



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad – 500043

Electronics and Communication Engineering

## List of Laboratory Experiments

ANTENNAS AND MICROWAVE ENGINEERING LABORATORY								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
AECB30	Core	0	0	3	1.5	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes:36			
Branch: ECE	Semester: VII	Academic Year: 2021-22			Regulation: R18			
<p><b>Course overview:</b>            This course deals with the measurements of the signals at micro frequency range. It introduces students to the broad area of RF microwave engineering. It involves measurement of frequency, wave length, VSWR, impedance and scattering parameters of various micro wave devices like circulator, directional coupler, and magic-tee. Microwave devices support larger bandwidth and hence higher data rates are transmitted. There are a wide variety of applications for microwaves like outdoor broadcasting transmissions and long distance telephone calls.</p>								
<p><b>Course objectives:</b>            The students will try to learn:            I. The characteristics of microwave components, electrical characteristics of waveguides and transmission lines through electromagnetic field analysis.            II. Fundamental parameters of the antenna, their structures and principles of microwave power generation.            III. The design of microstrip patch antenna with a particular operating frequency using High Frequency Structure Simulator.</p>								
<p><b>Course outcomes:</b>            After successful completion of the course, students will be able to:  <b>CO1: Summarize the waveguide components and their specifications using microwave test bench set-up. .</b>  <b>CO2: Sketch the characteristics of Reflex klystron to obtain the electronic tuning range using Klystron bench set up.</b>  <b>CO3: Analyze the characteristics of Directional coupler, circulator and magic tee using microwave test bench setup.</b>  <b>CO4: Distinguish the low and high Voltage Standing Wave Ratio of unknown load to find out the reflection coefficient using slotted line section.</b>  <b>CO5: Identify fundamental parameters of the antenna to measure far-field radiation pattern using High Frequency Structure Simulator.</b>  <b>CO6: Design antennas to find out the antenna parameters using test setup and high frequency structure simulator.</b></p>								
WEEK NO	EXPERIMENT NAME							CO
WEEK – I	STUDY OF MICROWAVE COMPLONENTS							CO1
	To study the different wave guide components in the microwave bench setup							
WEEK – II	MODE CHARACTERISTICS OF REFLEX KLYSTRON							CO2
	To study the characteristics of Reflex Klystron oscillator, finding the mode numbers and efficiencies of different modes.							
WEEK – III	GUNN DIODE CHARACTERISTICS							CO2
	To study the characteristics of Gunn diode oscillator.							
WEEK – IV	DIRECTIONAL COUPLER CHARACTERISTICS							CO3
	To measure coupling factor, insertion loss, isolation and directivity of a Directional coupler.							
3WEEK – V	MEASUREMENT OF VSWR							CO4

	To measure the low and high VSWR,,s of matched terminals	
<b>WEEK – VI</b>	<b>CIRCULATOR CHARACTERISTICS</b>	CO3
	To measure the isolation and insertion loss of a three port circulator	
<b>WEEK – VII</b>	<b>MEASURMENT OF SCATTERING PARAMETERS OF MAGIC TEE</b>	CO3
	To find the scattering parameters of a four port Magic Tee.	
<b>WEEK –VIII</b>	<b>INTRODUCTION TO HFSS</b>	CO5
	Introduction To HFSS Tool	
<b>WEEK - IX</b>	<b>MONOPOLE ANTENNA DESIGN</b>	CO5
	To find the gain of Monopole Antenna.	
<b>WEEK - X</b>	<b>DIPOLE ANTENNA DESIGN</b>	CO5
	To draw the Radiation Pattern of Dipole Antenna Design.	
<b>WEEK - XI</b>	<b>MICROSTRIP FEED ANTENNA DESIGN</b>	CO5
	To find the gain and radiation pattern of Microstrip Feed Antenna Design.	
<b>WEEK - XII</b>	<b>PROBE FEED PATCH ANTENNA DESIGN</b>	CO6
	To draw the 3D polar plot of Probe Feed Patch Antenna Design.	
<b>WEEK - XIII</b>	<b>SLOT COUPLED PATCH ANTENNA</b>	CO6
	To draw the 3D rectangular plot of Slot Coupled Patch Antenna.	
<b>WEEK - XIV</b>	<b>MICROSTRIP LINE DESIGN</b>	CO6
	To find the gain of Microstrip Line Design.	