

OS Assignment 3

Ans 1

Given,

$$\text{No. of tracks} = 200$$

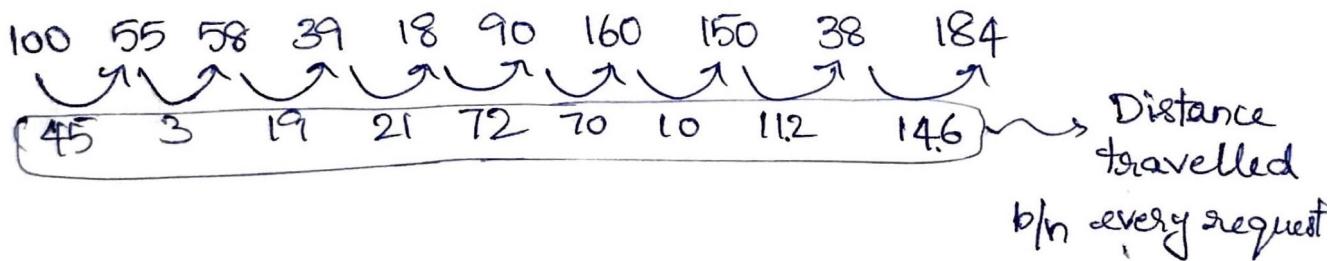
$$\text{Initial arm position} = 100$$

$$\text{Workqueue} \Rightarrow 55 \ 58 \ 39 \ 18 \ 90 \ 160 \ 150 \ 38 \ 184$$

FIFO scheduling:

The order in which requests are serviced is same as the workqueue order.

\therefore The position of the head varies as,



\therefore Total distance travelled by arm

$$= 45 + 3 + 19 + 21 + 72 + 70 + 10 + 112 + 146$$

$$= 498$$

$$\text{No. of requests} = 9$$

$$\therefore \text{Average Seek Length} = \frac{498}{9} = \underline{\underline{55.33}}$$

SSTF scheduling:

Work Queue \rightarrow 55, 58, 39, 18, 90, 160, 150, 38, 184

Next arm position is the nearest position in the workqueue

Order of servicing the request is as follows

| Current arm Position | Next arm position | Distance travelled by arm |
|---------------------------------------|-------------------|---------------------------|
| Initial arm position $\leftarrow 100$ | 90 | 10 |
| 90 | 58 | 32 |
| 58 | 55 | 3 |
| 55 | 39 | 16 |
| 39 | 38 | 1 |
| 38 | 18 | 20 |
| 18 | 150 | 132 |
| 150 | 160 | 10 |
| 160 | 184 | 24 |

\therefore Total distance travelled by arm = 248

$$\Rightarrow \text{Average Seek Length} = \frac{248}{9} = 27.55$$

\downarrow
no. of requests

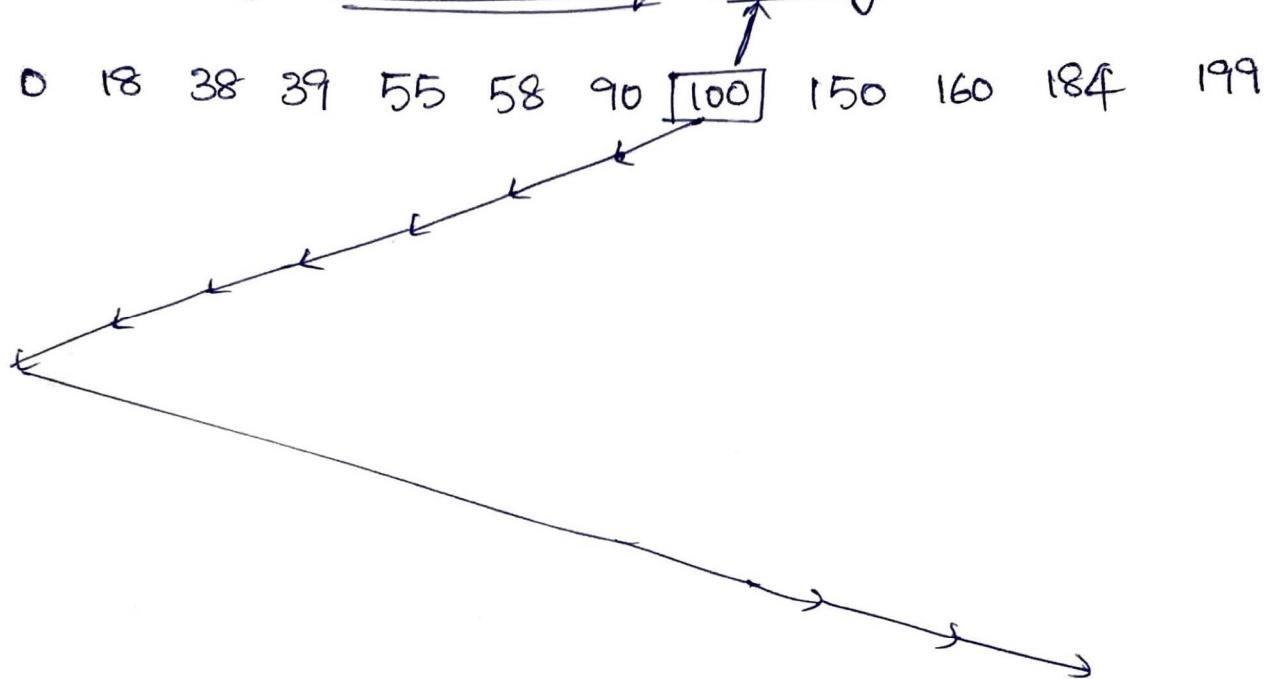
SCAN scheduling

Work queue is 55 58 39 18 90 160 150 38 164

Initial arm position is 100

The disk movement is illustrated below,

assuming arm moves left initially



Order of servicing requests is

90, 58, 55, 39, 38, 18, 150, 160, 184

Total Distance travelled is

$$\begin{aligned} &= (100-90) + (90-58) + (58-55) + (55-39) \\ &\quad + (39-38) + (38-18) + (18-0) + (150-0) + (160-150) \\ &\quad + (184-160) \end{aligned}$$

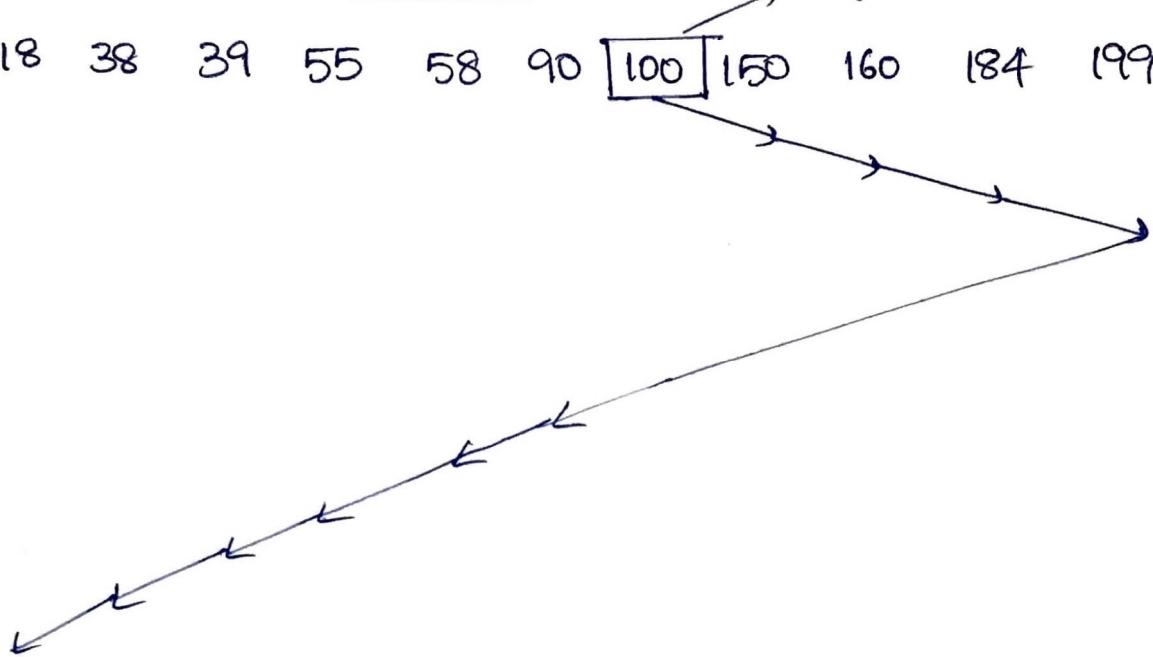
$$= 10 + 32 + 3 + 16 + 1 + 20 + 18 + 150 + 10 + 24$$

$$= 284$$

$$\Rightarrow \text{Average seek length} = \frac{284}{9} = \underline{\underline{31.55}}$$

assuming the arm moves right initially, the movements are

0 18 38 39 55 58 90 [100] 150 160 184 199



Order of servicing requests is

150, 160, 184, 90, 58, 55, 39, 38, 18

Total distance travelled is

$$\begin{aligned} &= (150-100) + (160-150) + (184-160) + (199-184) \\ &\quad + (199-90) + (90-58) + (58-55) + (55-39) + (39-38) \\ &\quad + (38-18) \end{aligned}$$

$$= 280, \quad \text{no. of requests} = 9$$

$$\text{Average seek time} = \frac{280}{9} = \underline{\underline{31.11}}$$

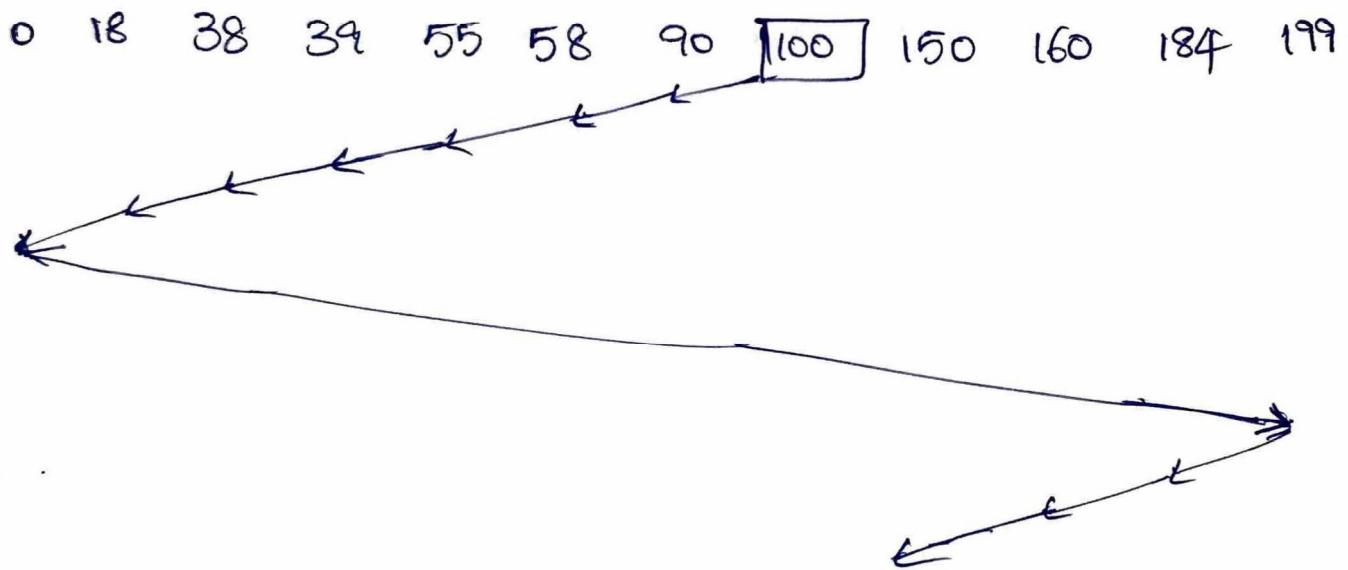
∴ For SCAN algorithm, average seek time is 31.55 if arm moves left initially and 31.11 if arm moves right initially.

C-SCAN scheduling

Work queue is 55, 58, 39, 18, 90, 160, 150, 38, 184

Initially arm head is at 100

Considering the arm goes left initially, its movements are



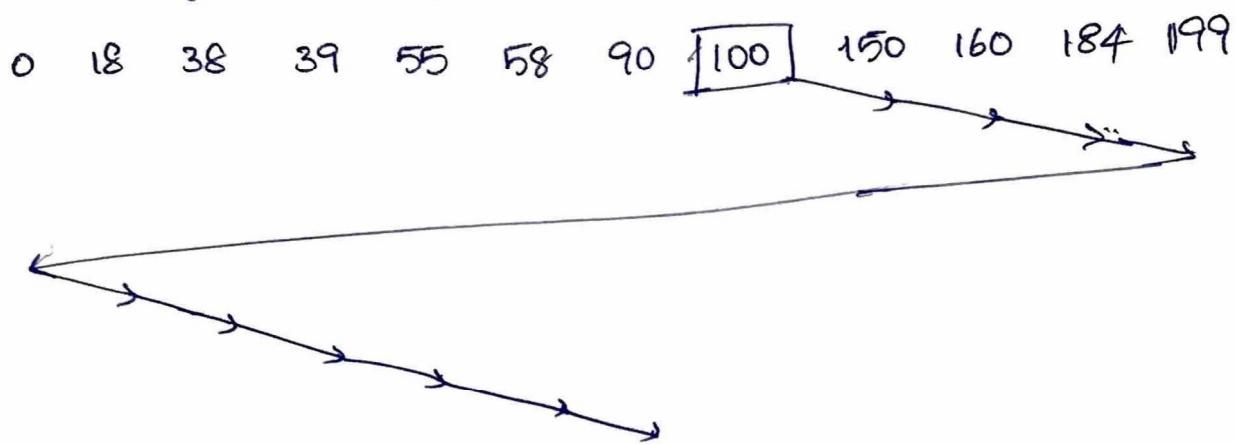
Order of servicing requests is 90, 58, 55, 39, 38, 18, 184, 160, 150

$$\begin{aligned}\text{Total distance travelled} &= (100-90) + (90-58) + (58-55) + (55-39) \\ &\quad + (39-38) + (38-18) + (18-0) + (199-0) \\ &\quad + (199-184) + (184-160) + (160-150) \\ &= 348\end{aligned}$$

No. of requests = 9

$$\text{Average seek length} = \frac{348}{9} = \underline{\underline{38.67}}$$

Assuming the arm goes right initially, its movements are.



Order of servicing the requests is 150, 160, 184, 199, 18, 38, 39, 55, 58, 90

$$\begin{aligned}\text{Total distance travelled} &= (150-100) + (160-150) + (184-160) + (199-184) \\ &\quad + (199-0) + (18-0) + (38-18) + (39-38) \\ &\quad + (55-39) + (58-55) + (90-58) \\ &= 388\end{aligned}$$

$$\therefore \text{Average seek length} = \frac{388}{9} = \underline{\underline{43.11}}$$

For C-SCAN algorithm, average seek length is 38.67 if disk moves left initially and 43.11 if disk moves right initially.

Final answers.

FIFO \rightarrow 55.33

SSTF \rightarrow 27.55

SCAN \rightarrow { 31.55 if disk moves left initially.

{ 31.11 if disk moves right initially.

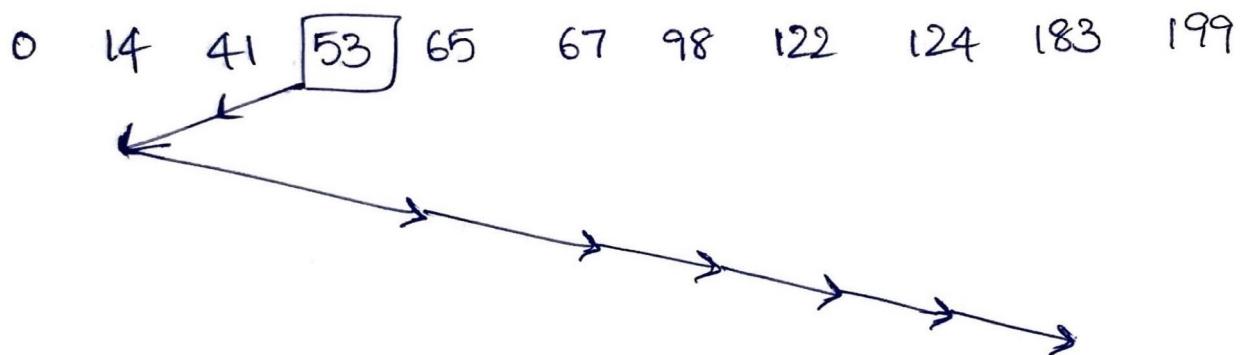
C-SCAN \rightarrow { 38.67 if disk moves left initially.
{ 43.11 if disk moves right initially.

Ans 2 Given, work queue \rightarrow 98, 183, 41, 122, 14, 124, 65, 67

initial head position \rightarrow 53 no. of cylinders \rightarrow 200

LOOK algorithm

Disk movements are illustrated below: (initially arm moves left)

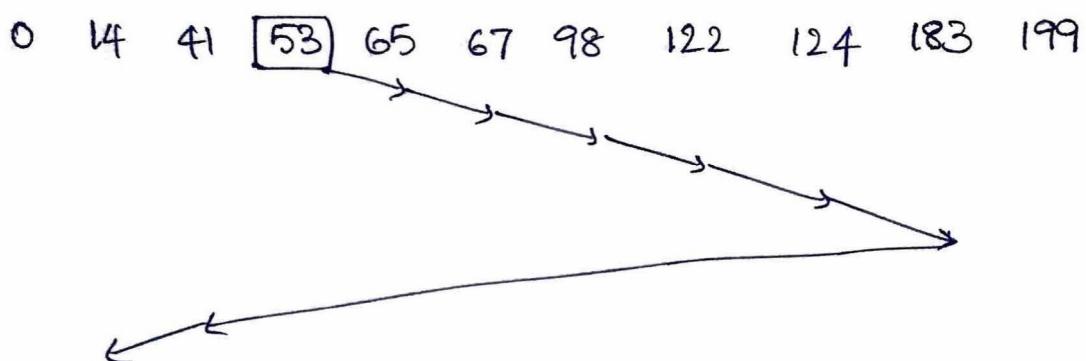


order of servicing requests is 41, 14, 65, 67, 98, 122, 124, 183

$$\text{Total distance travelled} = (53-14) + (183-14) = 208$$

If arm moves initially to the right,

disk movements will be



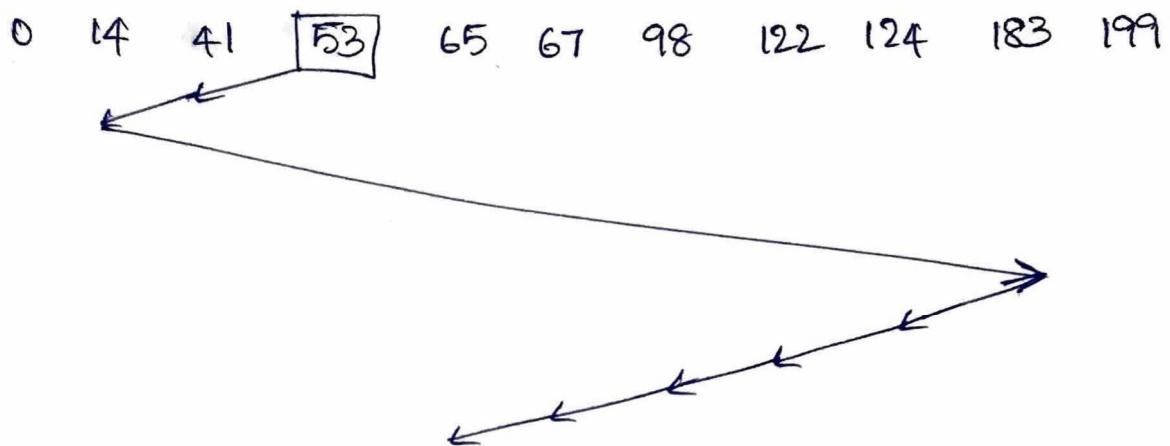
Order of servicing requests will be 65, 67, 98, 122, 124, 183, 41, 14

$$\text{Total distance travelled} = (183-53) + (183-14) = 299$$

\therefore For LOOK algorithm, total distance travelled is 208 if disk moves right initially and 299 if disk moves left initially

C-LOOK algorithm

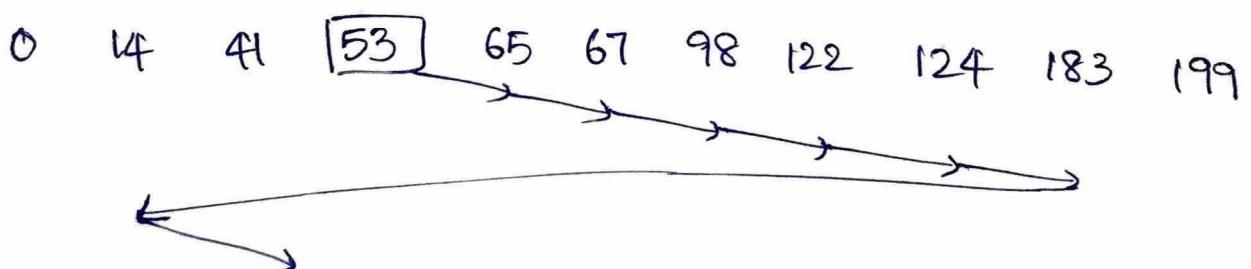
Disk movements are illustrated below (arm moves left initially)



Order of servicing requests: 41, 14, 183, 124, 122, 98, 67, 65

$$\begin{aligned}\text{Total distance travelled} &= (53-14) + (183-14) + (183-65) \\ &= 326\end{aligned}$$

If arm moves right initially, disk movements are



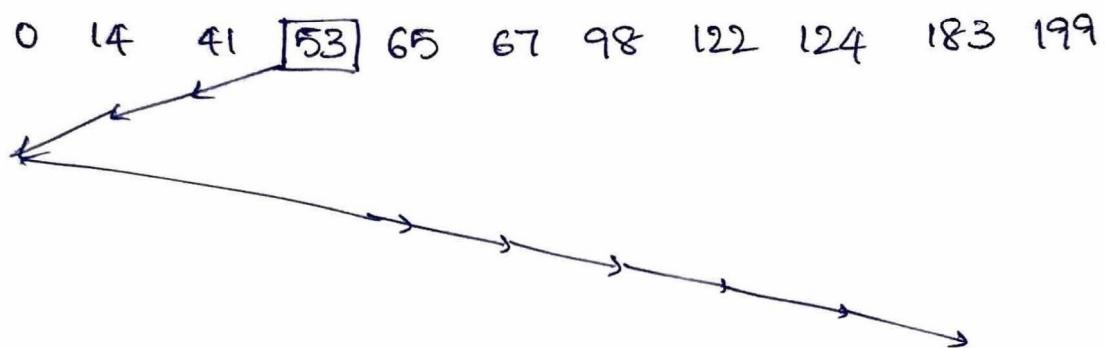
Order of servicing requests = 65, 67, 98, 122, 124, 183, 14, 41

$$\begin{aligned}\text{Total distance travelled} &= (183-53) + (183-14) + (41-14) \\ &= 326\end{aligned}$$

For C-LOOK algorithm, total distance travelled is 326 if disk moves right initially and 326 if disk moves left initially

SCAN algorithm

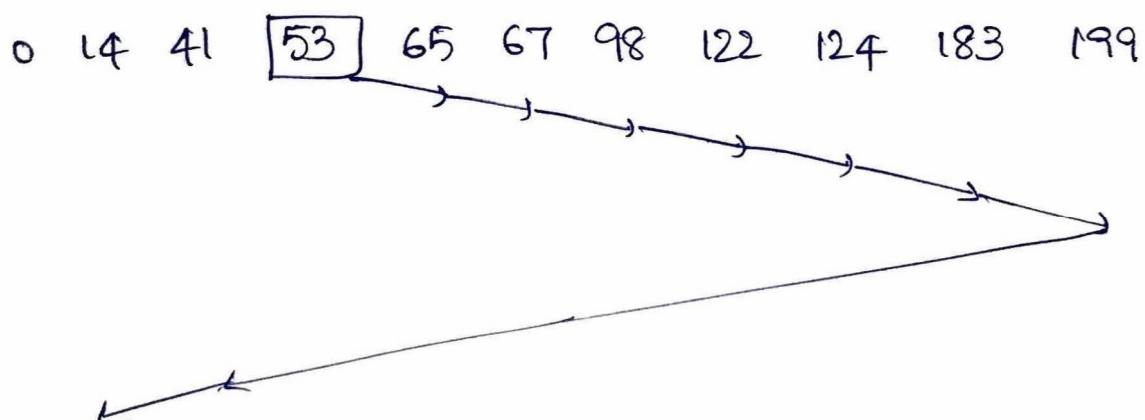
If disk moves left initially, its movements will be



Order of servicing requests is 41, 14, 65, 67, 98, 122, 124, 183

$$\text{Total distance travelled} = (53-0) + (183-0) = \boxed{236}$$

If disk moves right initially, its movements will be



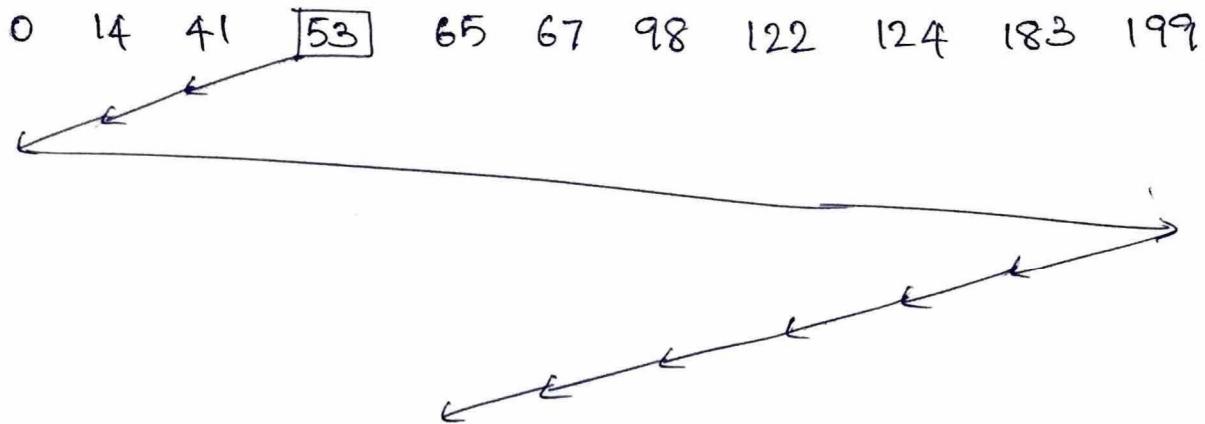
Order of servicing requests is 65, 67, 98, 122, 124, 183, 41, 14

$$\text{Total distance travelled} = (199-53) + (199-14) = \boxed{331}$$

∴ For SCAN, total distance travelled is 236 and 331 when disk moves left and right initially respectively.

C-SCAN algorithm

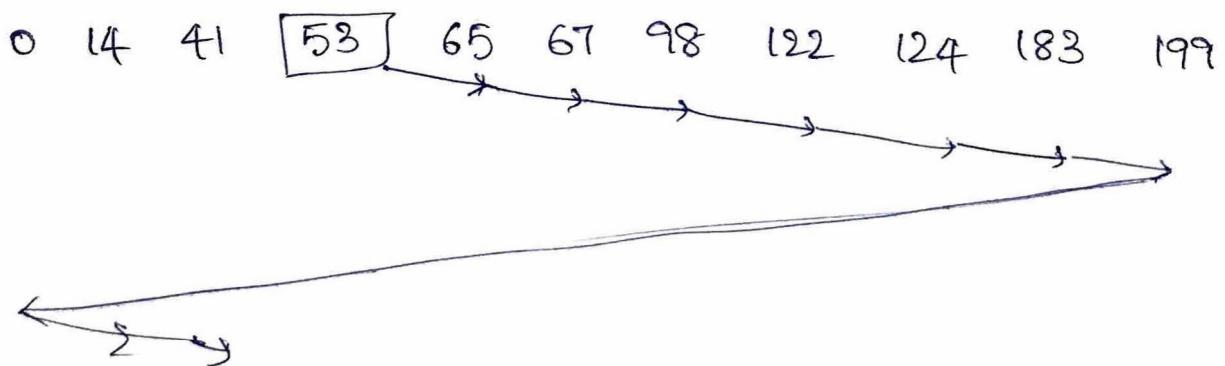
If disk moves left initially, its movements will be



Order of servicing requests is 41, 14, 183, 124, 122, 98, 67, 65

$$\begin{aligned}\text{Total distance travelled} &= (53-0) + (199-0) + (199-65) \\ &= 386\end{aligned}$$

If head moves right initially, its movements will be,



Order of servicing requests: 65, 67, 98, 122, 124, 183, 14, 41

$$\begin{aligned}\text{Total distance travelled} &= (199-53) + (199-0) + (41-0) \\ &= 386\end{aligned}$$

∴ For C-SCAN, total distance travelled is 386 and 386 when disk moves left and right initially respectively.

Final answers:

total distance travelled for all algorithms

| Algorithm | if disk moves left initially | if disk moves right initially |
|-----------|------------------------------|-------------------------------|
| LOOK | 208 | 299 |
| C-LOOK | 326 | 326 |
| SCAN | 236 | 331 |
| C-SCAN | 386 | 386 |