



Name : Vaibhav Atmaram Padghar
Assignment - 8.

Q1.

- Magnetism -

Q.1. Define Magnetic susceptibility and Magnetic flux.

Ans. i) Magnetic susceptibility :- It is defined as the ratio of the intensity of magnetization produced in the substance to the magnetizing field.

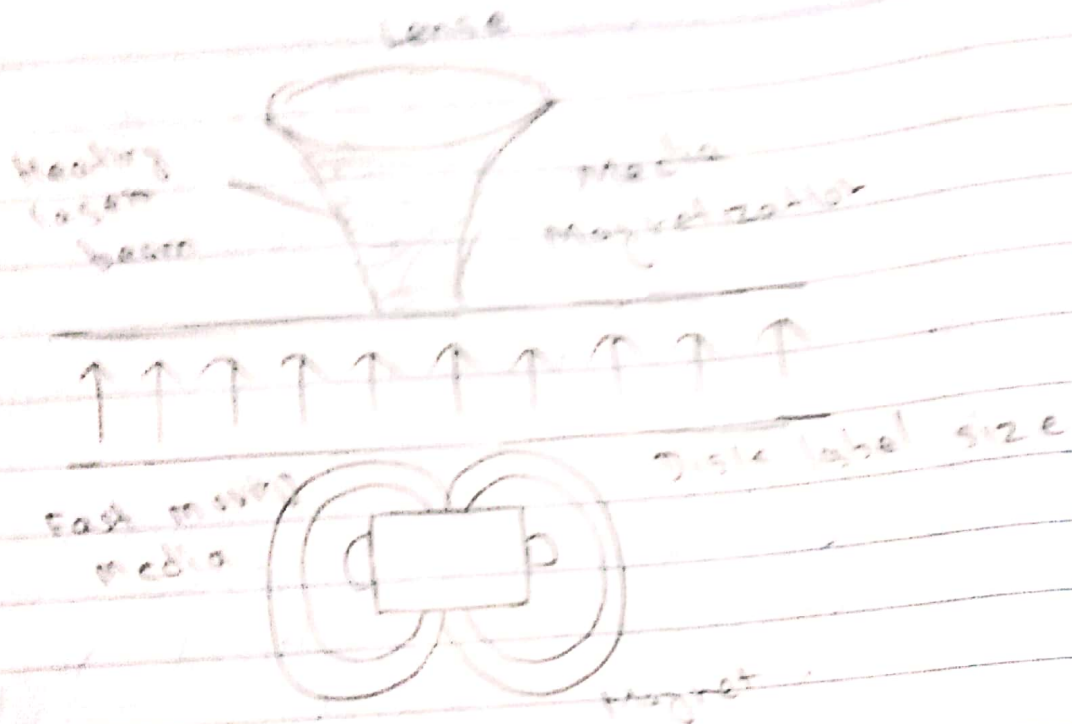
$$\therefore \chi = \frac{1}{H}.$$

ii) Magnetic flux :- It is defined as the number of lines of magnetic induction passing through unit cross sectional area. It is measured in unit Tesla (T).

Q.2. Explain how the information is recorded and retrieved in magneto optical recording devices.

1) Magneto optical drive is a popular way to back up files on a personal computer.

2) As the term implies an MO device uses both magnetic field and LASER source to obtain ultra-high density



data storage.

3) A typical Magneto-optical cartridge is slightly bigger than conventional 3.5 inch magnetic diskette but appears similar. But while the older type of magnetic diskette can store 1.44 MB of data, a magneto-optical diskette can store many times of that amount ranging from 100 MB to several gigabytes or TB.

4) An magneto-optic system achieved very high density data storage by using laser source and magnetic read-write head in combination.

5) LASER source heats up the diskette surface, hence it can be easily magnetized.

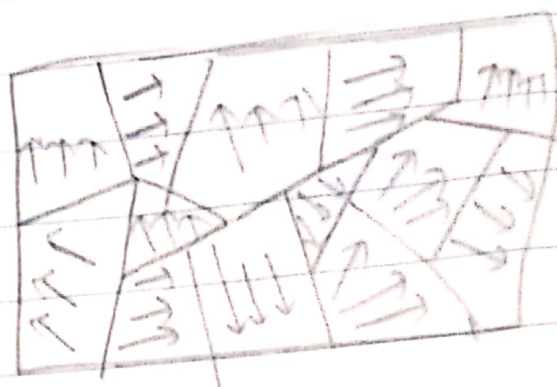
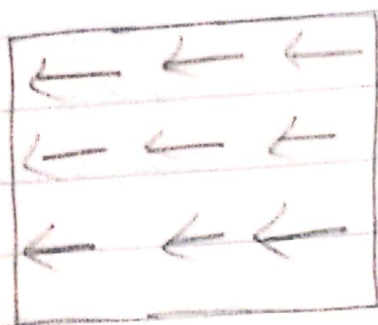
6) LASER It also helps to locate



the region precisely defined and confined. A less intense laser source is used to read the data from diskette.

- 7) Data can be erased or overwritten an unlimited number of times, similar to 5 inch diskette.
- 8) For example magneto-optical drives are Fujitsu Dynamo, a 230 MB drive used in the power PC Apple power book, a note book computers and the pinnacle micro vertex a 2.6 GB drive.
- 9) The main advantage of magneto optical drive includes it is very convenient, modest cost, reliable and approaching industry standardization.
- 10) The disadvantage of magneto-optical drives are they are slower compared to hard disk drives.
- 11) Although they are usually faster than conventional 3.5 diskette drives.

Q.3. Explain in brief what are ferromagnetic materials and their characteristics?



1) Ferromagnetic substances are those which are strongly attracted by magnets and can be easily magnetized. Examples of ferromagnetic substances are iron, cobalt, nickel, alloys, iron oxide, etc.

2) The small region in the diagram in which few atoms of a ferromagnetic material are coupled together is called domain.

3) A piece of unmagnetised ferromagnetic material consists of every large number of such domain. In this domain, the magnetic moments are pointing along same direction, through exchange interaction.

4) In the neighbouring domain, however magnetic moments align in different directions. Ferromagnetism is a property exhibited by certain metals, alloys and compounds of iron group, rare earth elements in



Modern College of Engineering

Shivajinagar, Pune 5.

in which below a certain temperature known as Curie temperature, the atomic magnetic moments tend to align in a particular direction.

5) The property of ferromagnet is that, below Curie temperature, it possesses a spontaneous magnetization in absence of external magnetic field. By application of weak magnetic field, the magnetization increases rapidly to a high value.

• Properties :-

- i) Ferromagnetic substance exhibits all the properties of paramagnetic substance.
- ii) The susceptibility has a positive value and the permeability is also large.
- iii) The magnetic lines of force are strongly attracted by ferromagnetic materials.
- iv) The susceptibility decreases with temperature and obeys Curie's law is given by,

$$\chi_m \propto \frac{1}{T} \Rightarrow \chi_m \cdot T = \text{constant}.$$

- v) At a temperature known as critical



Modern College of Engineering

Shivajinagar, Pune 5.

temperature on Curie point the value of susceptibility drops suddenly and it changes to paramagnetic.

6) The susceptibility of a ferromagnetic substance above its Curie point is proportional to difference of temperature of metal material and Curie point. This is known as Curie-Weiss law which is $\chi_m = \frac{C_m}{T - T_c}$

where,

χ_m = molar susceptibility

C_m = Curie constant

T_c = Curie Temperature

-11-