**Q.1.    Answer the following short questions:**                          **(6x5=30)**

(a) What are magnetic pole density and surface density of magnetic pole strength?

(b) Briefly discuss hysteresis loop of a ferromagnetic material.

(c) Differentiate between "microscopic" and "macroscopic" forms of Maxwell's equations?

(d) What is difference between index of refraction and dielectric constant?

(e) What are zonal harmonics?

(f) Briefly discuss electric polarization in dielectrics.


**Answer the following questions.**                          **(3x10=30)**

**Q. 2.** Discuss any two topics from the following:

   (a) Gauge transformations.
   (b) Nature of current.
   (c) Generalization of Ampere's law.


**Q. 3.** Find an expression for the magnetic field of a distant circuit, showing it does not depend on its detailed geometry, but only on its magnetic moment $m$.


**Q.4.** Briefly discuss field vector $H$ in magnetic theory. Also discuss boundary conditions for the field vectors $B$ and $H$ at an interface between two media.