

3 (A) –“ A multiplattered hard disk is divided into 1100 sectors and 40,000 cylinders. There are six platter surfaces. Each block holds 512 bytes. The disk is rotating at a rate of 4800 rpm. The disk has an average seek time of 12 msec. What is the total capacity of this disk?”

Answer:

The question gives data:

- Sectors per track = 1100 sectors
- Number of cylinders = 40,000 cylinders
- Number of platter surfaces = 6 surfaces
- Bytes per block = 512 bytes

Therefore,

The total capacity of this disk = $1100 * 40,000 * 6 * 512 = 135,168,000 \text{ Bytes}$

4 (A)- “The average latency on a disk with 2200 sectors is found experimentally to be 110 msec. What is the rotating speed of the disk?”

Answer:

The question gives data:

- Average latency = 110 milliseconds

From,

Average latency = $(1 / 2) * (1 / \text{Rotating speed})$

Therefore,

Rotating speed = $(1 / 2) * (1 / \text{Average latency}) = (1 / 2) * (1 / 0.110) = 4.5 \text{ rps}$

Chapter 10 Calculation Exercises

[I] For a display of 1920 pixels by 1080 pixels at 16 bits per pixel how much memory, in megabytes, is needed to store the image?

Answer:

Total number of pixels = $1920 * 1080 = 2,073,600 \text{ pixels}$

16 bits per pixel = 2 bytes per pixel

Total bytes needed for memory = $2,073,600 * 2 = 4,147,200 \text{ Bytes}$

As, 1 megabyte = $2^{20} = 1,048,576 \text{ bytes}$

Therefore,

Total megabytes needed for memory = $4,147,200 / 1,048,576 = 3.955 \text{ megabytes}$

[II] What is the average rotational latency of a hard drive rotating at 7,200 RPM or 120 revolutions per second? (Give your answer in milliseconds)

Answer:

Average latency = $(1 / 2) * (1 / \text{Rotating speed})$
= $(1 / 2) * (1 / 120)$
= 0.00417 sec
= 4.17 msec

[III] What is the transfer time for a hard drive rotating at 7,200 RPM or 120 revolutions per second? Assume there are 30 sectors per track. (Give your answer in milliseconds)

Answer:

$$\begin{aligned}\text{Transfer time} &= 1 / (\text{Number of sectors} * \text{Rotational speed}) \\ &= 1 / (30 * 120) \\ &= 0.000278 \text{ sec} \\ &= 0.278 \text{ msec}\end{aligned}$$