Devi Ahilya University, Indore, India Institute of Engineering & Technology				**IV Year B.E. (Electronics and Telecommunication)**			
Subject Code & Name	**Instructions Hours per Week**			**Credits**			
ETR7C3	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
ANTENNA AND WAVE PROPOGATION	**3**	**1**	**2**	**3**	**1**	**1**	**5**
Duration of Theory Paper: 3 Hours							

Learning Objectives: This course presents the fundamental concepts of antenna and radio wave propagation. It gives emphasis to the antenna theories, modeling, analysis and design and also the physical behaviors along with the radio wave propagation problems in telecommunication field.

Prerequisites: Knowledge of Electromagnetic field and theory, Fundamentals of Physics

COURSE CONTENTS

UNIT-I

Introduction to types of antennas, radiation mechanism, current distribution on thin wire antenna, radiation pattern like isotropic, directional and omnidirectional, Radiation intensity, gain ,directive gain, directivity, antenna efficiency, effective area, effective length, reciprocity theorem, radar equation, beam efficiency, bandwidth, polarization Antenna temperatures ,FBR ,radiation resistance, Equivalent noise temperature of antenna.

UNIT-II

Poynting theorem, wave equation in terms of electromagnetic potentials and their solution, short electric dipole, retarded vector potential, small current element, small dipole, Finite length dipole, Half wavelength dipole, Infinite perfect conductors, ground effects.

UNIT-III

Introduction to various form of array, array of n isotropic sources of equal and unequal amplitude and uniform spacing, design consideration of Broadside, End fire, Dolphy Tchebyscheff arrays, continuous arrays, rectangular arrays, planar array , binomial array circular array, and super directivity.

UNIT-IV

Huygens' Principle, Hertz and Marconi antenna, ground and antenna losses, High frequency antenna, Dipole antenna, Harmonic antenna and inverted V antenna, Rhombhic Antenna, RDF, Loop antenna, Adcock Antennas & direction finder, Folded Antenna, Yagi Uda Antenna, Corner Reflected Antenna, Helical Antenna, Horn Antenna, Slot Antenna, Microstrip Antenna, LPDA,

Microwave Antenna, Antenna with parabolic reflector, Lens Antenna, Babinet's Principle, Antenna Measurements.

UNIT-V

Modes of propagation, Sky wave propagation, Effect of earth's magnetic field on Ionospheric radio wave propagation, Virtual heights, MUF, LUF, Skip distance, OWF, Ionospheric abnormalities, Multihop propagation, Duct propagation, VLF and ELF propagations.

Learning Outcomes:

Upon completing the course, student will able to grasp the fundamental concept of antenna and its radiation mechanism.

BOOKS RECOMMENDED:

[1]. K.D.Prasad, Antenna and Wave Propagation, 3/e, Satya Prakashan, New Delhi; reprint-2007 .
[2]. Constantine A.Balanis, Antenna Theory: Analysis and Design, 2/e, John Wiley & Sons Inc, Noida India.
[3]. John Daniel Kraus, Ronald J. Marhefka, Antennas, 3/e, McGraw-Hill Higher Education
[4]. C.G.Christodoulou, P.F.Wahid, Fundamentals of Antennas: Concepts and Applications, SPIE
[5]. S.R.Saunders, Antennas and Propagation for Wireless Communication Systems, 1/e, Wiley, John & Sons, Inc.
[6]. Richard C. Johnson, Henry Jasik, Antenna Engineering Handbook, McGraw-Hill Companies.

List of Practical Assignments:

1) ARRANGING THE TRAINER AND PERFORMING FUNCTIONAL CHECKS
2) STUDY OF SIMPLE DIPOLE λ/2 ANTENN.
3) TO PERFORM POLARISATION TEST.
4) TO PERFORM MODULATION TEST.
5) STUDY OF THE VARIATION IN THE RADIATION STRENTH AT A GIVEN DISTANCE FROM THE ANTENNA.
6) STUDY OF RECIPROCITY THEOREM.
7) TO PRACTICE HOW TO USE THE MATCHING STUB PROVIDED WITH THIS TRAINER.
8) SWR MEASUREMENT.
9) STUDY OF SIMPLE DIPOLE λ/4 ANTENNA.
10) TO STUDY FOLDED DIPOLE λ/2ANTENNA.
11) STUDY OF YAGI UDA 3 ELEMENT FOLDED DIPOLE.
12) STUDY OF YAGI UDA 5 ELEMENT FOLDED DIPOLE.

13) STUDY OF YAGI UDA 5 ELEMENTS SIMPLE DIPOLE.
14) STUDY OF YAGI UDA 7 ELEMENTS SIMPLE DIPOLE.
15) STUDY OF HERTZ ANTENNA.
16) STUDY OF ZEPPELIN ANTENNA.
17) STUDY OF λ/2 PHESE ARRAY END FIRE ANTENNA.
18) STUDY OF λ/4 PHESE ARRAY ANTENNA.
19) STUDY OF COMBINED CO-LINER ARRAY.
20) STUDY OF BROAD SIDE ARRAY.
21) STUDY OF LOG PERIODIC ANTENNA.
22) STUDY OF LOOP ANTENNA.
23) STUDY OF RHOMUBUS ANTENNA.
24) STUDY OF GROUND PLANE ANTENNA.
25) STUDY OF SLOT ANTENNA.
26) ANTENNA CURRENT SENSOR**.**