



**REPORT
OF
WORKSHOP ON
Experiments in Engineering Physics**

20 JANUARY 2025 – 24 JANUARY 2025

DEPARTMENT OF APPLIED SCIENCE

NITTTR CHANDIGARH

SUBMITTED BY :

ANNU

(RESEARCH SCHOLAR)

DEPARTMENT OF PHYSICS

BHAGAT PHOOL SINGH MAHILA VISHWAVIDYALAYA

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The workshop on Experiments in Engineering Physics was officially inaugurated on 20 January 2025 at Department of Applied Science, NITTTR Chandigarh. The workshop, designed to enhance the teaching and research skills of scholars in the field of engineering physics, witnessed a enthusiastic participation from the academic community. This was five day workshop that aims to equip scholars with the latest experimental techniques and methodologies in physics. The workshop features a range of sessions, including hands-on experiments, workshops, seminars, and interactive lectures, delivered by experts in their respective fields.

Objectives of the workshop :-

- Role of laboratory in physics teaching
- Ethics in data acquisition and representation
- Theoretical concepts of physics experiments
- Graphical representation of data
- Physical measurements and error analysis

The session began with the topic “Role of laboratory in physics teaching” by Dr. Ashok Kumar and he explains that physics is an experimental science that relies heavily on laboratory experiments to validate theories and concepts. The laboratory plays a vital role in physics learning, providing scholars with hands-on experience and opportunities to explore and discover scientific principles. The role of laboratory experiments in physics teaching is crucial for developing a deep understanding of theoretical concepts. Laboratory experiments provide hands-on experience, allowing students to explore and analyze physical phenomena. This report discusses the importance of laboratory experiments in physics teaching, ethics in data acquisition and representation, theoretical concepts of physics experiments, graphical representation of data, and physical measurements and error analysis.

Role of Laboratory in Physics Teaching :-

Laboratory experiments play a vital role in physics teaching, as they:

1. Develop problem-solving skills
2. Enhance understanding of theoretical concepts
3. Foster critical thinking and analytical skills
4. Provide hands-on experience with experimental techniques and instruments
5. Encourage collaboration and teamwork

Ethics in Data Acquisition and Representation :-

Ethics in data acquisition and representation are essential in scientific research. Researchers must:

1. Ensure accuracy and precision in data collection
2. Avoid fabrication, falsification, and plagiarism
3. Represent data honestly and transparently
4. Acknowledge sources and give credit where due
5. Be aware of potential biases and take steps to mitigate them

Theoretical Concepts of Physics Experiments :-

Theoretical concepts are essential in designing and interpreting physics experiments. Key concepts include:

1. Hypothesis testing
2. Experimental design
3. Data analysis and interpretation
4. Error analysis and uncertainty quantification
5. Statistical analysis

Graphical Representation of Data :-

Graphical representation of data is a powerful tool for communicating results and trends. Effective graphical representation involves:

1. Choosing the right type of graph (e.g., line graph, scatter plot, histogram)
2. Labeling axes and providing clear titles and legends
3. Using color and symbols effectively
4. Avoiding distortion and misrepresentation of data

Physical Measurements and Error Analysis :-

Physical measurements are subject to errors and uncertainties. Error analysis involves:

1. Identifying sources of error (e.g., instrumental, systematic, random)
2. Quantifying errors and uncertainties
3. Propagating errors through calculations
4. Reporting errors and uncertainties transparently

Laboratory experiments, ethics in data acquisition and representation, theoretical concepts, graphical representation of data, and physical measurements and error analysis are all essential components of physics education. By emphasizing these aspects, educators can help students develop a deep understanding of physics concepts and principles, as well as essential skills in scientific inquiry and critical thinking.

The lab session was conducted in different sessions which consisted of several experiments: Solar Cell, Photovoltaic Cell, GM Counter, Numerical Aperture, Snell's Law, Diffraction Grating, 4-Probe, and Hall Effect etc. The objective of the session was to provide hands-on experience with various physics experiments and to understand the underlying principles.

Experiment : Solar Cell

- Objective: To study the characteristics of a solar cell and measure its efficiency.
- Methodology: The solar cell was exposed to different light intensities, and the resulting current and voltage were measured.
- Results: The data showed a linear relationship between light intensity and current.

Experiment : Photovoltaic Cell

- Objective: To study the effect of temperature on the efficiency of a photovoltaic cell.
- Methodology: The photovoltaic cell was exposed to different temperatures, and the resulting current and voltage were measured.
- Results: The data showed a decrease in efficiency with increasing temperature.

Experiment : GM Counter

- Objective: To study the detection of ionizing radiation using a Geiger-Müller counter.
- Methodology: The GM counter was exposed to different radiation sources, and the resulting counts were measured.
- Results: The data showed a linear relationship between radiation intensity and counts.

Experiment : Numerical Aperture

- Objective: To study the effect of numerical aperture on the resolution of a microscope.
- Methodology: The microscope was used to image different samples, and the resulting images were analyzed.
- Results: The data showed an improvement in resolution with increasing numerical aperture.

Experiment : Snell's Law

- Objective: To verify Snell's Law of refraction.

- Methodology: The experiment involved measuring the angles of incidence and refraction for different media.
- Results: The data showed that the ratio of the sines of the angles of incidence and refraction is constant.

Experiment : Diffraction Grating

- Objective: To study the diffraction of light through a grating.
- Methodology: The experiment involved measuring the diffraction pattern for different grating spacings and wavelengths.
- Results: The data showed that the diffraction pattern depends on the grating spacing and wavelength.

Experiment : 4-Probe Experiment

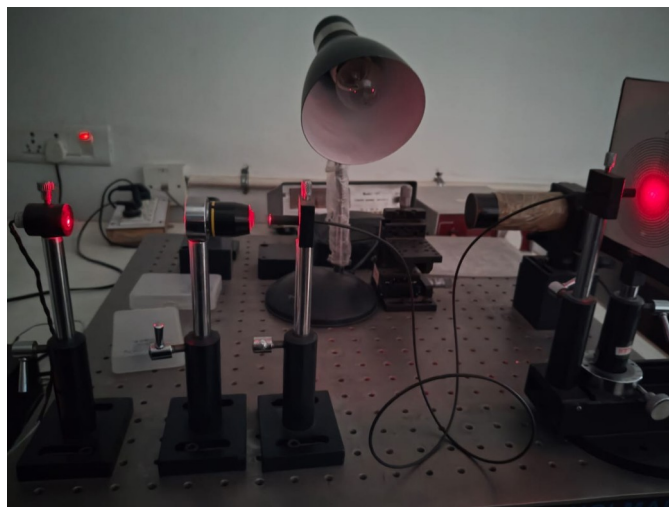
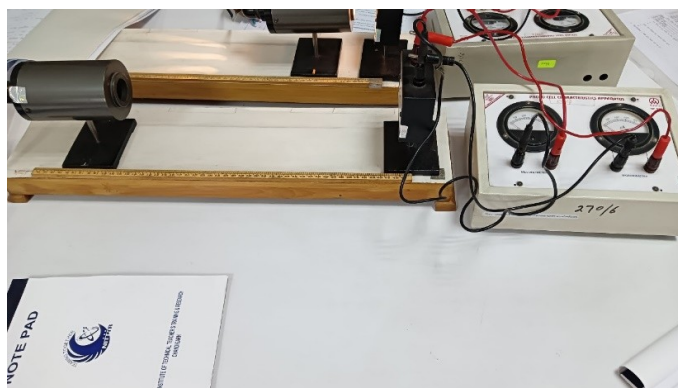
- Objective: To measure the resistivity of a material using a 4-probe technique.
- Methodology: The experiment involved measuring the resistance of a material using a 4-probe setup.
- Results: The data showed that the resistivity of the material can be accurately measured using the 4-probe technique.

Experiment : Hall Effect

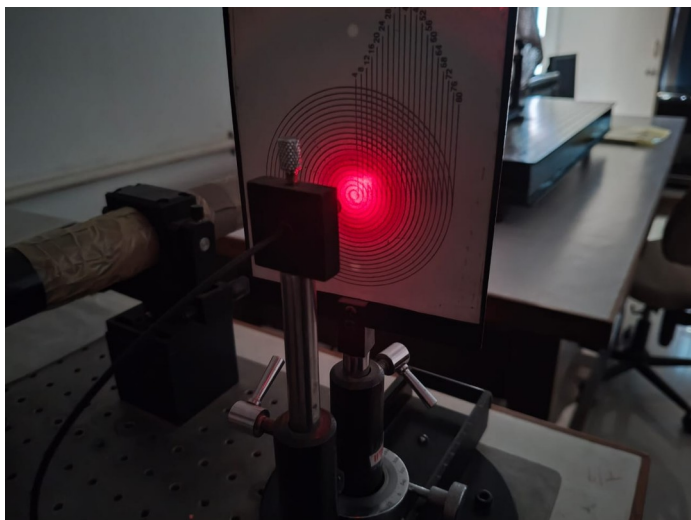
- Objective: To study the Hall Effect in a conductor.
- Methodology: The experiment involved measuring the Hall voltage for different magnetic field strengths and currents.
- Results: The data showed that the Hall voltage depends on the magnetic field strength and current.

The lab session provided a comprehensive understanding of various physics experiments and the underlying principles. The experiments were carefully designed to demonstrate key concepts, and the data collected was analyzed to verify theoretical predictions.

The participants provided feedback on the workshop, highlighting its strengths and weaknesses. The feedback was overwhelmingly positive, with participants praising the workshop's content, organization, and delivery. The workshop was evaluated based on its objectives, content, and delivery, and was found to have met its objectives successfully. The participants were awarded certificates of completion of the workshop. The workshop provided a valuable opportunity for scholars to enhance their knowledge and skills in the area of physics. We look forward to organizing more such workshops in the future.







राष्ट्रीय तकनीकी शिक्षक प्रशिक्षण एवं अनुसंधान संस्थान, चंडीगढ़
National Institute of Technical Teachers Training and Research, Chandigarh
APPLIED SCIENCE DEPARTMENT
 One Week Short Term Course on "Experiments in Engineering Physics" from 20.01.2025 to 24.01.2025
 (TAC No. AS-11)

Timetable

Date	Session I 9:30 AM – 11:00 AM	Session II 11:30 AM – 1:00 PM	Session III 2:00 PM – 3:30 PM	Session- IV 4:00 PM – 5:30 PM
20.01.2025	Registration and Inauguration (Dr. Ashok Kumar, NITTTR CHD)	Role of Laboratory in Physics Teaching (Dr. Ashok Kumar, NITTTR CHD)	Lab Session- I (PS/ CK)	Lab Session- II (PS/ CK)
21.01.2025	Ethics in Data Acquisition and Representation (Prof. Pankaj Sharma, NITTTR Chandigarh)	Lab Session – I (AK/CK)	Lab Session – II (AK/CK)	Lab Session – III (AK/CK)
22.01.2025	Theoretical Concepts of Physics Experiments (Dr. Ashok Kumar, NITTTR CHD)	Lab Session- I (BCC/CK)	Lab Session- II (BCC/CK)	Lab Session- III (BCC/CK)
23.01.2025	Graphical Representation of Data (Prof. Pankaj Sharma, NITTTR Chandigarh)	Lab Session – I (AK/CK)	Lab Session – II (AK/CK)	Lab Session – III (AK/CK)
24.01.2025	Physical Measurements and Error Analysis (Dr. BC Choudhary, NITTTR Chandigarh)	Presentation by Participants (Dr. Ashok Kumar/ Prof. Pankaj Sharma/ Prof. BC Choudhary)	Discussion, Evaluation & Valediction (Dr. Ashok Kumar/ Prof. Pankaj Sharma/ Prof. BC Choudhary)	

Note:

11:00 AM- 11:30 AM Tea Break, 01:00 PM – 02:00 PM Lunch Break, 03:30 PM – 04:00 PM Tea Break

1. AK – Dr. Ashok Kumar, PS- Prof. Pankaj Sharma, BCC- Prof. BC Choudhary, CK- Mr. Chandan



Certificate No: 1847/25

**National Institute of
Technical Teachers Training and Research
Chandigarh**

MINISTRY OF EDUCATION, GOVERNMENT OF INDIA

Certificate

This is to certify that

ANNU

**BHAGAT PHOOL SINGH MAHILA VISHWAVIDYALAYA, KHANPUR KALAN
HARYANA**

Participated in the AICTE Recognized Faculty Development Programme

on

Experiments in Engineering Physics

Conducted by

Applied Science Department

from

20/01/2025 to 24/01/2025 (One Week)

at

NITTTR, Chandigarh



Coordinator

Head of Department

Director

NATIONAL INSTITUTE OF TECHNICAL TEACHERS TRAINING AND RESEARCH

SECTOR 26, CHANDIGARH - 160019, Ph.0172-2759500, 2792369

**Application for Short Term Course
Organised by
APPLIED SCIENCE DEPARTMENT**

Course title : EXPERIMENTS IN ENGINEERING PHYSICS , **Schedule:** 20/01/2025 to 24/01/2025, **Venue :** NITTTR, CHANDIGARH

Application ID	AS-1125192974
O.Plan No.	AS-11
Name (in BLOCK letters)	ANNU
Gender	FEMALE
Category	GENERAL
Highest Qualification	M.SC (PHYSICS)
Designation and Department	RESEARCH SCHOLAR , PHYSICS
Institute name & address	BHAGAT PHOOL SINGH MAHILA VISHWAVIDYALAYA , KHANPUR KALAN , HARYANA
Institute type & status	OTHER , GOVT
Address for correspondence	BUANA LAKHU, TEH. ISRANA, PANIPAT, 132107
Phone	8572063412
E-Mail	malikannu33333@gmail.com
Whether you are working in AICTE approved Technical Institute	YES
Whether your Institute is under TEQIP-III scheme of MHRD	no
Whether Accommodation required	YES
Course fee & Fee Status :	paid
	<i>Annu</i> Signature of the Applicant
Recommended/Forwarded by <i>Dr. Sheela Devi, Associate Prof, Bhagat Phool Singh Mahila Vishwavidyalaya, Panipat</i>	Date: 18-1-25 <i>Sheela</i> Place: <i>Incharge Institution (with office seal) Panipat</i> Signature of Head of the Department of Physics <i>Vishwavidyalaya Khanpur Kalan, Sonapat (Haryana)</i>

Note: This form will not be treated as complete and it will not be processed until the requisite course fee is paid.