

MICROWAVE DEVICES AND ANTENNA DESIGN LAB

(Core Subject)

Course Code:	17B17EC572	Semester:	5th Semester, B. Tech (ECE)
Credits:	1	Contact Hours:	L-0, T-0,P-2

Course Objectives

The main objective of the lab is to be familiar with unique equipments used in microwave devices and antenna systems. And gaining hands on experience of some unique microwave circuits and antenna units.

Course Outcomes

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

1. Know about the different types of devices and their usage in microwave frequencies.
2. Familiarize the students with handling, working and tuning of various equipment pertinent to the hardware experiments in the field of Microwave and antennas.
3. Integrate theory with experiments so that the students appreciate the knowledge gained from the theory course, e.g., microwave devices and antennas, and applied in practice.
4. Familiarize the students with some antenna hardware and help them to connect and visualize the properties of the same.
5. At the conclusion of the course, the student should have a far greater capacity to design, measure, and understand novel microwave and antenna prototypes.

List of Experiments

1. Getting familiar with handling, working and tuning of various equipment to be used in this lab.
2. To measure the frequency and wavelength of TE₁₀ mode in a rectangular waveguide
3. To measure the VSWR for different loads. Low VSWR (Matched load), Medium VSWR, High VSWR.
4. To measure the unknown load impedance using the Smith chart in a rectangular wave guide setup.
5. To match unknown impedance to characteristic impedance using stubs (with the help of slide-screw tuner).
6. To derive the fundamental and derived (secondary) parameters of a coaxial transmission line. Finding R, L, G and C using LCR meter. Finding the attenuation constant as a function of frequency.
7. To find the reflection coefficient on a co-axial transmission line with different terminations. Matched load, Open circuit, Short Circuit. Determining the dielectric constant of the coaxial cable used.
8. To measure coupling coefficient, Insertion loss and Directivity of a Directional coupler.

9. Study the characteristics of a Gunn diode oscillator, and make power and frequency measurements.
10. To determine the half power beam width, radiation pattern, gain and directivity of horn antenna in E – plane and H – plane.
11. Performance evaluation and study of Yagi-Uda antenna.

Evaluation Scheme

1. Mid Sem Evaluation	20 Marks
2. End Sem Evaluation	20 Marks
3. Attendance	15 Marks
4. Class response	30 Marks
5. File	15 Marks
Total Marks	100 Marks

Text Books

1. Pozar, David M. *Microwave engineering*, John Wiley & Sons, 2009.
2. Liao, Samuel Y. *Microwave solid-state devices*. Prentice Hall, 1985.
3. Elliot, Robert S. *Antenna theory and design*. John Wiley & Sons, 2006.
4. Ballanis, Constantine A. "Antenna theory analysis and design." *John Willey and Son's Inc., New York* (1997).