**Title:** Radio Wave Propagation

**Credit Structure (L-T-P-Cr):** 3 0 0 3

**Course Code:** CT450

**Semester:** B. Tech. Semester 6 and 8, M. Tech. and Ph. D.

**Category:** B. Tech. Elective

**Prerequisites:** SC217

**Abstract:**

This course will discuss all modes of propagation of radio waves in the frequency range of 1 Hz to 100 GHz. Ground wave, sky wave and space wave propagation will be covered in detail. Also, statistical distributions and diversity principles will be taught along with microwave radio relay systems. Propagation problems in mobile radio communications will be discussed.

**Outcomes and Objectives:**

On completion of the subject, the students are expected to understand ground wave, sky wave and space wave (line-of-sight) propagation of electromagnetic waves. The students will become familiar with design of line-of-sight microwave relay link and radio propagation in the mobile radio systems.

**Detailed Contents:**

**Introduction to Radio Wave Propagation** (2 hrs)

Modes of propagation: ground wave, sky wave and space wave propagations. General applications.

**Ground Wave Propagation** (5 hrs)

**Sky Wave Propagation** (6 hrs)
The Ionosphere, primary and secondary parameters such as attenuation, refractive index, etc. Electron collision frequency and D-layer attenuation. Critical frequency and maximum usable frequency. Propagation problems for mobile radio communications. Antennas for sky wave propagation.

**Space Wave Propagation** (10 hrs)
Line-of-sight range. Reflections from flat earth and reflection with variable height and wavelength. Inverse distance equations, point of reflection on curved earth and divergence of reflected waves.
Diffraction of space waves. Variation of space wave signal strength. Antennas for space wave propagation.

**Statistical Distributions and Diversity Principles**
(8 hrs)

**Microwave Radio Relay Systems**
(10 hrs)

**Mobile Radio Communications**
(3 hrs)
Propagation problems in rural, suburban and urban areas. Effects of different terrain conditions.

**Reference Books**


**Evaluation**

1. 1st Quiz (4th Feb.) - 8%
2. 1st In-Semester (6 to 8 Feb.) - 25%
3. 2nd Quiz (11th March) - 7%
4. 2nd In-Semester (13 to 15 March) - 25%
5. End-Semester (28 to 30 April) - 25%
6. Attendance - 10%