ANTENNA AND WAVE PROPAGATION (THEORY) EE-449

Pre-requisite: Electro Magnetic Theory
Credit Hours 03
Contact Hours 48

RECOMMENDED BOOKS

- Constantine A. Balanis, "Antenna Theory: Analysis and Design", Third Edition, 2005, Wiley, ISBN-13: 978-0471667827

REFERENCE BOOKS

- Antennas for all applications (2nd Ed.) by J. D. Krauss
- Antennas and propagation for wireless communication systems (2nd Ed.) by Simon R. Saunders

OBJECTIVE OF COURSE

Objective of course is to introduce the students with fundamental concepts, parameters, and types of antenna systems and to apply them to analyze and design antennas. Students will learn the matching and feeding networks, array antennas, effective antenna area and radar cross section and radio wave propagation.

S.NO	CLO/PLOS MAPPING	DOMAIN	PLO
01	**Define** the fundamental concepts of Antenna Radiation, and Identify the difference between different types of Antennas	C1	01
02	**Analyze** the behavior of waves coming out of the Antenna	C4	02
03	**Compare** the performance of Antenna arrays based upon different arrangement of point sources	C4	03
04	**Design** an antenna for the given requirements and Evaluate its performance for performance validation	C5	03

COURSE CONTENTS

- Antenna and Radiation, Basic Antenna Types (Two wire antenna + dipole), Isotropic, omni-directional antennas, Practical antenna types
- Antenna pattern, Beam area, beam solid angle, radiation intensity, Gain and Directivity

- Short dipole, Fields of a short dipole, The thin linear antenna, Radiation patterns of a dipole antenna, Helical antenna, Modes of operation (Helix), Design procedure
- Microstrip antennas + feeding methods, Transmission line models, Cavity model, Slot antenna + feeding method, Different forms of slot antenna
- Horn Antenna, Phase Center, Rectangular horn design, Reflector antenna, Corner reflector + parabolic dish, Yagi-Uda configuration, Yagi-Uda design
- Point sources, Antenna arrays, Different cases of isotropic sources, Principle of pattern multiplication, Pattern synthesis
- Linear array of N isotropic sources, Evaluation of total field, Broadside and End-fire arrays, Beam scanning and Null pointing, Phase shifters, Beam switching feed network
- Antennas for different applications, Mobile phones and antennas, Satellite antennas, Active antennas, multiband / broadband antennas