L33- DISK SCHEDULING TUTORIALS

Disk Scheduling Algorithm

Q1: Consider a disk with 4 platters (0, 1, 2 and 3), 200 cylinders (as 0, 1, . 199), and 256 sectors per track (0, 1,.., 255). The following 6 disk requests of the form [Request ID, sector number, cylinder number, platter number] are received by the disk controller given in the order of arrival time: [A, 120, 72, 2], [B, 180, 134, 1], [C, 60, 50, 0], [D, 212, 86, 3], [E, 56, 126, 2], [F, 118, 10, 1]. Currently the head is positioned at sector number 80 of cylinder 70. The disk is rotating in anticlockwise direction. The average power dissipation in moving the head over 50 cylinders is 35 milliwatts and each reversal of the direction of the head movement dissipates 25 milliwatts. Power dissipation associated with rotational latency and switching of head between different platters is negligible. What is the total power consumption (in milliwatts) to satisfy all of the above disk requests using (a) FCFS (b) SSTF (c) Elevator (d) C-SCAN (e) C-LOOK scheduling algorithms?

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Disk Scheduling Algorithm

Request	Service Order	Sector Number	Cylinder number	Platter Number
A	?	120	**72**	2
B	?	180	**134**	1
C	?	60	**50**	0
D	?	212	**86**	3
E	?	56	**126**	2
F	?	118	**10**	1

a. For FCFS scheduling, give a suitable value to p and q (such that, 45<p, q<65) for a new request (X, p, q, 3), whose addition to the above 6 requests will not change the total power consumption calculated in initially. X should be serviced before servicing D.

b. For SSTF scheduling, give a suitable value to m and n (such that, 80<m, n<90) for a new request (Y, m, n, 1), whose addition to the above 6 requests will not change the total power consumption calculated initially.

Disk Scheduling Algorithm

c. For elevator scheduling, give a suitable value to x and y (such that, 55<x, y<65) for a new request (Z, x, y, 0), whose addition to the above 6 requests will not change the total power consumption calculated initially.

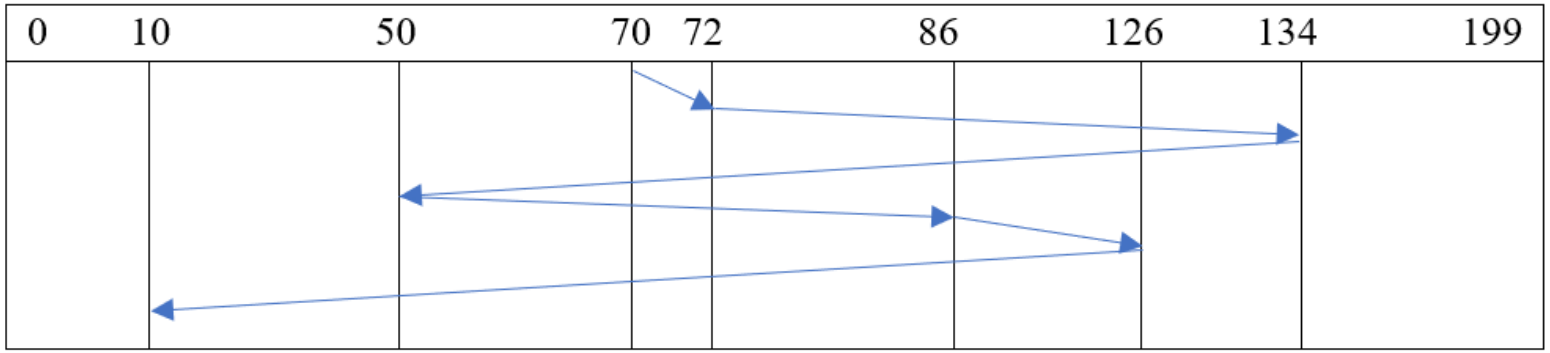
d. For C-SCAN scheduling, is it possible to have a new request (Q, r, s, 2), whose addition to the above 6 requests will not change the total power consumption calculated initially., under the condition 150<r, s<180? If so, give a suitable value for r and s.

e. For C-LOOK scheduling, is it possible to have a new request (P, i, j, 3), whose addition to the above 6 requests will not change the total power consumption calculated initially. under the condition 55<i, j<70.?. If so, give a suitable value for i and j.

Disk Scheduling Algorithm – FCFS Scheduling

Request	Service Order	Sector Number	Cylinder number	Platter Number
A	?	120	**72**	2
B	?	180	**134**	1
C	?	60	**50**	0
D	?	212	**86**	3
E	?	56	**126**	2
F	?	118	**10**	1

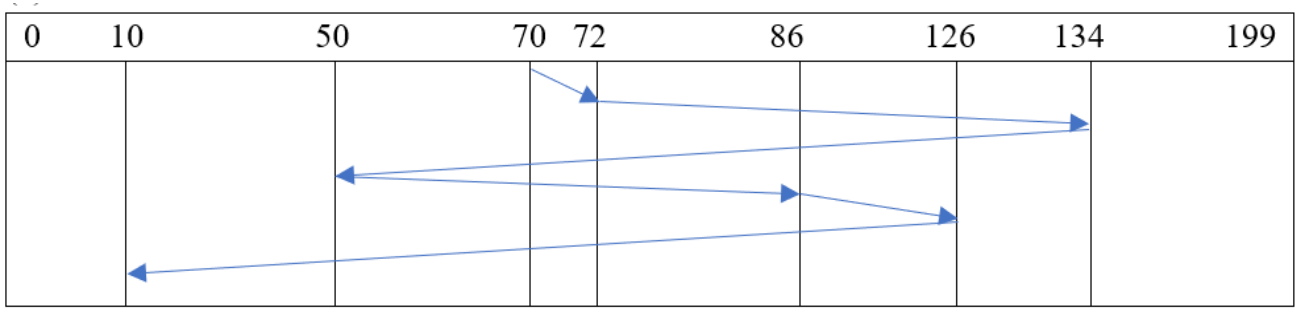
Request	Service Order	Sector Number	Cylinder number	Platter Number
A	1	120	**72**	2
B	2	180	**134**	1
C	3	60	**50**	0
D	4	212	**86**	3
E	5	56	**126**	2
F	6	118	**10**	1



- Total head movements = (134-70) + (134-50) + (126-50) + (126-10) = 340
- Number of reversal of head movement = 3
- Total power consumption = (340/50)x35 + (3x25) = **313 milliwatts.**

Disk Scheduling Algorithm – FCFS Scheduling

Request	Service Order	Sector Number	Cylinder number	Platter Number
A	1	120	**72**	2
B	2	180	**134**	1
C	3	60	**50**	0
D	4	212	**86**	3
E	5	56	**126**	2
F	6	118	**10**	1

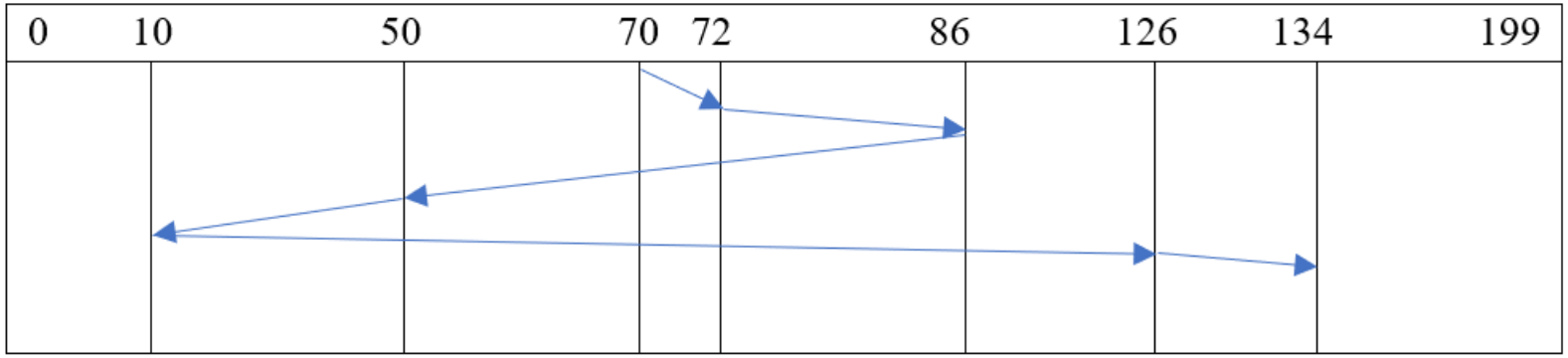


- Total head movements = (134-70) + (134-50) + (126-50) + (126-10) = 340
- Number of reversal of head movement = 3
- Total power consumption = (340/50)x35 + (3x25) = **313 milliwatts.**
- For FCFS scheduling, give a suitable value to p and q (such that, 45<p, q<65) for a new request (X, p, q, 3), whose addition to the above 6 requests will not change the total power consumption calculated in initially. X should be serviced before servicing D.
- A new request (X, p, q, 3) with any p between 45 and 65 and q value between 50 and 65 will give same power value as calculated before

Disk Scheduling Algorithm – SSTF Scheduling

Request	Service Order	Sector Number	Cylinder number	Platter Number
A	?	120	**72**	2
B	?	180	**134**	1
C	?	60	**50**	0
D	?	212	**86**	3
E	?	56	**126**	2
F	?	118	**10**	1

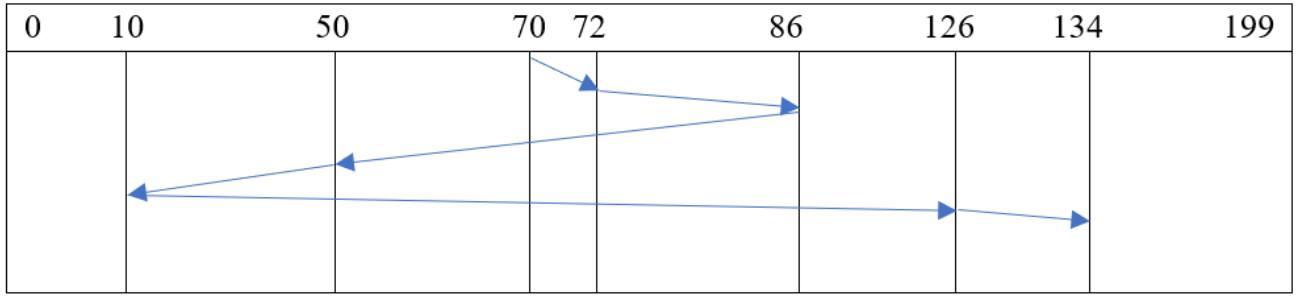
Request	Service Order	Sector Number	Cylinder number	Platter Number
A	1	120	**72**	2
B	6	180	**134**	1
C	3	60	**50**	0
D	2	212	**86**	3
E	5	56	**126**	2
F	4	118	**10**	1



- Total head movements = (86-70) + (86-10) + (134-10) = 216
- Number of reversal of head movement = 2
- Total power consumption = (216/50)x35 + (2x25) = **201.2 milliwatts.**

Disk Scheduling Algorithm – SSTF Scheduling

Request	Service Order	Sector Number	Cylinder number	Platter Number
A	1	120	**72**	2
B	6	180	**134**	1
C	3	60	**50**	0
D	2	212	**86**	3
E	5	56	**126**	2
F	4	118	**10**	1

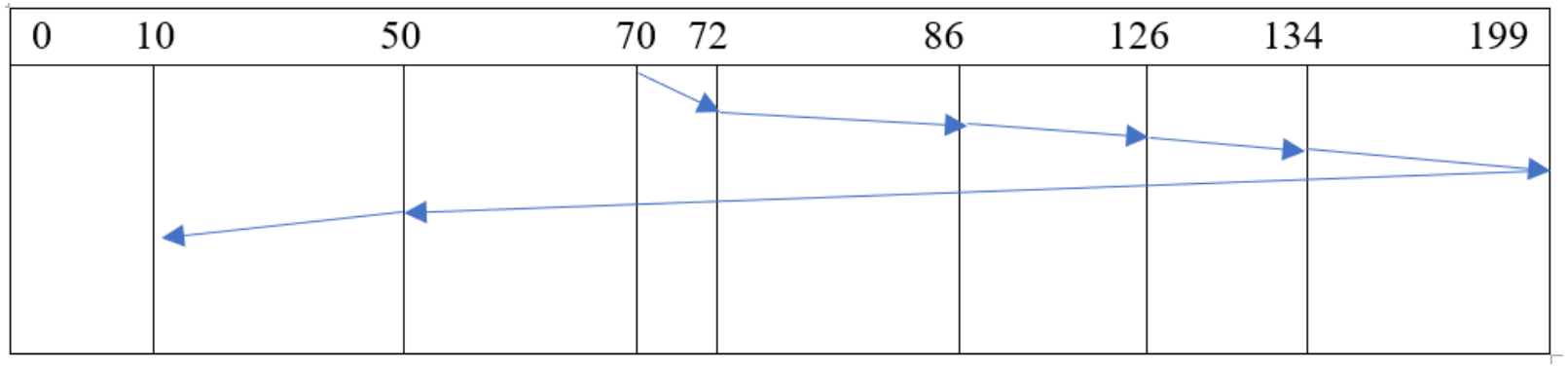


- Total head movements = (86-70) + (86-10) + (134-10) = 216
- Number of reversal of head movement = 2
- Total power consumption = (216/50)x35 + (2x25) = **201.2 milliwatts.**
- For SSTF scheduling, give a suitable value to m and n (such that, 80<m, n<90) for a new request (Y, m, n, 1), whose addition to the above 6 requests will not change the total power consumption calculated initially.
- A new request (Y, m, n, 1) where m can be any value between 80 and 90 and n between 80 and 86 will give same power value as calculated before.

Disk Scheduling Algorithm – Elevator Scheduling

Request	Service Order	Sector Number	Cylinder number	Platter Number
A	?	120	**72**	2
B	?	180	**134**	1
C	?	60	**50**	0
D	?	212	**86**	3
E	?	56	**126**	2
F	?	118	**10**	1

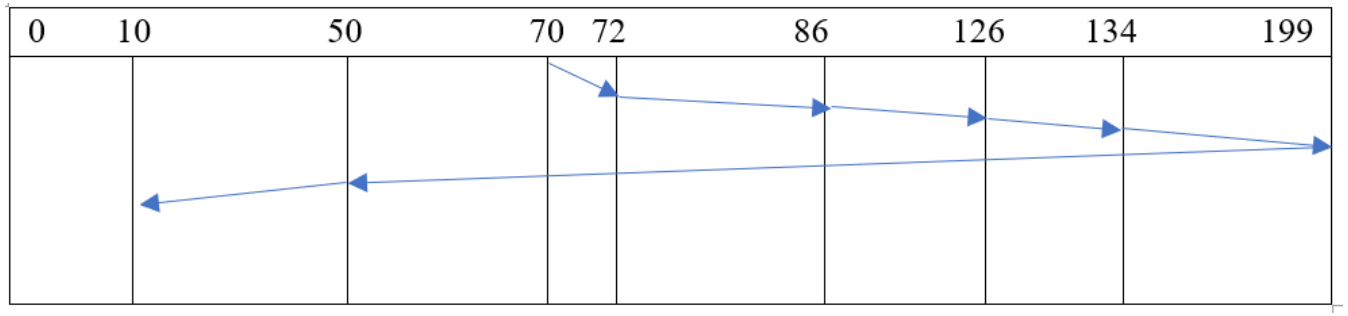
Request	Service Order	Sector Number	Cylinder number	Platter Number
A	1	120	**72**	2
B	4	180	**134**	1
C	5	60	**50**	0
D	2	212	**86**	3
E	3	56	**126**	2
F	6	118	**10**	1



- Total head movements = (199-70) + (199-10) = 318
- Number of reversal of head movement = 1
- Total power consumption = (318/50)x35 + (1x25) = **247.6 milliwatts.**

Disk Scheduling Algorithm – Elevator Scheduling

Request	Service Order	Sector Number	Cylinder number	Platter Number
A	1	120	**72**	2
B	4	180	**134**	1
C	5	60	**50**	0
D	2	212	**86**	3
E	3	56	**126**	2
F	6	118	**10**	1

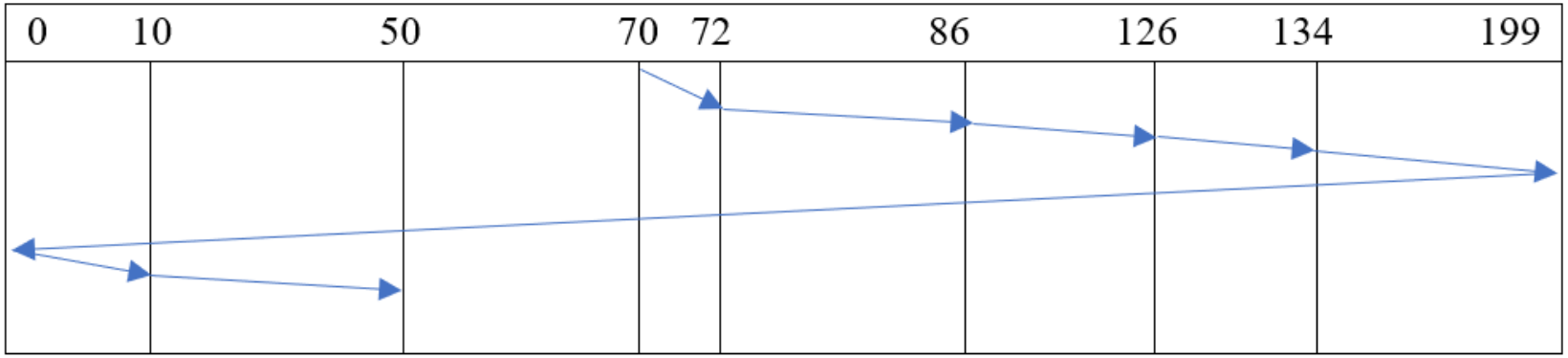


- Total head movements = (199-70) + (199-10) = 318
- Number of reversal of head movement = 1
- Total power consumption = (318/50)x35 + (1x25) = **247.6 milliwatts.**
- For elevator scheduling, give a suitable value to x and y (such that, 55<x, y<65) for a new request (Z, x, y, 0), whose addition to the above 6 requests will not change the total power consumption calculated initially.
- A new request (Z, x, y, 0) where x and y can be any value between 55 and 65 will give same power value as calculated before.

Disk Scheduling Algorithm – C-SCAN Scheduling

Request	Service Order	Sector Number	Cylinder number	Platter Number
A	?	120	**72**	2
B	?	180	**134**	1
C	?	60	**50**	0
D	?	212	**86**	3
E	?	56	**126**	2
F	?	118	**10**	1

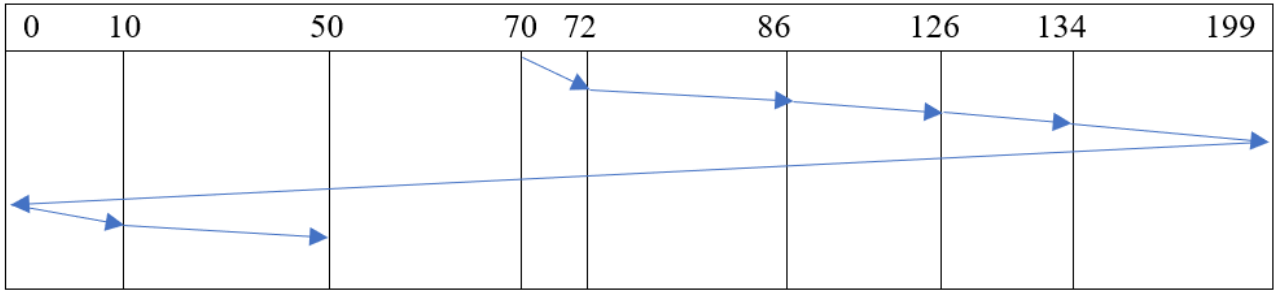
Request	Service Order	Sector Number	Cylinder number	Platter Number
A	1	120	**72**	2
B	4	180	**134**	1
C	6	60	**50**	0
D	2	212	**86**	3
E	3	56	**126**	2
F	5	118	**10**	1



- Total head movements = (199-70) + (199-0) + (50-0) = 378
- Number of reversal of head movement = 2
- Total power consumption = (378/50)x35 + (2x25) = **314.6 milliwatts.**

Disk Scheduling Algorithm – C-SCAN Scheduling

Request	Service Order	Sector Number	Cylinder number	Platter Number
A	1	120	**72**	2
B	4	180	**134**	1
C	6	60	**50**	0
D	2	212	**86**	3
E	3	56	**126**	2
F	5	118	**10**	1

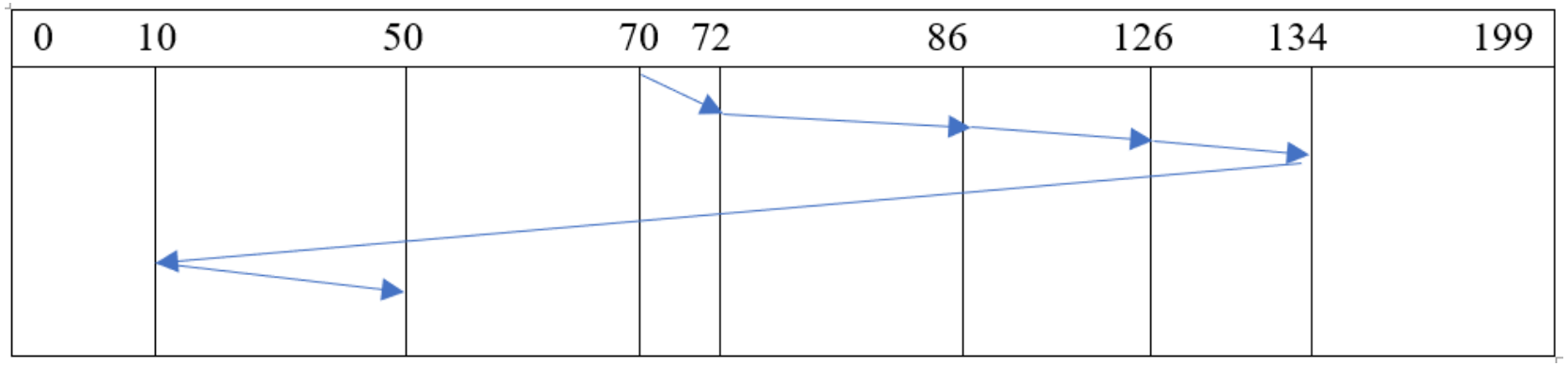


- Total head movements = (199-70) + (199-0) + (50-0) = 378
- Number of reversal of head movement = 2
- Total power consumption = (378/50)x35 + (2x25) = **314.6 milliwatts.**
- For C-SCAN scheduling, is it possible to have a new request (Q, r, s, 2), whose addition to the above 6 requests will not change the total power consumption calculated initially., under the condition 150<r, s<180? If so, give a suitable value for r and s.
- A new request (Q, r, s, 2) r and s can be any value between 150 and 180 will give same power value as calculated before.

Disk Scheduling Algorithm – C-LOOK Scheduling

Request	Service Order	Sector Number	Cylinder number	Platter Number
A	?	120	**72**	2
B	?	180	**134**	1
C	?	60	**50**	0
D	?	212	**86**	3
E	?	56	**126**	2
F	?	118	**10**	1

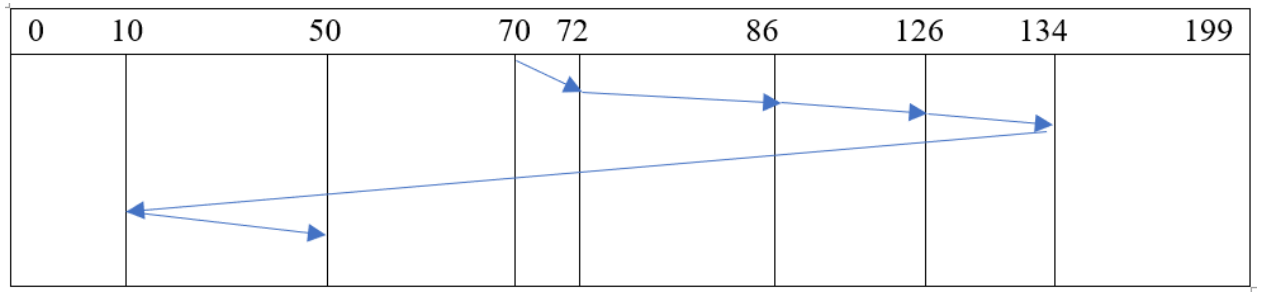
Request	Service Order	Sector Number	Cylinder number	Platter Number
A	1	120	**72**	2
B	4	180	**134**	1
C	6	60	**50**	0
D	2	212	**86**	3
E	3	56	**126**	2
F	5	118	**10**	1



- Total head movements = (134-70) + (134-10) + (50-10) = 228
- Number of reversal of head movement = 2
- Total power consumption = (228/50)x35 + (2x25) = **209.6 milliwatts.**

Disk Scheduling Algorithm – C-LOOK Scheduling

Request	Service Order	Sector Number	Cylinder number	Platter Number
A	1	120	**72**	2
B	4	180	**134**	1
C	6	60	**50**	0
D	2	212	**86**	3
E	3	56	**126**	2
F	5	118	**10**	1



- Total head movements = (134-70) + (134-10) + (50-10) = 228
- Number of reversal of head movement = 2
- Total power consumption = (228/50)x35 + (2x25) = **209.6 milliwatts.**
- For C-LOOK scheduling, is it possible to have a new request (P, i, j, 3), whose addition to the above 6 requests will not change the total power consumption calculated initially. under the condition 55<i, j<70.?. If so, give a suitable value for i and j.
- A new request (P, i, j, 3): no possible value for i and j is there that will give same power value as calculated before.

Thank You