TULSIRAMJI GAIKWAD-PATIL College of Engineering and Technology
Wardha Road, Nagpur - 441108
Accredited with NAAC **A+** Grade
Approved by AICTE, New Delhi, Govt. of Maharashtra
(An Autonomous Institution Affiliated to RTM Nagpur University)

Department of Electronics and Communication Engineering

Name of Course-Microwave and Radar Engineering

Sem/Year-VII SEM/4th Year

Name of Course Coordinator-Prof. Rahul Dhuture

Title of Innovative practices for learning teaching process

Online Collaboration Tools: Virtual Lab Tools

Objective:- *Platform that facilitate group work, discussions and information sharing among the students*

For Students:-

1. Interactive Learning:- Virtual labs offer hands-on experience in a controlled environment, enabling students to interact with equipment, settings, and parameters to observe real-time outcomes.

2.Concept Reinforcement: Students can apply theoretical concepts learned in lectures to practical scenarios, reinforcing their understanding of microwave and radar engineering principles.

3. ***Risk-Free Experimentation***: Virtual labs eliminate risks associated with real-world equipment handling, allowing students to experiment freely without the fear of damaging expensive equipment.

4. Visual and Spatial Understanding: Complex microwave and radar concepts, such as wave propagation and antenna radiation patterns, can be better understood through visualizations in a virtual lab.

5. *Self-Paced Learning:* Students can repeat experiments as many times as needed, enabling self-paced learning and facilitating a deeper understanding of concepts.

6. Exploration of Scenarios: Virtual labs can simulate scenarios that might be impractical or dangerous in a physical lab setting, enabling students to explore a wider range of conditions.

7. Instant Feedback: Virtual labs often provide immediate feedback on students' actions and outcomes, helping them identify and correct mistakes in real-time.

8. Preparation for Industry: Familiarity with virtual labs can prepare students for using simulation tools commonly employed in industry for microwave and radar system design and analysis.

9. Collaborative Learning: Virtual labs can support collaborative learning, allowing students to work together on experiments and share insights.

10. Inclusive Learning: Virtual labs can cater to diverse learning styles and abilities, ensuring that all students have the opportunity to engage with and understand the subject matter.

For Educators:

1. ***Enhanced Teaching Effectiveness:*** Virtual labs provide educators with a platform to demonstrate complex microwave and radar concepts more effectively, making it easier to explain abstract theories through interactive simulations.

2. ***Scalability***: Virtual labs can accommodate a larger number of students compared to traditional physical labs, allowing educators to reach more learners without concerns about space or equipment limitations.

3. ***Reduced Costs:*** Setting up and maintaining physical labs with expensive microwave and radar equipment can be costly. Virtual labs eliminate the need for purchasing and maintaining physical equipment, thus reducing costs.

4. ***Flexibility:*** Educators can design and modify virtual lab experiments to suit different learning objectives and adapt to changing curriculum requirements.

5. ***Data Collection and Analysis***: Virtual labs often provide tools for data collection and analysis, allowing educators to demonstrate data processing techniques that might be challenging to conduct in a physical lab.

6. ***Remote Learning:*** Virtual labs enable remote access, allowing students to perform experiments from anywhere with an internet connection, even outside traditional classroom hours.

Incorporating virtual labs into microwave and radar engineering education can significantly enrich the learning experience by bridging the gap between theoretical knowledge and practical application.

Program: B.Tech Semester: VII

(Microwave and Radar Engineering)

Course Name: Microwave and Radar Engineering

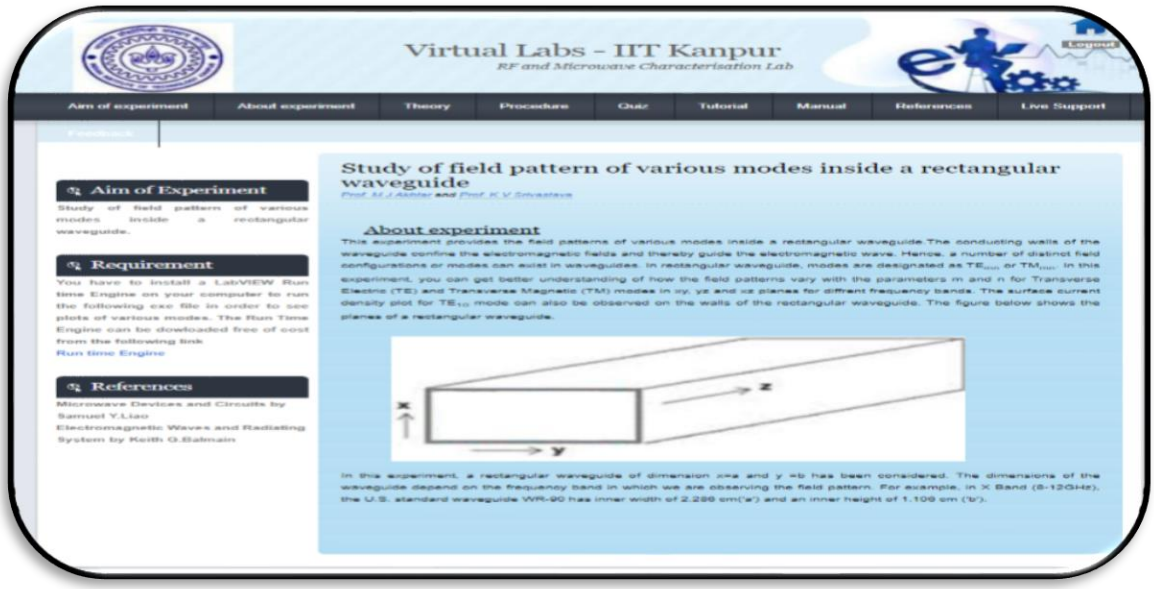
Course Code: BEETC702PE-T

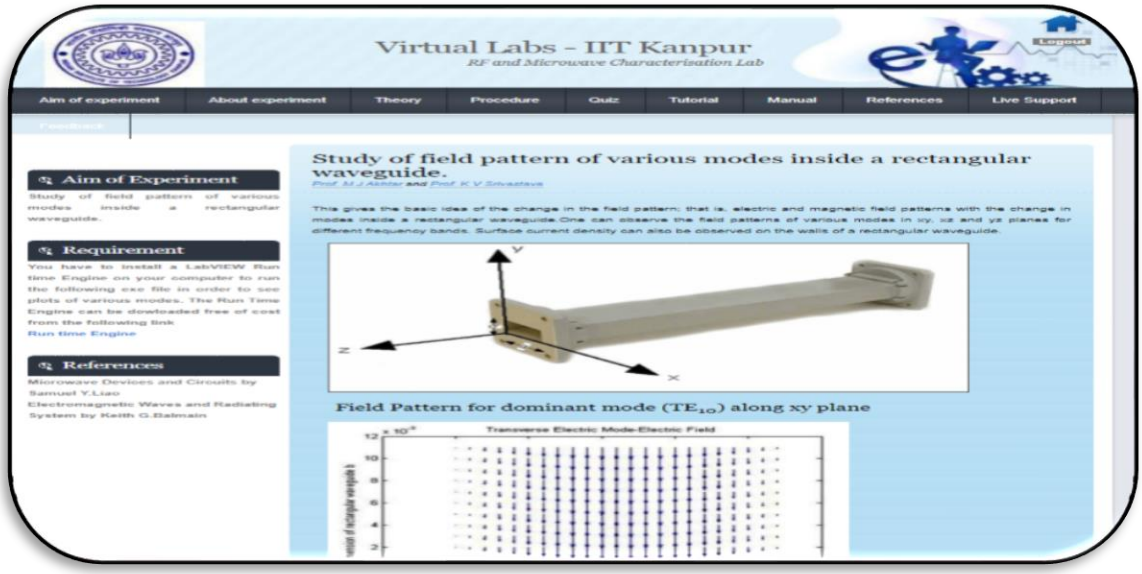
Course Cordinator: Prof. Rahul Dhuture

PO	1	2	3	4	5	6	7	8	9	10	11	12	PSO1	PSO2	PSO3
CO	Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern tool usage	The engineer and society	Environment and sustainability	Ethics	Individual and team work	Communication	Project management and finance	Lifelong learning	To achieve competence in designing, analyzing and testing electronic systems for social, industrial and research application in communication, signal processing and embedded system.	An ability to independently carry out research/investigation and development work to solve practical problems.	To inculcate research attributes and approach through industry oriented internships and projects.
CO 1	1	1	0	1	2	1	0	2	2	3	2	3	2	0	0
CO 2	1	1	0	2	2	2	0	2	3	3	2	3	2	0	0
CO 3	1	1	0	0	3	0	0	3	3	2	3	3	2	0	0
CO 4	2	2	0	3	1	1	0	0	3	3	2	3	2	0	0
CO 5	1	0	0	3	1	0	0	0	2	2	3	3	2	0	0

CO-PO Mapping

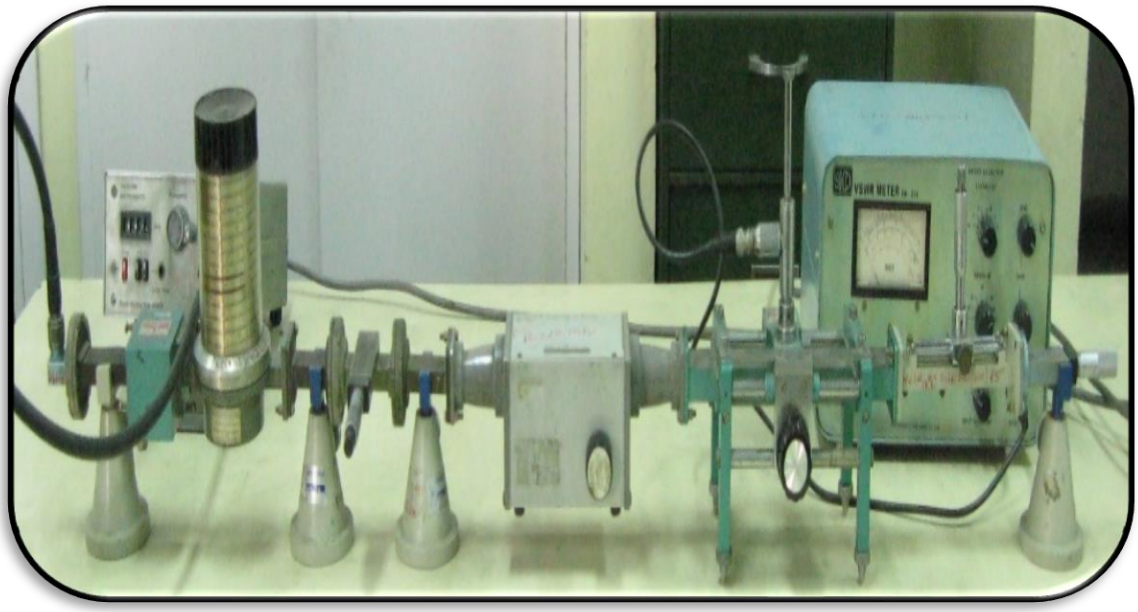
Study of field pattern of various modes inside a rectangular waveguide cavity.





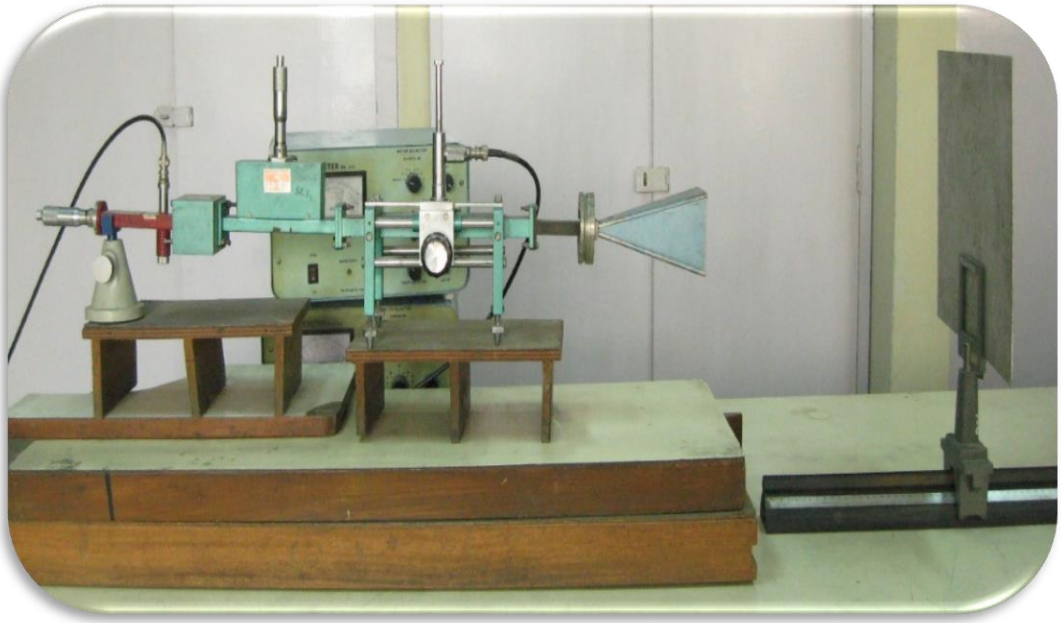
Link for Learning topics from Virtual Lab

1. **Measurement of VSWR on a line**:- http://eem-iitd.vlabs.ac.in/exp1.html



Measurement of VSWR on a line

2. **Relationship between guide λ_g and λ_0**:- http://eem-iitd.vlabs.ac.in/exp3.html



Relationship between guide λ_g and λ_0

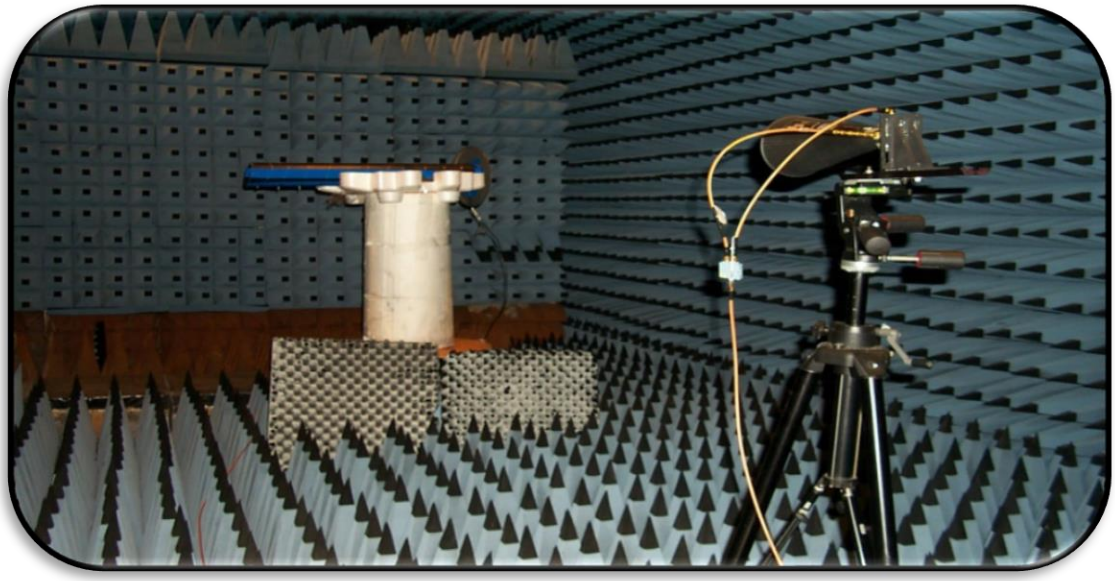
3. **Experiment of Microwave Cavity**:- http://eem-iitd.vlabs.ac.in/exp4.html

Experiment of Microwave Cavity

3. **Microwave Coupler**:- http://eem-iitd.vlabs.ac.in/exp5.html

Microwave Coupler

4. **Radiation Pattern of Horn Antenna**:- http://eem-iitd.vlabs.ac.in/exp7.html

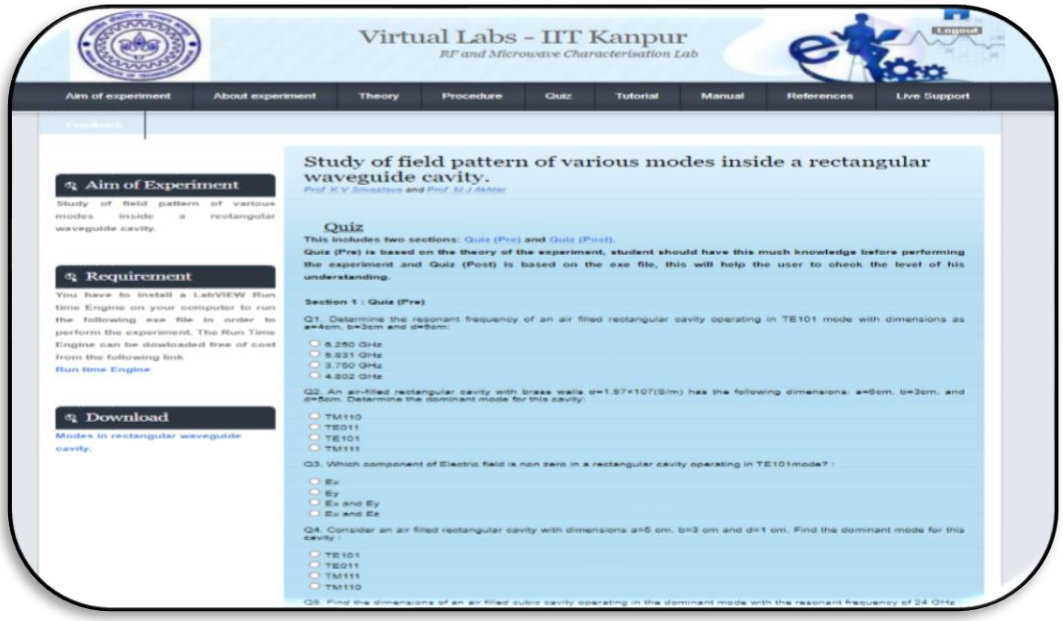


Radiation Pattern of Horn Antenna

5. **Experiments of Transmission Line :- http://eem-iitd.vlabs.ac.in/exp1.pdf**

Experiments of Transmission Line

Quiz



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