

**A Proposal for Basics of Physics-II Lab**

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**I. Objectives of the Virtual Lab**

- Student will be able to explain the Basics of Physics.
- Student will be able to predict the variation of various measurable Physical quantities with physical conditions like temperature.
- Student will be able to analyze the Basic laws of physics

**II. List of experiments**

1. To determine the wavelength of sodium light by Newton's ring experiment.
2. To determine the wavelength of different spectral lines of mercury light using plane transmission grating
3. To determine the wavelength of He-Ne laser light using single slit diffraction
4. To determine the value of acceleration due to gravity (g) using compound pendulum
5. To study Hall effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall effect setup.
6. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil
7. To determine the electrochemical equivalent (ECE) of copper
8. To calibrate the given ammeter and voltmeter by potentiometer.
9. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss
10. To study the resonance condition of a series LCR circuit.

**III. Target group of users**

- UG (1<sup>st</sup> Year/ 2<sup>nd</sup> Year) [highest priority for development]
- UG (3<sup>rd</sup> Year/ 4<sup>th</sup> Year) [next higher priority for development]

**IV. Mapping of proposed lab with AICTE courses as per attached list of potential labs**

- Physics-I(Waves and Optics and Introduction to Quantum Mechanics) BSC 102

**V. Mapping of proposed lab with universities (minimum 3 universities)**

- Delhi Technical University; AP101; B. Tech: Engineering Physics
- Guru Gobind Singh Indraprastha University; ETPH 103; B. Tech
- NIT Calicut; PH1002; B. Tech:Physics
- ISM Dhanbad; APC 31201; M.Sc : Physics

## VI. Expected timelines

Presentation of proposal to domain experts' committee – 31st March 2022

Demo of First 3 Expts and Review – 30th June 2022

Demo of 5-6 Expts and review – 31st August 2022

Demo of 7-10 Expts and review – 31st October 2022

Final demo of 7-10 Expts – 15th November 2022

Hosting of lab (7-10 Expts) – 30th November 2022

Note 1: The [LDC](#) will coordinate the [reviews](#) and [hosting](#)

Note 2: The lab is supposed to be developed and hosted within 6 - 9 months from the date of approval

## VII. Budget (Max. Rs 2 Lakhs per experiment with a ceiling of Rs 20 Lakhs per Lab)

**Table I. Budget for < Basics of Physics-II Lab >**

S. No.	Equipment/Activity	Budget # (In Rupees)
1	Laptop / Machine( <a href="#">computer/laptop</a> )	2.70
2	Manpower( <a href="#">project engineer/scientist</a> )	4.80
3	Consumables ( <a href="#">various materials including optical bench, lenses, ammeter, voltmeter, battery etc</a> )	4.00
4	Contingency ( <a href="#">circuit connection, lense alignment, repair, incidentals, miscellaneous, etc</a> )	4.00
5	Honorarium for Lab Developer (Rs 20k per experiment; Ceiling of Rs 2 Lakhs per lab)	2.50
6	Miscellaneous	2.00
<b>TOTAL</b>		<b>20 Lakhs</b>

# To be released based on the recommendation of the review committee

**Note:** Institute overheads not to be included in the budget

## VIII. Justification of the budget requirements

(a) Details of Laptop/Machine

[A laptop/computer will be required for data-keeping.](#)

(b) Details of Manpower (number, cost per man-months etc.)

i. Total man-months required

[1 project staff](#)

ii. No. of project staff, cost per man-months

[1 project engineer/scientist \(~Rs. 40k per month\)](#)

iii. Honoraria for other staff associated with the project

Honoraria for Faculty developing the Virtual Lab: (A maximum of Rs. 2 lakhs honorarium for the developers & Rs. 25k for reviews)

Honoraria for Other staff associated with the project  
Rs. 25k honorarium for the associated staff

(c) Details of Consumables

Procurement of various materials including optical bench for the setup of experiment, lenses (concave and convex lens), ammeter, voltmeter, battery etc

(d) Details of Miscellaneous cost

- i. Internal Review (Optional, Rs 1000 per experiment)
- ii. Field Trials - N.A.-
- iii. Others - N.A.-

**IX. Student Feedback and Learning**

- How will you collect feedback and use them?

- i. We will collect feedback through feedback (online/offline) form and workshops
- ii. There is also an associated email id for providing feedback
- iii. An expansion or additional explanation will be added if the need arises

- What is the actual learning component provided by the Virtual Lab?

The learning component includes that student will study the analytical procedures for characterizing the properties of foods constituents and their interactions that affect the quality and stability of foods

- After the Virtual Lab experience, would the student be able to perform the experiment in the real lab?

Yes, after the Virtual Lab experience, the student can perform the experiment in the real lab

**ANNEXURE-I**

Important information for the development of Virtual Labs

(A Virtual Lab consists of 7-10 experiments)

**X. Link to some sample virtual labs**

<https://python-iitk.vlabs.ac.in/>      <https://cs-iitd.vlabs.ac.in/>      <https://plchla-coep.vlabs.ac.in/>

**XI. Technology Used**

- We will use HTML, CSS and Java Script for front-end design (free and open source)
- For Back-end we will use JSON (Free and open-source Software)

**XII. Required Components for virtual experiments**

- Step by step procedure similar to a physical lab will be drafted for the virtual lab
- Online manual with aim/objective and underlying theory
- Pre-test for understanding current status of user
- Simulator for learning the concept of food technology
- Post-test questions to check the understanding of student after using virtual lab
- Related resources (web & NPTEL lectures)
- Additional help/feedback