Q1. Consider a storage disk with 4 platters (numbered as 0, 1, 2 and 3), 200 cylinders (numbered as 0, 1, … , 199), and 256 sectors per track (numbered as 0, 1, … 255). The following 6 disk requests of the form [sector number, cylinder number, platter number] are received by the disk controller at the same time:

[120, 72, 2], [180, 134, 1], [60, 20, 0], [212, 86, 3], [56, 116, 2], [118, 16, 1]

Currently head is positioned at sector number 100 of cylinder 80, and is moving towards higher cylinder numbers. The average power dissipation in moving the head over 100 cylinders is 20 milliwatts and for reversing the direction of the head movement once is 15 milliwatts. Power dissipation associated with rotational latency and switching of head between different platters is negligible.

The total power consumption in milliwatts to satisfy all of the above disk requests using the Shortest Seek Time First disk scheduling algorithm is _____ .

Q2. A hard disk system has the following parameters :

- Number of tracks = 500

- Number of sectors/track = 100

- Number of bytes /sector = 500

- Time taken by the head to move from one track to adjacent track = 1 ms

- Rotation speed = 600 rpm.

What is the average time taken for transferring 250 bytes from the disk ?
(A) 300.5 ms
(B) 255.5 ms
(C) 255.0 ms
(D) 300.0 ms

Q3. Suppose the following disk request sequence (track numbers) for a disk with 100 tracks is given: 45, 20, 90, 10, 50, 60, 80, 25, 70. Assume that the initial position of the R/W head is on track 50. The additional distance that will be traversed by the R/W head when the Shortest Seek Time First (SSTF) algorithm is used compared to the SCAN (Elevator) algorithm (assuming that SCAN algorithm moves towards 100 when it starts execution) is _____ tracks
(A) 8
(B) 9
(C) 10
(D) 11

Q4.

Consider a disk queue with requests for I/O to blocks on cylinders 47, 38, 121, 191, 87, 11, 92, 10. The C-LOOK scheduling algorithm is used. The head is initially at cylinder number 63, moving towards larger cylinder numbers on its servicing pass. The cylinders are numbered from 0 to 199. The total head movement (in number of cylinders) incurred while servicing these requests is:

(A) 346
(B) 165
(C) 154
(D) 173

Q5. Consider a disk pack with 16 surfaces, 128 tracks per surface and 256 sectors per track. 512 bytes of data are stored in a bit serial manner in a sector. The capacity of the disk pack and the number of bits required to specify a particular sector in the disk are respectively:

(A) 256 Mbyte, 19 bits

(B) 256 Mbyte, 28 bits

(C) 512 Mbyte, 20 bits

(D) 64 Gbyte, 28 bits

Q6. Disk requests are received by a disk drive for cylinder 5, 25, 18, 3, 39, 8 and 35 in that order. A seek takes 5 msec per cylinder moved. How much seek time is needed to serve these requests for following Disk Scheduling algorithm? Assume that the arm is at cylinder 20 when the last of these requests is made with none of the requests yet served.

FCFS

SSTF

SCAN

LOOK

Q7.
Disk requests come in to the disk drive for tracks 10, 22, 20, 2, 40, 6, and 38, in that order. A seek takes 5 ms per track moved. In all cases, the arm is initially at track 20. How much seek time is needed for

    a) First-come, first served
    b) Shortest seek time first
    c) Scan scheduling (initially moving upwards)

Q8.
Consider the following parameters describing a disk:

Parameter	Description
C	Number of cylinders
T	Number of tracks per cylinder (number of platters)
S	Number of sectors per track
ω	Rotational velocity (rotations per second)
B	Number of bytes per sector

In terms of these parameters, how many bytes of data are on each disk cylinder?

Suppose that you are designing a disk drive, and that you hope to reduce the expected rotational latency for requests from the disk. Which of the parameters above would you attempt to change, and in what way would you change them?

Suppose you wanted to reduce the disk's data transfer time - which parameters would you attempt to change?

Q9. Suppose a disk has 201 cylinders, numbered from 0 to 200. At some time the disk arm is at cylinder 100, and there is a queue of disk access requests for cylinders 30, 85, 90, 100, 105, 110, 135 and 145. If Shortest-Seek Time First (SSTF) is being used for scheduling the disk access, the request for cylinder 90 is serviced after servicing _____ number of requests.

(A) 1

(B) 2

(C) 3

(D) 4

Q10. A fast wide SCSI-II disk drive spins at 7200 RPM, has a sector size of 512 bytes, and holds 160 sectors per track. Estimate the sustained transfer rate of this drive

(A) 576000 Kilobytes / sec

(B) 9600 Kilobytes / sec

(C) 4800 Kilobytes / sec

(D) 19200 Kilobytes / sec