



# 2008

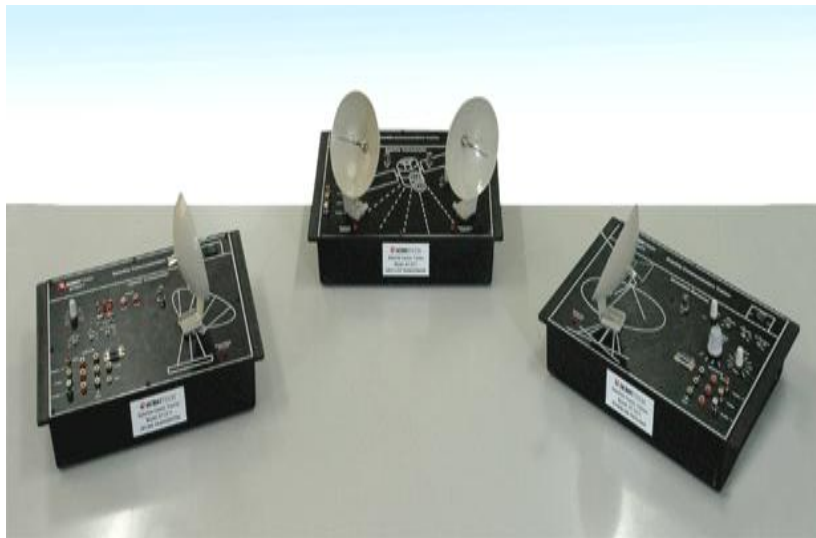
## Microwave Laboratory



Venue: First Floor  
Department of Electrical Engineering  
University of Engineering and  
Technology Lahore

## Lab Motive

This Lab was established in 1978 with the motive to equip students of Electrical Engineering with the tools of microwave design and measurements. The experiments are designed to ensure that the students are capable of designing transmission line circuits, microwave active and passive components, antennas. Throughout the lab experiments students use advanced measurement equipment including spectrum analyzer, vector network analyzer, digital oscilloscope, VSWR indicator, noise figure analyzer and vector signal analyzer.



### Lab Instructors

**Zeeshan Ahmad**

**Zohaib Mehmood**

**Qammer H Abbasi**

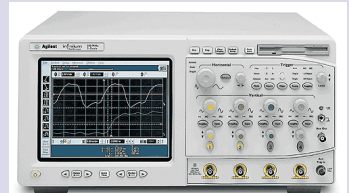
### Lab Staff:

**Muhammad Nawaz**

**Umar Khitab**

# LAB EQUIPMENT

- Agilent 8720ES Network Analyzer
- Agilent 54832B Oscilloscope
- Agilent 83623 Synthesized Sweep/CW Generator
- Agilent 83732B Synthesized Signal Generators
- Agilent E7405A EMC Analyzer
- Agilent E4438C Vector Signal Generator
- Agilent E8408A Vector signal Analyzer
- Agilent 8720ES Network Analyzer
- Agilent N8975A Noise Figure Analyzer
- Agilent 1671G RF Logic Analyzer
- Agilent E7405A EMC Analyzer
- Agilent 54832B Oscilloscope
- Optical testing equipment.(MTS 5001)
- Feedback Microwave trainer MWT 530 (2 sets)
- Antenna Test Bench 6452A Marconi
- Microwave Mixer (HMC 220)
- Satellite trainer
- Dipole Antenna
- Parabolic antenna
- Loop antenna
- Log periodic Antenna
- Horn Antenna
- Dipole fed horn Antenna
- Slotted Array
- Patch Antenna
- Wave Guide Linear Slot Array



1. Agilent Technologies' top-of-the-line model 54845A DSO in the Infinium family sports a bandwidth of 1.5 GHz, four channels, and a sampling rate of up to 8 Gsamples/s.



Courses conducted

Microwave

Antenna Propagation

## Microwave

Introduction to a microwave waveguide bench and measurement of:

- a) source frequency b) guide wavelength

Measurement of voltage standing wave ratio (vswr)

Measurement of impedance and impedance matching

Study of spectrum and network analyzer

Measurement of effective dielectric constant using a ring resonator

Introduction to the microwave vco source and detector and action of a 3-port circulator

Measurement of effective dielectric constant using a ring resonator

Investigate the insertion losses of optical fiber using optical testing equipment(MTS 5001)

Measurement of mixer parameters using spectrum analyzer



Courses conducted

Microwave  
Antenna Propagation



## Transmission Line and Antenna Propagation

Design and Analysis of Microstrip lines

Electromagnetic Windows, Dielectric Resonance, and Fresnel Coefficients

Design and Analysis of a  $\lambda/4$  Microstrip Line Matching Network

Measurement of the Gain of a Waveguide Horn

Measurement of the Radiation Pattern of a Waveguide Horn

Measurement of the Gain of a Horn-fed Paraboloid

Measurement of the Gain of a Waveguide Linear Slot Array

Measurement of the Radiation Pattern of a Linear slot Array

Measurement of the Radiation Pattern of a Horn-fed



# RESEARCH THEMES AND FUTURE PLANS



## Active Research Areas include

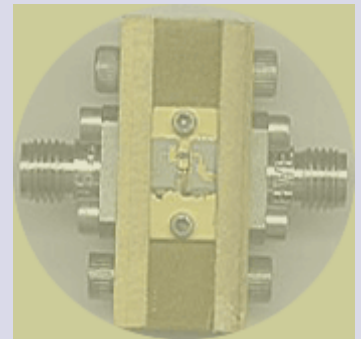
Metamaterials  
Planar Microwave circuits  
Fractal Antennas  
Ultra-wide band Antennas  
Smart Antennas  
Microwave Active Circuit Design  
EMC/EMI

## Future Plans

Anechoic Chamber (Under Construction)  
Development of advanced PCB Fabrication Lab

## Selected Publications

- 1 .A. Maalik and Z. Mahmood, "A Novel C-Band Single Diode Mixer with Ultra High LO/RF and LO/IF Isolation," in IEEE International Conference on Electrical Engineering. (ICEE), Apr. 2007.
- 2.M. I. Sheikh, A. S. Hussain, "RF Absorber Model for Cost Effective Asymmetrical Anechoic Chamber."APEC 2005.



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## Researchers

|                     |                  |                |
|---------------------|------------------|----------------|
| Dr. Mohammad Saleem | Dr. Haroon Babri | Zohaib Mahmood |
| Dr. Noor M. Sheikh  | Syed Ali Mohsin  |                |
| Dr. Muhammad Imran  | Qammer H Abbasi  |                |
| Dr. Salim Tariq     | Zeeshan Ahmad    |                |



# INDUSTRIAL COLLABORATION



The research conducted in the lab are funded primarily by:

- Higher Education Commission of Pakistan
- Pakistan Space and Upper Atmosphere Research Commission (SUPARCO)
- Syed Bhais



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Made By:

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