

# ANTENNA AND RADIO WAVE PROPAGATION

(Elective Subject)

<b>Course Code:</b>	<b>12M1WEC231</b>	<b>Semester:</b>	<b>7<sup>th</sup> Semester, B. Tech (ECE)</b>
<b>Credits:</b>	<b>3</b>	<b>Contact Hours:</b>	<b>L-3, T-0,P-0</b>

## Course Objectives

At the completion of this course, the student should have in depth knowledge antennas and radio wave propagation.

## Course Outcomes

After the successful completion of the course, student should be able to:

1. Know the analysis of simple antenna structures.
2. Design different types of antennas.
3. Have an in-depth knowledge of antenna arrays and applications.
4. Apply the knowledge for wide area of recent applications.

## Course Contents

<b>Unit</b>	<b>Topics</b>	<b>References (chapter number, page no. etc)</b>	<b>Lectures</b>
<b>1.</b>	Fundamental concepts: Types of antennas, radiation mechanism, antenna parameters.	Ballanis	8
<b>2.</b>	Radiation from wires and loops: Dipole, finite length dipole, half-wave dipole and its properties, loop antennas.	Ballanis	9
<b>3</b>	Aperture antennas: Field equivalence principle, radiation between wire and aperture antennas, horn antenna design principles.	Elliot	5
<b>4</b>	Broadband antennas: Principle of frequency dependent antennas, log periodic antennas	Elliot	4
<b>5</b>	Antenna arrays: Broadside, end-fire phased arrays. Dolph-Tchebyshev antenna arrays. Planar arrays.	Elliot	8
<b>6</b>	Radio-wave propagation: antenna located over a flat earth, over a spherical earth. Surface wave propagation, scattering by rain, propagation into sea water, atmospheric ducts and nonstandard	Collins	8

	refraction.		
<b>Total Number of Lectures</b>			42

## Evaluation Scheme

1. Test 1 :15 marks
2. Test 2 : 25 marks
3. Test 3 : 35 marks
4. **Internal Assessment** : 25 marks
  - 10 Marks : Class performance, Tutorials & Assignments
  - 10 Marks : Quizzes
  - 5 marks : Attendance

## Text Books

1. Elliot, Robert S. *Antenna theory and design*. John Wiley & Sons, 2006.
2. Ballanis, Constantine A. "Antenna theory analysis and design." *John Willey and Son's Inc., New York* (1997).
3. Collin, Robert E. *Antennas and radiowave propagation*. McGraw-Hill, 1985.

## Reference Books

1. Jordan, E. C., and K. G. Balmain. *Electromagnetic Waves and Radiating Systems*, Prentice Hall." *Englewood Cliffs, New Jersey* (1968).
2. Robert E.Colin. *Foundations for Microwave Engineering*, McGraw Hill, 2<sup>nd</sup> Edition, 2001.
3. John D. Kraus & R.J Marhefka, *Antennas for all applications*, The McGraw-Hill Companies, 2<sup>nd</sup>/3<sup>rd</sup> edition, 2006
4. C.A. Balanis, *Antenna Theory, Analysis and Design*. NY: John Wiley and Sons, 2<sup>nd</sup> edition, 2002
5. WL Stutzman & GA Thiele, *Antenna Theory and Design* , John Wiley and Sons, 2<sup>nd</sup> edition,1997