Deliverable: Magnetic discs

Submission form

|  |  |
| --- | --- |
| **Surname, Name:** | **Group**: |

*Submission deadline: 29 April 2022, 23:55.*

Exercise 1

A file takes 2,147,483,648 bytes. Give its size using both decimal and binary prefixes. Make sure you apply the recommendations given in Annex *Style matters* at the end of the task instructions.

|  |  |
| --- | --- |
| With decimal prefixes | kB        MB        GB |
| With binary prefixes | kiB        MiB        GiB |

Exercise 2

A given hard disk has 6 sides and a linear track density of 52,000 tpi. The innermost diameter is 1.2" and the outermost is 2.5".

2.1 What is the amount of useful surface in the disk? Give the result in square inches (*in2*).

|  |
| --- |
|  |

**Result:** ***in2***

2.2 How many cylinders and tracks does the disk contain?

|  |
| --- |
|  |

**Result:       cylinders and** **tracks**

Exercise 3

The disk of exercise 2 has CAV format with 3500 sectors/track and a sector size of 1024 bytes.

Calculate the capacity of the disk

|  |
| --- |
|  |

**Result:       Bytes**

What is the areal density of the disk? Give in both kbit/in2 and Mbit/in2.

|  |
| --- |
|  |

**Result:       kb/*in2***

**Result:       Mb/*in2***

Exercise 4

The disk described in exercise 2 has a linear density of 52,000 tpi and that it receives ZCAV format with the following distribution of sectors of 1024 bytes.

|  |  |  |
| --- | --- | --- |
| Zone | Limits (ID – OD) | Sectors/track |
| 0 | 2.18" – 2.50" | 5500 |
| 1 | 1.85" – 2.18" | 4400 |
| 2 | 1.52" – 1.85" | 3500 |
| 3 | 1.20" – 1.53" | 2800 |

Calculate the capacity of the disk.

|  |
| --- |
|  |

**Result:       Bytes**

What is the areal density of this disk? Give it in both *kbit/in2* and *Mbit/in2* units.

|  |
| --- |
|  |

**Result:       Kb/*in2***

**Result:       Mb/*in2***

Exercise 5

Consider the disk described in exercise 4 rotates at 9000 rpm. The average seek time is 9 ms, and the track-to-track seek time is 0.8 ms. Calculate:

**5.1** The average access time.

|  |
| --- |
|  |

**Result:       ms**

**5.2** The internal transfer speed for each zone.

|  |
| --- |
|  |

**Results: Zone 0:       µs Zone 1:       µs**

**Zone 2:       µs Zone 3:       µs**

**5.3** The average time it takes to read a 120 KB file stored in correlative sectors of the same track. Consider two cases: when the track is in zone 0 and when it is in zone 3.

Zone 0:

|  |
| --- |
|  |

**Result:       ms**

Zone 3:

|  |
| --- |
|  |

**Result:       ms**

**5.4** The average time it takes to read e 120 KB file stored in randomly distributed sectors of cylinders located in zone 0. Assume the average seek time within a given zone is the average seek time divided by the number of zones, i.e., 9 / 4 = 2.25 ms.

|  |
| --- |
|  |

**Result:       ms**

**5.5** The time for reading a 2000 MB file, assuming it is **optimally** stored in zone 0 (with all the optimisations described in Section 4).

|  |
| --- |
|  |

**Result:       ms**