Circuit theory and Field theory

Circuit theory

→ It is a two dimensional analysis

→ Deals with voltage(v) and current(I)

→ V and I are scalars

→ Radiations effects are neglected.

→ lumped components are involved.

→ using circuit theory, transmitter and receiver circuits can be analyzed and designed

It cannot be used to design (or) analyze a medium like free space.

Field theory

It is a three dimensional analysis

Deals with electric and magnetic fields

E and H are vectors

E and H are functions of time and space variables (x, y, z) (or) (ρ, ϕ, z) (or) (r, θ, ϕ).

Radiations effects are considered.

→ Distributed components are involved.

→ Parameters of the medium (Permittivity and permeability are involved)

→ Using field theory, the medium also can be designed and analyzed.

Applications of electromagnetic wave.

→ Radio & television

→ Satellite communications & cooking food

→ Electrical heaters, cooking food & Infrared cameras

→ Fibre optic communications

→ Ultraviolet for energy efficient lamps, sun tanning

→ Medical imaging & treatments