

Total page hits : 4 //

* Optimal

Optimal page replacement algorithm with a page frame size of 3 and the Reference string: 1 3 3 2 3 0 9 7 0 1 3 3

Reference	Page Frame	Page Fault
1	1	yes
3	31	yes
3	31	No
2	231	yes
3	231	No
0	031	yes
9	091	yes
7	071	yes
0	071	No
1	071	No
3	371	yes
3	371	No

Total Number of hits : 5

Total Number of page faults : 7

* LRU (counter implementation)

LRU (counter implementation) page replacement algorithm with a page frame of 3 and the Reference string:

1 3 3 2 3 0 9 7 0 1 3 3

Reference	Page Frames	Page faults
1	1	yes
3	31	yes
3	31	No
2	231	yes
3	231	No
0	230	yes
9	930	yes
7	970	yes
0	970	No
1	170	yes
3	130	yes
3	130	No

Total page faults : 8

Total page hits : 4

* LRU (Stack Implementation)

LRU (Stack Implementation) page replacement algorithm with a page frame of 3 and Reference string:
1 3 3 2 3 0 9 7 0 1 3 3

Reference	Page Frame	Page fault:
1	1	yes
3	3 1	yes
3	3 1	No
2	2 3 1	yes
3	2 3 1	No
0	0 2 1	yes
9	9 2 1	yes
7	7 2 1	yes
0	0 2 1	yes
1	1 0 2	No
3	3 0 2	yes
3	3 0 2	No

Total page faults : 8
Total page hits : 4

* Second Chance :-

Second chance page replacement algorithm with a page frame size of 3 and Reference String :

1 3 3 2 3 0 9 7 0 1 3 3

Reference	Page Frame	Page fault
1	1	yes
3	3 1	yes
3	3 1	No
2	2 3 1	yes
3	2 3 1	No
0	2 3 0	yes
9	9 3 0	yes
7	9 3 7	yes
0	9 0 7	yes
1	1 0 7	yes
3	1 0 3	yes
3	1 0 3	No

Total page faults : 9 //
Total hits : 3 //

Q2

Given:-

The disk drive has 5,000 cylinders, numbered 0 to 4,999.
The current head position is at cylinder 2,150.
The previous request was at cylinder 1,805.
The queue of pending request in FIFO order is:
2,069, 1,212, 2,296, 2,800, 544, 1,618, 356, 1,523, 4,965, 3,681.

* FCFS

- Total distance travelled:

$|2,150 - 2,069| + |2,069 - 1,212| + |1,212 - 2,296| + |2,296 - 2,800| + |2,800 - 544| + |544 - 1,618| + |1,618 - 356| + |356 - 1,523| + |1,523 - 4,965| + |4,965 - 3,681|$

$= 81 + 857 + 1,084 + 504 + 2,256 + 1,074 + 1,074 + 1,262 + 1,167 + 3,442 + 1,284$

$= 12,011$ cylinders

- The total distance the disk arm moves to satisfy all the pending request using the FCFS disk-Scheduling algorithm is 12,011 cylinders.

* SSTF

- Total distance travelled :

$|2,150 - 2,069| + |2150 - 1618| + |1618 - 1,523| + |1,523 - 1,212|$
$+ |1,212 - 544| + |544 - 356| + |356 - 2,296| + |2,296 - 2800|$
$+ |2,800 - 3,681| + |3,681 - 4965|$

$= 81 + 532 + 95 + 311 + 668 + 188 + 1940 + 504 + 881 + 1,284$

$= 6,484$ cylinders

- The total distance the disk arm moves to satisfy all the perding request using the SSTF disk-Scheduling algorithm is 6,484 cylinder

* SCAN

- Started from current position (2,150)
then the disk arm moves outword to maximum cylinder 4,999

outward movement : 2,296, 2,800, 2,965, 3,681, 4,965

inward movement : 2,069, 1,618, 1,523, 1,212, 544, 356

Total distance : $|4999 - 2,150| + [redacted] |4999 - 356|$

$= 7,492$

The total distance the dist arm moves to satisfy all the pending request using the SCAN algorithm is 7,492 cylinders

* LOOK

Starting position:-(2150)

- maximum outward direction : 4965
  minimum inwards direction : 365
  ~~outward movement~~ :

Total distance travelled : ~~46~~

$$|4965 - 2,150| + |4965 - 356|$$
$$= 6,824 \text{ cylinders}$$

Total distance the disk arm moves to satisfy all the pending request using the LOOK disk-scheduling algorithm is 6,824 cylinders

* C-SCAN

Starting position : 2150

move disk arm to the maximum outward : 4,999

move disk arm to the minimum inward : 0

The distance travelled = $|4,999 - 2,150| + |4,999 - 0| + |356 - 0|$

$= 8204$ cylinders.

The total distance disk arm moves to satisfy all the pending request using the C-Scan disk-schedulling algorithm is 8204 cylinders

* C-LOOK

Starting position : 2,150

The distance travelled :- $|4965 - 2,150| + |4965 - 356| + |2,069 - 356|$

$= 9,164$ cylinder

in this case the disk arm moves to the maximum outward : 4965 then to the minimum inward 356 to the last service request : 2069.

The total distance the disk arm moves to satisfy all the pending request using the C-LOOK disk sceduling algorithm is : 9164 cylinder.