ELECTRONICS DEVICES AND CIRCUITS

OBJECTIVE

MAGNETIC FIELD AND ITS EFFECT ON MATERIALS,

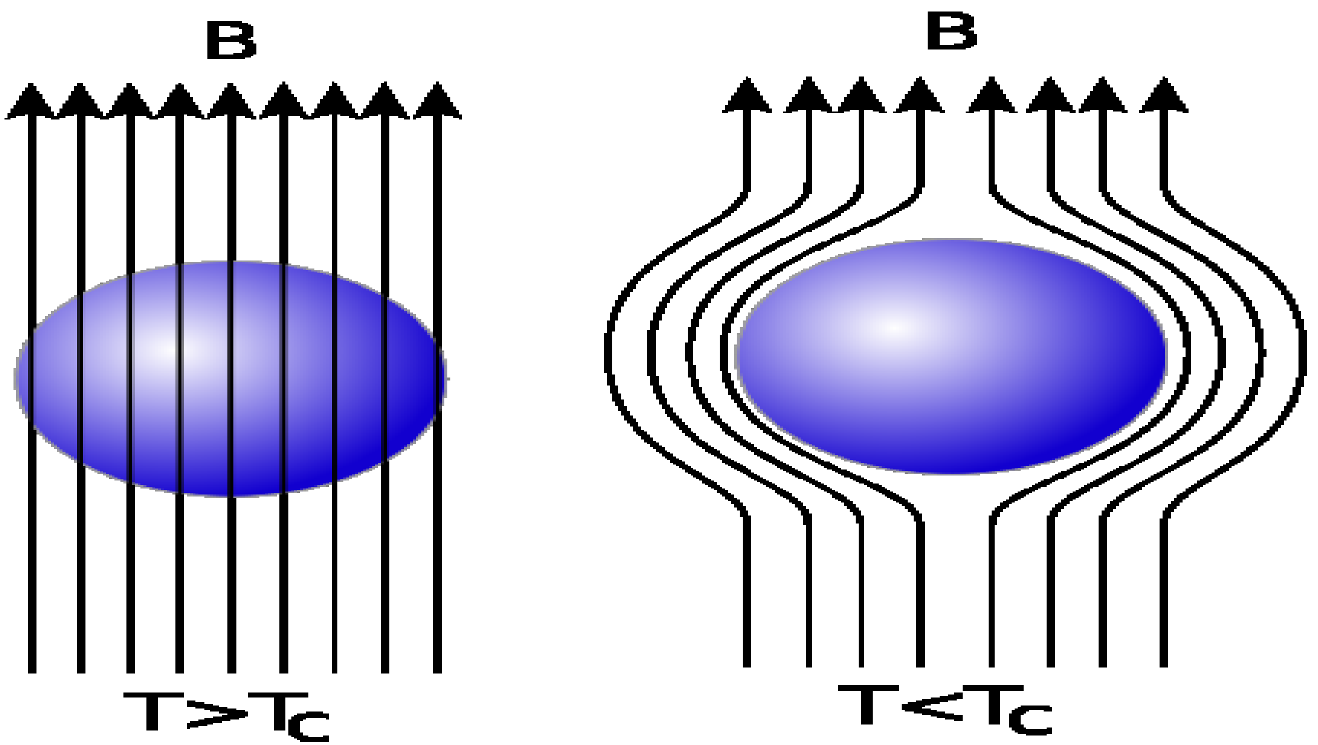
- A **magnetic field** is a mathematical description of the magnetic influence of electric currents and magnetic materials. The magnetic field at any given point is specified by both a *direction* and a *magnitude* (or strength); as such it is a vector field. The magnetic field is most commonly defined in terms of the Lorentz force it exerts on moving electric charges. *Magnetic field* can refer to two separate but closely related fields which are denoted by the symbols **B** and **H**.

- Magnetic fields are produced by moving electric charges and the intrinsic magnetic moments of elementary particles associated with a fundamental quantum property, their spin. In special relativity, electric and magnetic fields are two interrelated aspects of a single object, called the electromagnetic tensor; the split of this tensor into electric and magnetic fields depends on the relative velocity of the observer and charge. In quantum physics, the electromagnetic field is quantized and electromagnetic interactions result from the exchange of photons.

- In everyday life, magnetic fields are most often encountered as an invisible force created by permanent magnets which pulls on iron objects and attracts or repels other magnets. Magnetic fields are very widely used throughout modern technology, particularly in electrical engineering and electromechanics. The Earth produces its own magnetic field, which is important in navigation. Rotating magnetic fields are utilized in both electric motorsand generators. Magnetic forces give information about the charge carriers in a material through the Hall effect. The interaction of magnetic fields in electric devices such as transformers is studied in the discipline of magnetic circuits.

Meissner effect

- The **Meissner effect** is an expulsion of a magnetic field from a superconductor during its transition to the superconducting state. The German physicists Walther Meissner andRobert Ochsenfeld discovered the phenomenon in 1933 by measuring the magnetic field distribution outside superconducting tin and lead samples.[1] The samples, in the presence of an applied magnetic field, were cooled below their superconducting transition temperature. Below the transition temperature the samples cancelled nearly all interior magnetic fields. They detected this effect only indirectly because the magnetic flux is conserved by a superconductor: when the interior field decreases, the exterior field increases. The experiment demonstrated for the first time that superconductors were more than just perfect conductors and provided a uniquely defining property of the superconducting state.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