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10.3(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 the disk?

Ans: The capacity of the disk will be = number of sectors*number of cylinders* platter surfaces*size of block

$$\text{Capacity} = 1100 * 40000 * 6 * 512 = 135,168,000,000 \text{ bytes}$$

10.4(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?

Ans: Number of Sectors = 2200
Average Latency = $(1/2) * (1 / \text{Rotational speed})$
Rotational Speed = $1/2 \text{ Average Latency}$
Rotational Speed = $1 / (2*110)$
Rotational Speed = 0.0045

[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?

Ans: Total number of pixels = $1920 * 1080 = 2,073,600$
Total memory needed = $2,073,600 * 2 \text{ bytes/pixels} = 4,147,200$
 $1 \text{ mb} = 2^{20} \text{ B} = 1,048,576$
Converting To MB = $(1/ 1,048,576) = 3.955 \text{ MB}$

[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)

Ans: Rotational Speed = 120 Rev/sec
Average Latency time = $(1/2) * (1 / \text{Rotational Speed})$
 $= (1/2) * (1/120)$
 $= 0.004167 \text{ sec or } 4.167 \text{ ms}$

[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)

Ans: Rotational Speed = 120 Rev/sec
No. of Sectors = 30 sector/track
Transfer Time = $1 / (\text{No of Sector} * \text{Rotational Speed})$
 $= 1 / (30*120)$
 $= 0.000278 \text{ sec or } 0.278 \text{ ms}$