

Chapter 6 : I/O Management & Disk Scheduling.

a. Total

2075 Baisakh

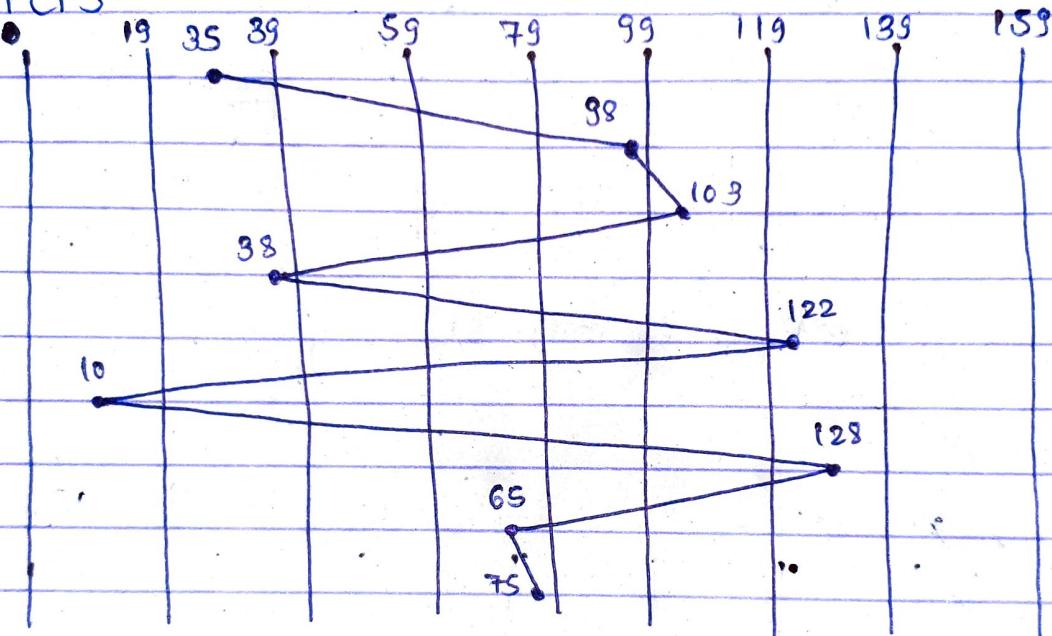
Q. Total 150 cylinder.

Currently at 35 and previous at 120.

Queue: 98, 103, 38, 122, 10, 128, 65, 75

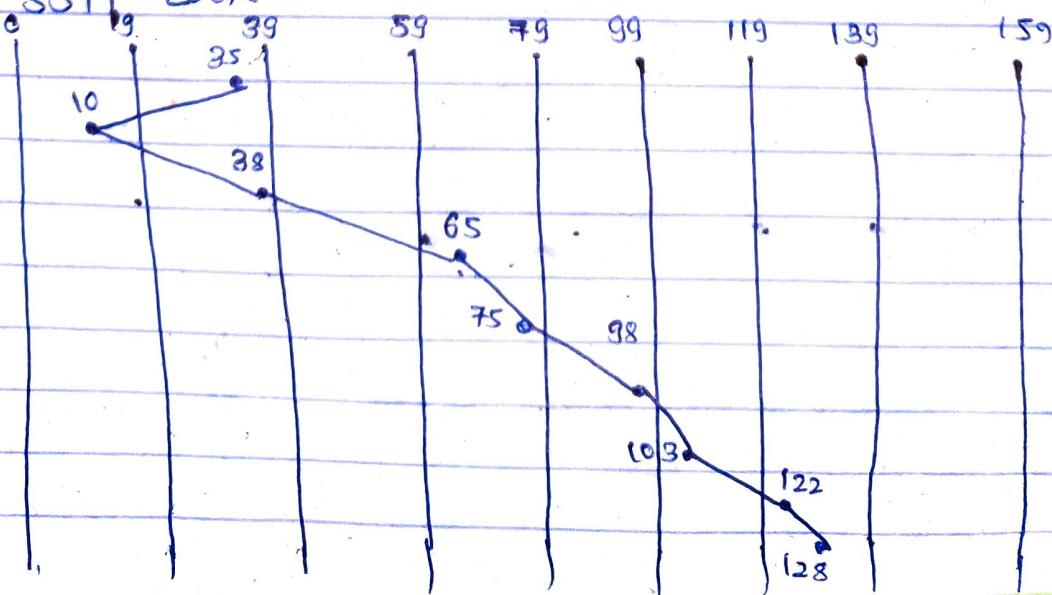
Calculate total head movement (in cylinder) for SSTF, SCAN, C-SCAN, LOOK, FCFS.

i) FCFS.



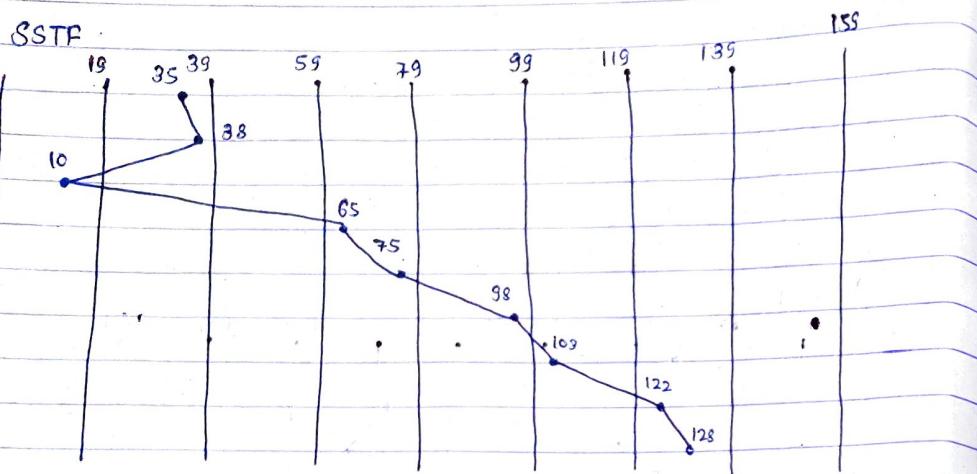
$$\begin{aligned} \text{Total head movement: } & (98-35) + (103-98) + (103-38) + (122-38) + (122-10) \\ & + (128-10) + (75-65) = 520 \text{ cylinders} \end{aligned}$$

ii) SSTF, LOOK



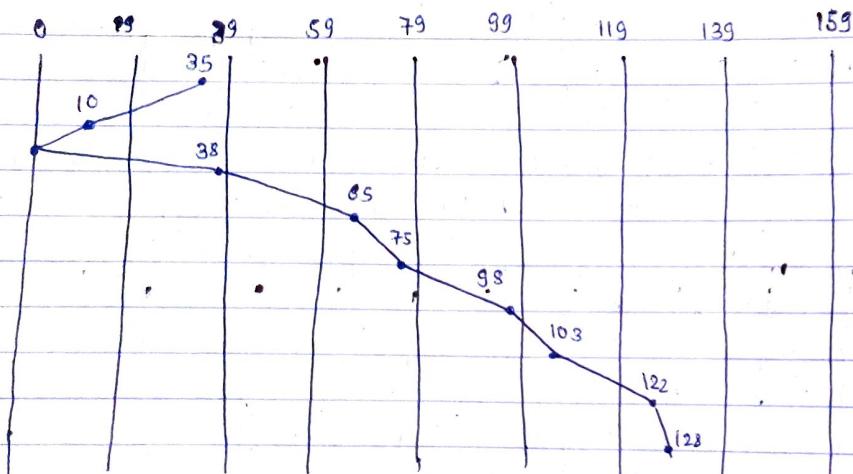
Total distance in cylinder = 143 cylinders.

iii) SSTF



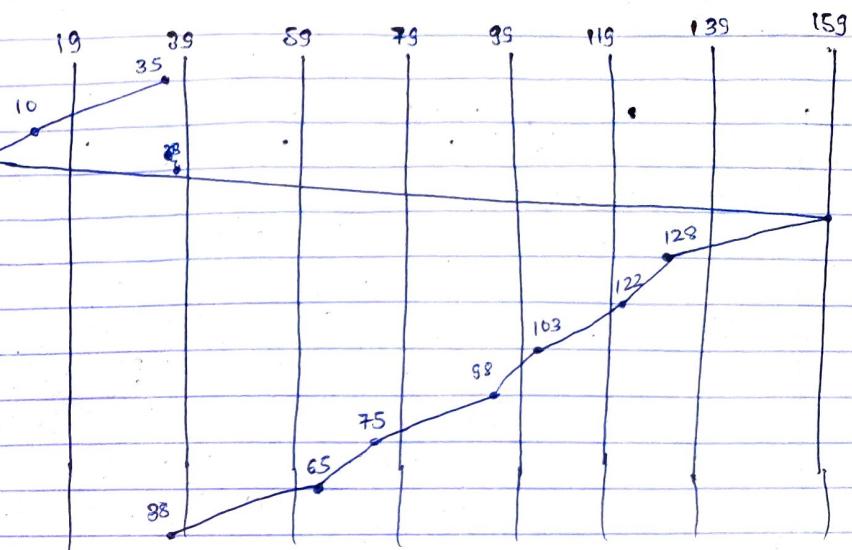
Total head movement in cylinders = 149 cylinder.

iv) LOOK SCAN



Total head movement = 168 cylinders.

v) C-SCAN



Total head movement = 315 cylinders //

2074 Bhadra

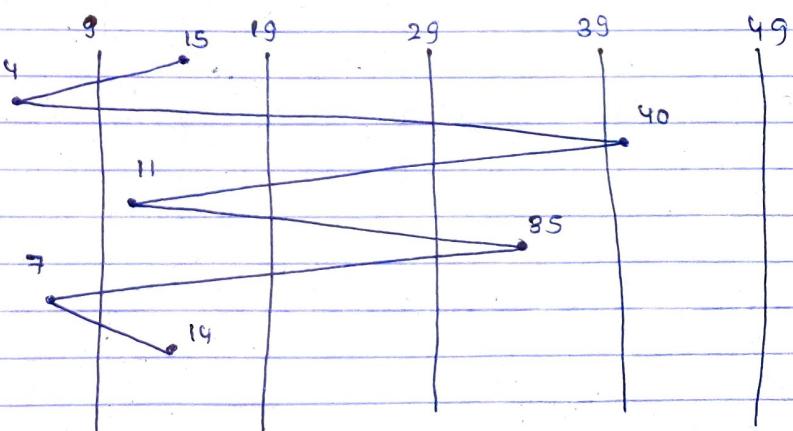
Q. Currently at cylinder 15

Total 50 cylinders

Queue: 4, 40, 11, 35, 7, 14.

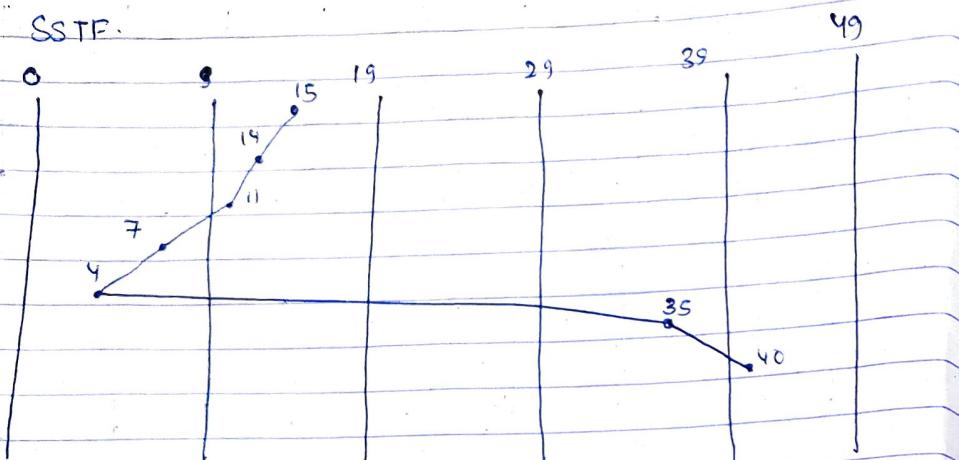
FCFS, SSTF, SCAN, LOOK, C-SCAN, C-LOOK.

i) FCFS:



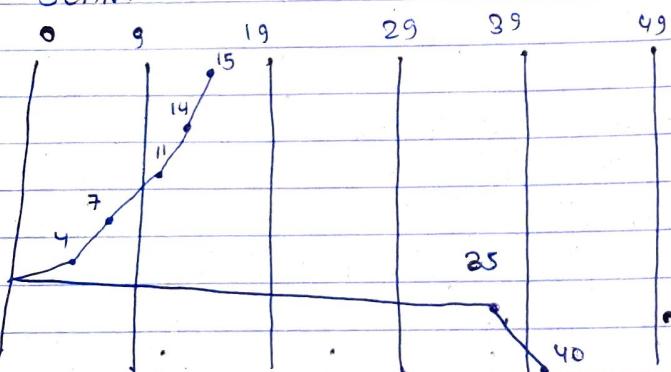
Total distance in cylinder = 135 cylinder

ii) SSTF:



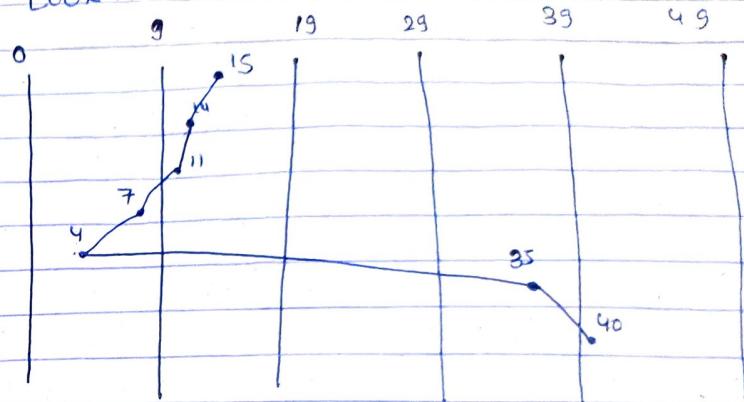
Total distance in cylinder = 47

iii) SCAN:



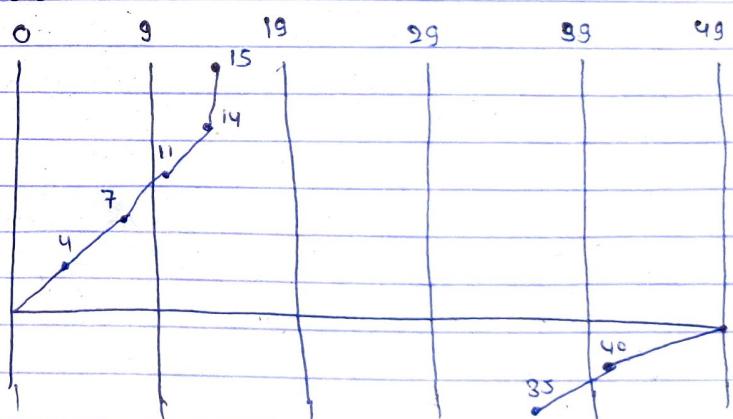
Total distance in cylinder = 55.

iv) LOOK:



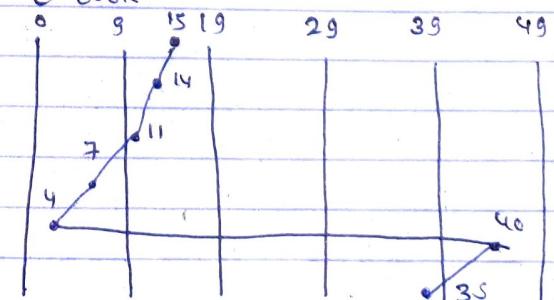
Total distance in cylinder = 47

v) C-SCAN:



Total distance = 77

vi) C-LOOK



Total distance in cylinders = 51

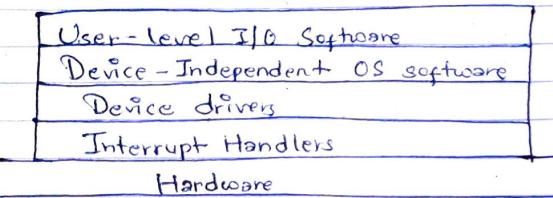
2073 Bhadra

Q. Briefly mention the structured I/O software with suitable diagram. Compare the throughput of SCAN and SSTF.

Ans. I/O Software is organised in four layer.

Each layer has a well defined function to perform and a well define interface to the adjacent layers.

The functionality and interface differ from system to system.



• User-level I/O Software:

It provides simple interface to the user program to perform input and output.

• Device Independent OS software:

The basic function of the device-independent software is to perform the I/O functions that are common to all devices and to provide a uniform interface to the user-level software.

• Device driver:

Device drivers are software modules that can be plugged into an OS to handle a particular device.

• Interrupt Handler:

An interrupt handler is a piece of software or more specifically a callback function in an OS or more specifically in a device driver, whose execution is triggered by the reception of an interrupt.

Throughput of SCAN and SSTF:

In 2074 Bhadra, the total distance in cylinder is 47

and 55 respectively for SSTF and SCAN respectively. So, SSTF has higher throughput than that for SCAN.

Q. Principle of I/O Software: [3-5]

The principles of I/O Software are:

a) Device Independence:

It should be possible to write programs that can access any I/O device without having to specify the device in advance.

b) Uniform naming:

The name of device should simply be a string or an integer and do not depend on the device in any way.

c) Error Handling:

Errors should be handled as close to the hardware as possible.

d) Synchronous (blocking) v/s Asynchronous (Interrupt driven) transfer:

It is upto Os to make the operations that are interrupt driven look blocking to the user program.

e) Buffering:

f) Dedicated v/s Shared device

2073 Magh

Q. Total no. of cylinders = 200

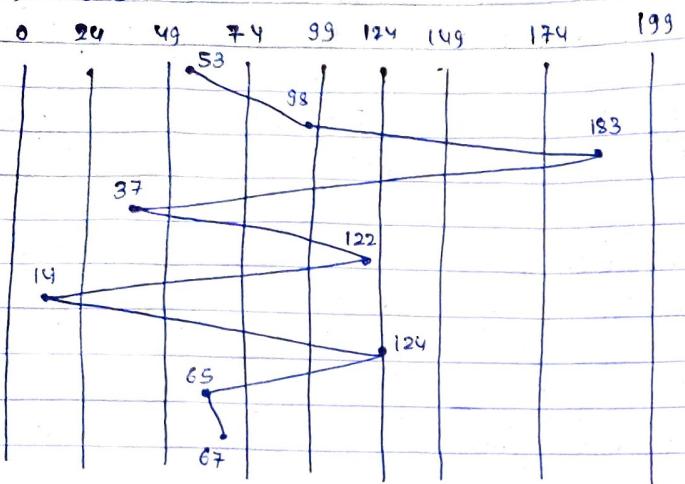
Currently at 53

Queue: 98, 183, 37, 122, 14, 124, 65, 67.

Calculate total head movement.

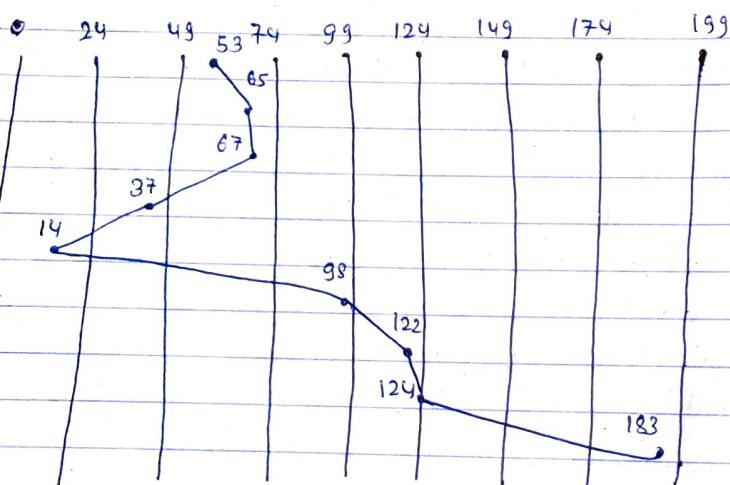
FCFS, SSF, SCAN.

Ans: i.) FCFS



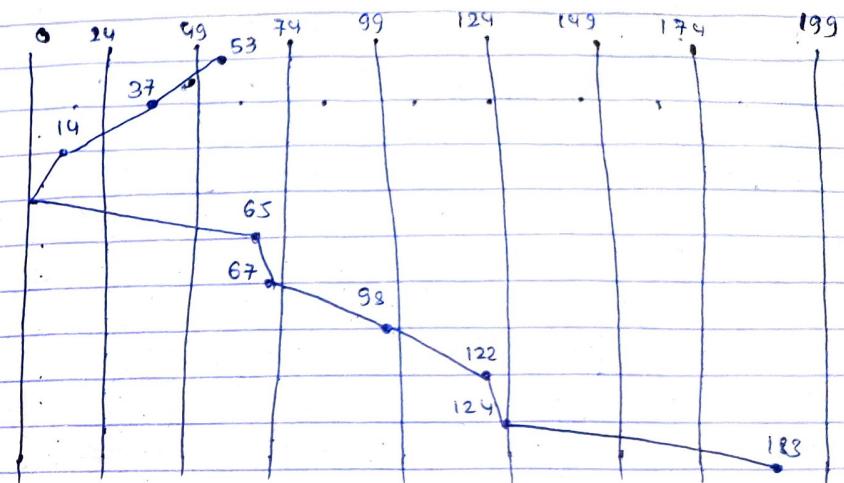
Total head movement = 640

ii.) SSF



Total head movement = 286.

iii.) SCAN

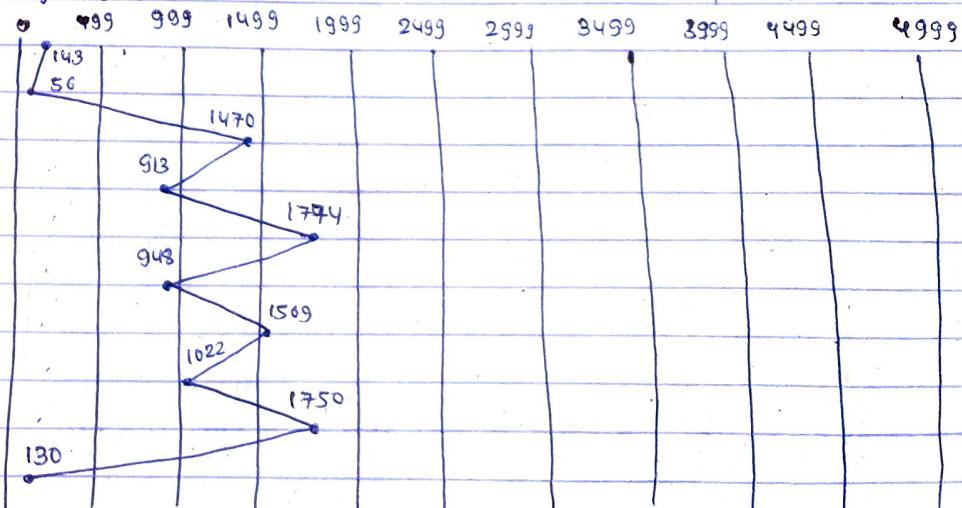


Total head movement = 236

2072 Math

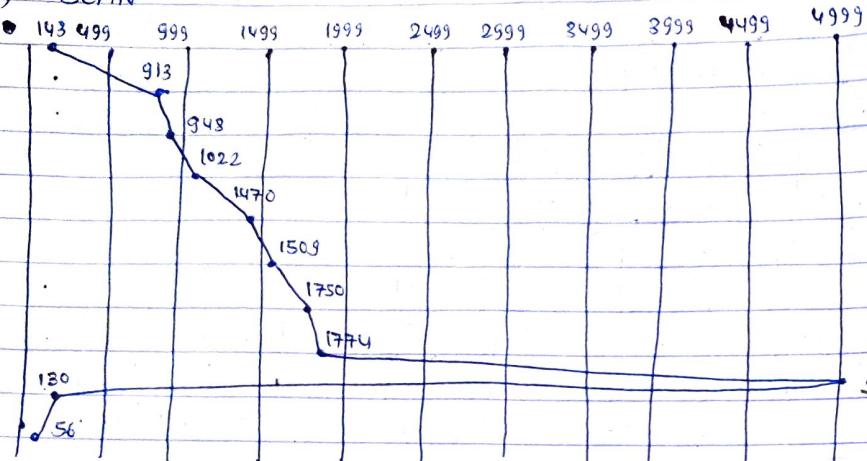
5000 cylinders, Currently at 143, previous request was 125
Queue: 56, 1470, 913, 1774, 948, 1509, 1022, 1750, 130

Ans: i.) FCFS



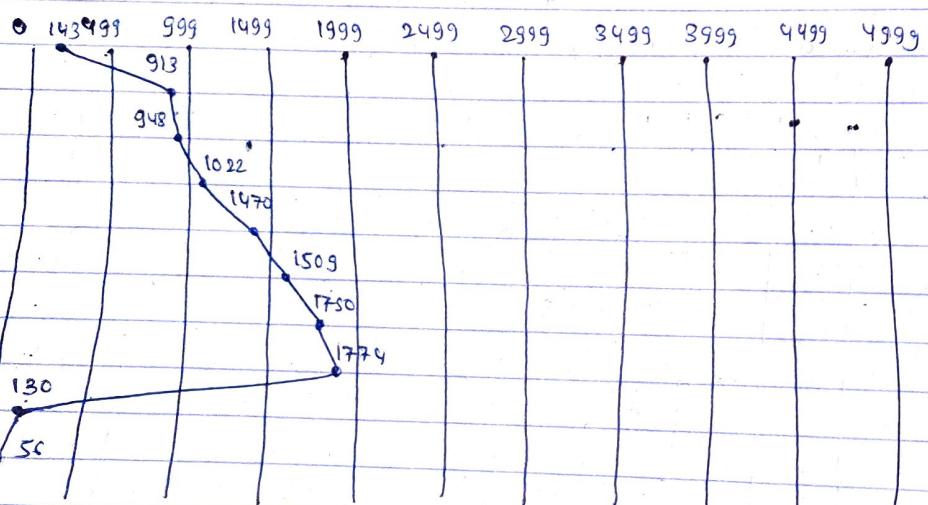
Total head movement = 7142 cylinders

ii) SCAN



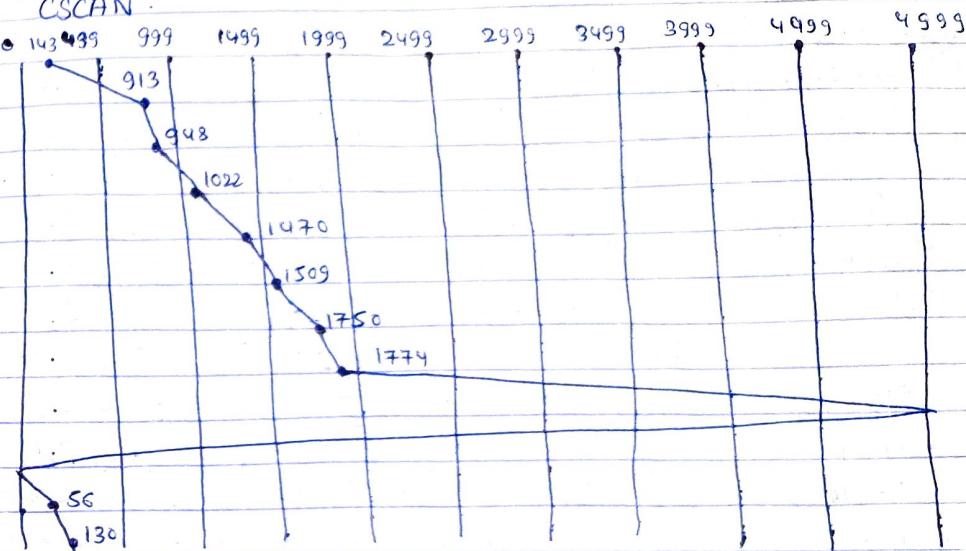
Total distance = 9779 cylinders

iii) LOOK



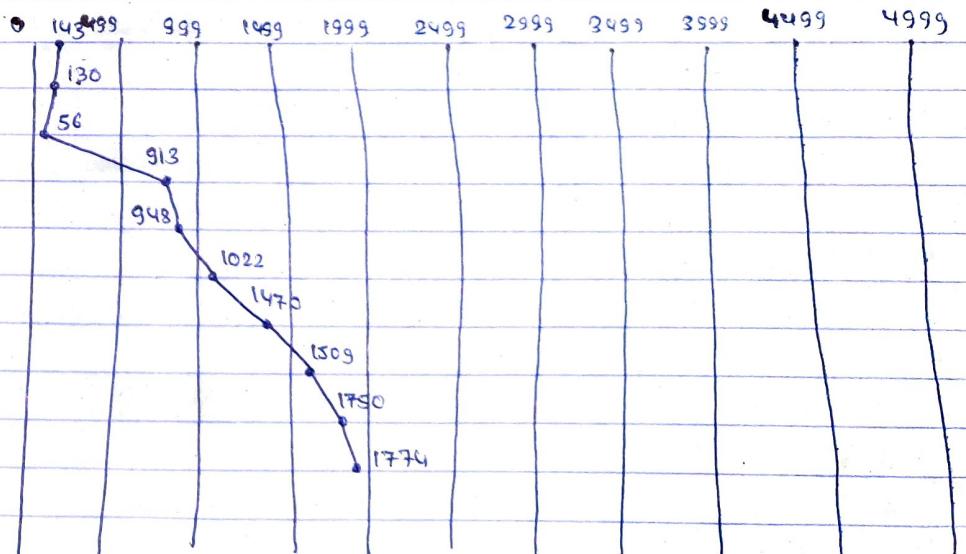
Total distance = 8349 cylinders.

iv) CSCAN



Total distance = 9685 cylinders 9985 cylinders

v) SSTF



Total distance = 1805 cylinders

2072 Ashwin

Q. What is disc scheduling? Explain details about the 'device independent I/O software' with example. [3+6]

Ans: Disk scheduling is done by operating system to schedule I/O requests arriving from + for the disk.

Disk scheduling is also known as I/O scheduling.

First Come First Served, Shortest Seek Time First, C-Scan, etc. are some of the disk scheduling algorithms.

The basic function of the device-independent I/O software is to perform the I/O functions that are common to all devices and to provide a uniform interface to the user-level software. Though it is difficult to write completely device independent software but we can write some modules which are common among all devices. The functions performed by device independent I/O Software are:

- > Uniform Interfacing for device driver
- > Device naming
- > Device protection
- > Error reporting
- > Providing a device-independent block size
- > Storage allocation on block devices.
- > Allocating and releasing dedicated drivers.

2071 Bhadra

Q. Disk with 1000 cylinders

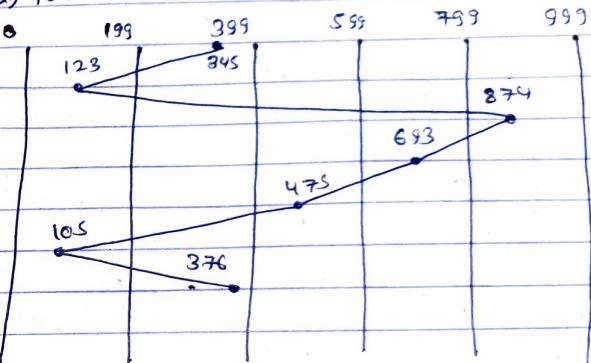
Last request at 345 and moving towards 0.

Queue: 123, 874, 693, 475, 105, 376

Calculate computation for following scheduling algorithms

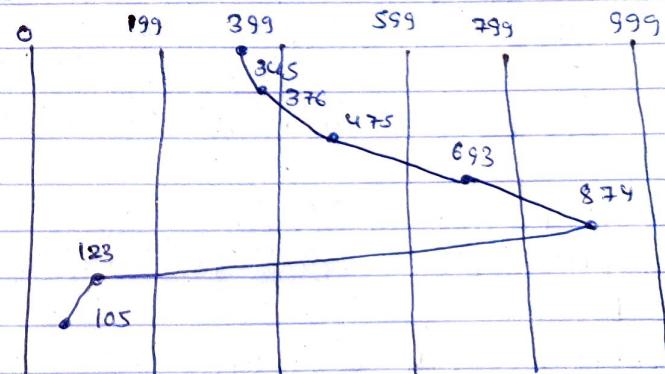
- FIFO
- SSTF
- SCAN

a) FIFO



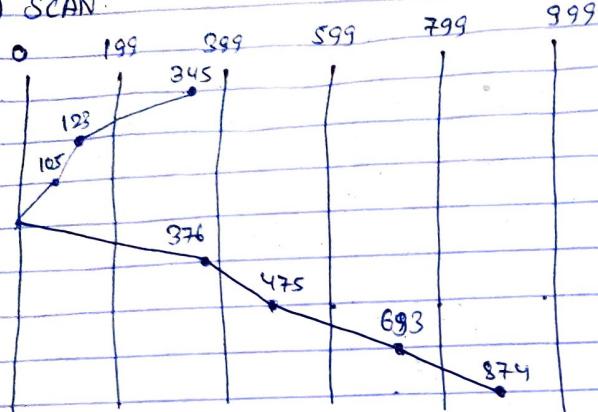
Total distance in cylinders = 2013

b) SSTF



Total distance in cylinders = 1298

c) SCAN



Total distance in cylinders = 1219.1)

2071 Magh

⇒ 2073 Magh.

2070 Bhadra

Q. What are the disadvantages of programmed I/O? Explain about DMA. What are the functions of device independent I/O Software.

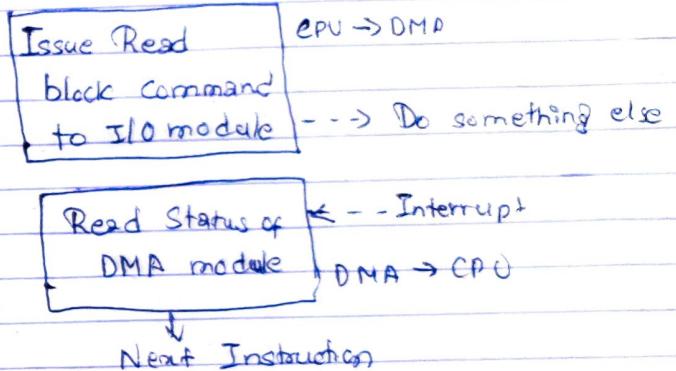
[2+2+4]

Ans: Device independent I/O Software [2072 Ashwin]

The disadvantages of programmed I/O are

- o It is a time consuming process since it needlessly keeps the CPU busy.
- o Performance of entire system is degraded.
- o Processor, while waiting, must repeatedly interrogate the status of I/O module

Direct Memory access (DMA) is a method that allows an input/output device to send or receive data directly to or from the main memory, bypassing the CPU to speed up memory operations. This process is performed by DMA controller.



Direct Memory Access.