**Question #1**

Explain magnetic field and its properties.

**Question #2**

Derive the expression for the magnetic field of an infinitely long straight conductor.

**Question #3**

Derive the expression for the magnetic field from a circular conductor. Give the definition of the magnetic moment.

**Question #4**

Explain the theorem of the circulation of the magnetic field.

**Question #5**

Derive the expression for the ratio of electric force to magnetic force.

**Question #6**

Derive the expressions for magnetic susceptibility and magnetization.

**Question #7**

Explain the difference between paramagnets, diamagnets and ferromagnets.

**Question #8**

Explain the hysteresis curve for the magnetization of a ferromagnets.

**Question #9**

Explain interaction between magnets.

**Question #10**

Explain magnetization of diamagnets and paramagnets.

**Question #11**

Explain the dependence of coercivity on the size of magnets. Explain why magnetic nanoparticles are superparamagnetic.

**Question #12**

Explain how the magnetic nanoparticles impact on the convective heat transfer of magnetic nanofluid.

**Question #13**

Describe numerical experiment where the dependence of the direction of external magnetic field on the convective heat transfer of magnetic nanofluid is investigated.

**Question #14**

Explain how external alternating magnetic fields heat up magnetic nanoparticles.

**Question #15**

Describe the experiment where using magnetic nanoparticles heat up petroleum reservoir.