Ref. No: LIET/PHYSICS/BOS-5/MOM/2026/1 Date: 29-04-2026

DEPARTMENT OF PHYSICS

MINUTES OF THE BOARD OF STUDIES MEETING-5

The Fifth Board of Studies Meeting of the Department of Physics was conducted through circulation on 29th April 2026 at 11:30 AM in offline mode at LORDS Institute of Engineering and Technology, Hyderabad with the following members to discuss the mentioned agenda.

Members Present:

Course: Engineering Physics (Theory & Lab)

S.No.	Name	Designation	Category	Signature
1.	Dr. V. Ravi Kumar	Professor & HoD, Department of Physics, LIET (A)	Chairperson	
		Nominees of Osmania University, Hyderabad		
2.	Dr. D. Karuna Sagar	Professor & Principal, University College of Science, Saifabad, Osmania University, Hyderabad.	University Nominee	
		Experts / Academicians from Outside the Parent University nominated by Academic Council		
3.	Dr. H. Aleem Basha	Professor and Dean, Department of Physics, Maulana Azad National Urdu University, Hyderabad.	External Member (Subject Expert)	
4.	Dr. Dadamiah PMD Shaik	Assoc. Professor & Head of the Department, Department of Physics, Vardaman College of Engineering (A), Hyderabad.	External Member (Subject Expert)	
		Representatives from R&D / Industry / Corporate Sector / Allied areas relating to placements		
5.	Mr. Hasan Zubair	Director, Cognizant Technologies, Hyderabad	Industry Representative	
6.	Mr. Syed Shujauddin	Business Development Manager TATA Capital, Hyderabad	Alumni	

Faculty members from each specialization				
7.	Dr. Mujeeb Hasan	Assistant Professor, Dept. of Physics, LIET(A)	Internal Member	M. Hasan
8.	Mrs. SK Hussain Bee	Assistant Professor, Dept. of Physics, LIET(A)	Internal Member	
9.	Mrs. Shireen Tagore	Assistant Professor, Dept. of Physics, LIET(A)	Internal Member	
10.	Mr. Aslam Shareef	Assistant Professor, Dept. of Physics, LIET(A)	Internal Member	
11.	Mr. S. Bhanu Prasad	Assistant Professor, Dept. of Physics, LIET(A)	Internal Member	
12.	Mr. A. Jagdeesh	Assistant Professor, Dept. of Physics, LIET(A)	Internal Member	
13.	Mr. D. Sadanandam	Assistant Professor, Dept. of Physics, LIET(A)	Internal Member	

The meeting was conducted as per the scheduled time to discuss the agenda outlined below.

AGENDA:

1. Formal introduction of new Board of Studies (BoS) members to the faculty, and vice versa
2. Confirmation of last BoS minutes of meeting held on **21-06-2025** at **11:00 a.m.**
3. Action taken report on previous BoS minutes held on 21-**06-2025**.
4. Extension of approval of Courses and Syllabi of LR-26 B.E.1^{stt} Year for the academic year 2026-27 too
   a. **Engineering Physics (Theory)**
   b. **Engineering Physics (Lab)**
5. Approval of the Ratified list of Question Paper Setters, Examiners, and Evaluators for the B.E. I & II Semesters of LR-26.
6. Suggestions and deliberation on adopting innovative teaching methodologies and Recommendations for strengthening research, extension activities, and broader academic engagement of Physics.
7. Any other point with the permission of chair.

<u>Item No. 1:</u> Formal introduction of new Board of Studies (BoS) members to the faculty, and vice versa

Deliberation: The BoS Chairperson Physics welcomed all the members of the Board of Studies, Principal, Dean-I Year and other faculty members to the meeting for the extension of approval of the above sanctioned Courses and Syllabi for the academic year 2026-27.

- BoS Chairperson introduced the BoS members to the respected Principal and Dean-I Year, LIET and also introduced the departmental faculty members to University Nominee, External Members, Member Corporate Sector and the Alumni and further presented the brief profile

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and achievements of the department.

- The BoS Chairperson presented the salient features, curriculum analysis, and the syllabi of the I-Year Engineering Physics (Theory and Lab) courses to the Board members for the extension of approval and adoption of LR-26 approved syllabus for the Academic Year 2026–27 too.

Resolution: Noted and Approved

<u>Item No. 2:</u> Confirmation of last BoS minutes of meeting held on 21-06-2025 at 11:00 a.m.

Deliberation: The BoS Chairperson presented the minutes of the previous meeting before the members of the 5th BoS. The members reviewed and approved the same.

Resolution: Noted and Approved

<u>Item No. 3</u>: Action taken report for the previous BoS minutes of meeting held on 21-06-2025.

Deliberation: BoS Chairperson presented the Action Plan taken up on Minutes of the last BoS meeting held on **21-06-2025** as mentioned in tabular column below:

S.No.	Points Discussed	Action Plan Taken
1.	University Nominee suggested and proposed the following points: • He suggested to Reshuffle the proposed syllabus of LR-24 (Theory) i.e., Unit-I, II, III, IV, V can be as Unit-II, I, IV, III, V as per the review syllabus frame structure of Osmania University. • He suggested that the concept of Concentration of Schottky defects in ionic crystal can be removed • He suggested correctional change of the experiment name "To draw the **I-V**	The suggestions provided by the University Nominee were carefully reviewed and found to be highly relevant and constructive. Accordingly, each recommendation was deliberated upon by the Board members and approved for inclusion in the LR-24 syllabus and included too.

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	Characteristics of a p-n junction diode" with "To draw the **V-I** Characteristics of a p-n junction diode". • In the all units, He suggested to include the real time applications as Fiber Sensors in Fiber Optics, Bar codes in LASER. • He recommended to have demonstration session under Practicals, on Synthesis of Nano particles by Sol Gel in Osmania university lab in place of torsional pendulum.	
2.	Subject Expert-1 suggested the following points: • He suggested to use single statement while framing Course outcomes instead of complex statement in CO 5. • He suggested to remove Schrodinger time dependent wave equation and include the fundamentals of Quantum Mechanics, QLEDs, Qubits in Quantum Computing. • He suggested to add the challenges and applications of Quantum Computing in the Syllabi	All the suggestions provided by Subject Expert–1 were thoroughly considered, and the necessary modifications were made to the syllabus at the appropriate sections in accordance with the recommendations.
3.	Subject Expert-2 suggested the following points: • He also suggested to modify the course outcome 5 with the BTL verb "Understand. • He suggested that the phrase "wave nature" of course outcome 3 is felt as incomplete, so the phrase "wave nature of matter" was suggested to be added. • He suggested that the phrase "wave nature" of course outcome 3 is felt as incomplete, so the phrase "wave nature of matter" was suggested to be added.	The suggestions provided by External Member–2 were duly considered, and appropriate modifications were incorporated into the syllabus

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4.	Industry Expert has suggested the following points: • He suggested the inclusion of application-oriented topics that align with current trends and emerging technologies to enhance the practical relevance of the curriculum.	The Industry Expert's suggestions were reviewed, and relevant application-oriented topics reflecting current trends and emerging technologies were identified and integrated into the syllabus.
5	Alumnus has suggested the following points: • He expressed that the syllabus appears appropriate and well-aligned with the current academic and industry requirements.	The Alumnus's feedback was noted.

Resolution: Noted and Approved

Item No. 4: Extension and approval of Courses and Syllabi of LR-26 B.E. 1st Year for the adoption of the academic year 2026-27.

a. **Engineering Physics (Theory)**
b. **Engineering Physics (Lab)**

Deliberation:

The BoS Chairperson presented the comprehensive syllabi for 'Engineering Physics' and 'Engineering Physics Lab' for B.E. 1st Year under the LR 26 Regulation. The Board of Studies approved the same syllabi for the extension and adoption in the Academic Year 2026–27.

Resolution: Noted and Approved

The detailed approved syllabi of Engineering Physics (Theory and Lab) are given in **Annexure I & II.**

Item No. 5: Approval and Ratification of list of Question Paper Setters, Examiners, and Evaluators for the B.E. I & II Semesters of LR-26. [2026-2027]

Deliberation: The Chairperson of the BoS presented the list of Question Paper Setters, Examiners & Evaluators of B.E. I & II Semesters [Physics department related courses] of LR-26 [2026-2027] and after elaborated discussion, BoS members suggested the following points:

- The members recommended that question paper setters and evaluators should possess a minimum of 10 years of teaching experience in the relevant subject area.
- Members recommended that no repetition of paper setters at least for 3 years.

Resolution: All members have approved and ratified the same.

Item No. 6: Suggestions and deliberation on adopting innovative teaching methodologies and Recommendations for strengthening research, extension activities, and broader academic engagement of Physics department.

Deliberation: The Board of Studies (BoS) members recommended the incorporation of innovative teaching–learning methodologies and underscored the importance of enhancing evaluation mechanisms, as well as research and development activities within the Department of Physics. They further suggested organizing and participating in Faculty Development Programs (FDPs) and awareness sessions to promote the publication of research articles in reputed journals indexed in Web of Science and Scopus.

Resolution: Noted and Approved

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Dean-I Year honored the suggestions given by the BoS members and thanked all the members for accepting the invitation and attending the meeting and concluded the meeting.

BOS Chairperson thanked all the members for the suggestions towards improvement. BOS Chairperson conveyed vote of thanks to all the BOS members for spending their valuable time in reviewing the course structures & syllabi. He also thanked all the Deans, HODs of other departments and faculty members for their support in designing the course structures of UG.
He also thanked the Principal and the Management for continuous guidance, encouragement and support.

The meeting was concluded with the approval of University Nominee and consensus of all BOS Members.

Dr. V. Ravi Kumar
Chairperson – Board of Studies
Department of Physics
Lords Institute of Engineering and Technology [A]

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Course code	Course title						Core/Elective
U26PH101	**ENGINEERING PHYSICS (Common to CSE, CSD, CIVIL & MECH)**						**Core**
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
--	3	0	-	-	40	60	3

Course Objectives:

1. To understand the fundamental principles of lasers and optical fibers, and their technological applications.
2. To understand the fundamental principles of quantum mechanics and their application in quantum computing.
3. To understand the fundamental properties and classifications of magnetic materials and superconductors along with their underlying principles and applications.
4. To understand crystal structures and semiconductor physics concepts, including lattice systems, diffraction, and electronic properties of materials.
5. To understand the fundamentals of nanomaterials and digital electronics, including synthesis methods, properties, and basic digital logic systems.

Essential Course Outcomes: After completion of this course, the student will be able to:

1. Analyze laser operation and optical fiber behavior and apply these concepts in modern communication and optical systems.
2. Apply quantum mechanical concepts to analyze and design basic quantum computing systems and algorithms.
3. Understand the fundamental properties and classifications of magnetic materials and superconductors along with their underlying principles and applications.
4. Analyze crystal structures and semiconductor behavior and apply these concepts to electronic devices and material characterization.
5. Analyze nanomaterial properties and apply digital electronics concepts to design and interpret basic logic circuits.

Advanced Course Outcomes:

1. Illustrates the basic concepts of quantum superposition and entanglement, and describe their importance in emerging technologies like quantum computing and quantum communication.
2. Analyze the properties of modern semiconductor materials and propose their use in designing next-generation electronic and optoelectronic devices.

UNIT-I

Lasers: Characteristics of Lasers, Absorption, Spontaneous and stimulated emissions, Pumping process, Population inversion, Einstein's A and B Coefficients, Ruby Laser, He-Ne Laser, Semiconductor Laser, Applications of Lasers, Barcode Scanner.

Fiber Optics: Propagation of light through an optical fiber, Acceptance angle, Numerical aperture (NA), Types of Optical fibers and Refractive index profiles, Attenuation Losses in optical fibers, Applications of optical fibers, fiber sensors.

UNIT-II

Wave Mechanics: Introduction to matter wave, de-Broglie's hypothesis, properties of wave function and its physical significance, Davisson and Germer Experiment, Time independent wave equation, Particle in a one-dimensional box.

Quantum Computing: Introduction to Quantum Computing, Moore's law and its end, Differences between Classical and Quantum computing. Gates - Hadamard and CNOT (Qualitative) Concept of qubit and its properties, Challenges and application of Quantum Computing.

UNIT-III

Magnetic Materials: Classification of magnetic materials – dia, para, ferro, antiferro and ferri magnetic materials. Domain Theory, Hysteresis curve, Soft and hard magnetic materials and their applications, Magnets in Electric Vehicles (EVs)

Superconductors: Properties of superconductors, Meissner effect, Type I and Type II superconductors, BCS theory (qualitative), High Tc superconductors, Applications of superconductors, Superconducting qubits.

UNIT-IV

Crystallography: Types of crystal systems, Bravais lattices, Lattice planes and Miller indices, Inter planar spacing (Cubic system), Bragg's law, Powder diffraction method.

Semiconductor Physics: Introduction, Intrinsic and extrinsic semiconductors, carrier concentration in intrinsic semiconductors, formation of p-n junction diode and its V-I characteristics, Thermistor, Hall effect and its applications, Solar cell, LED and QLED.

UNIT-V

Nano Materials: Introduction, Properties of materials at reduced size, Surface to volume ratio at nano scale, Classification of nano materials, Preparation of nano materials – Bottom-up methods (sol-gel & CVD) and Top-down method (ball milling), Applications of nano materials.

Digital Electronics: Introduction of Digital Electronics, Number Systems and their conversions (Decimal. Binary) Logic Gates (AND, OR, NOT, NAND, NOR, XOR) NAND and NOR as Universal gates, Truth tables, Basic circuit symbols, De-Morgan's Theorem and Karnaugh Map.

Text Books:

T1. S.L. Gupta and Sanjeev Gupta, Modern Engineering Physics, Dhanpat Rai publications, 2011Edition, Reprint 2025. (Unit 1-4)
T2. B. K. Pandey and S. Chaturvedi, Engineering Physics, Cengage Publications, 2025, 1st Edition. (Unit 1-5)
T3. M.N. Avadhanulu, P.G. Kshirsagar and TVS Arun Murthy, A Text Book Advance Engineering Physics, 11th Edition, S. Chand, 2025. (Unit 1-4).

References/ Suggested Reading:

R1. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition Paperback – 1 January 2019
R2. V. Raghavan, Materials Science and Engineering, Prentice Hall India Learning Private Limited; 6th Revised Edition, 2015.

Weblinks:

- Lasers (NPTEL) – *Optoelectronics* - https://nptel.ac.in/courses/117102061
- Fiber Optics - NPTEL – *Optical Communication* - https://nptel.ac.in/courses/117101054
- **Wave Mechanics – Course** NPTEL – *Quantum Mechanics*- https://nptel.ac.in/courses/122106034
- Quantum Computing - Quantum Computation - https://nptel.ac.in/courses/106106168
- Magnetic Materials - Magnetic Materials and Devices - https://nptel.ac.in/courses/113104096
- Superconductors - NPTEL – *Introduction to Superconductivity* - https://nptel.ac.in/courses/115102024

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Course code	Course title						Core/Elective
U26PH201	**ENGINEERING PHYSICS (Common to CSM, INF, AIML & ECE)**						**Core**
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
--	3	0	-	-	40	60	3

Course Objectives:

1. To understand the fundamental principles of lasers and optical fibers, including light generation, propagation, and their technological applications.
2. To understand the fundamental principles of quantum mechanics and their application in quantum computing.
3. To understand the fundamental properties and classifications of magnetic materials and superconductors along with their underlying principles and applications.
4. To understand crystal structures and semiconductor physics concepts, including lattice systems, diffraction, and electronic properties of materials.
5. To understand the fundamentals of nanomaterials and digital electronics, including synthesis methods, properties, and basic digital logic systems.

Essential Course Outcomes:

After completion of this course, the student will be able to:

1. Students will be able to analyze laser operation and optical fiber behavior and apply these concepts in modern communication and optical systems.
2. Students will be able to apply quantum mechanical concepts to analyze and design basic quantum computing systems and algorithms.
3. To understand the fundamental properties and classifications of magnetic materials and superconductors along with their underlying principles and applications.
4. Students will be able to analyze crystal structures and semiconductor behavior and apply these concepts to electronic devices and material characterization.
5. Students will be able to analyze nanomaterial properties and apply digital electronics concepts to design and interpret basic logic circuits.

Advanced Course Outcomes:

1. Illustrates the basic concepts of quantum superposition and entanglement, and describe their importance in emerging technologies like quantum computing and quantum communication.
2. Analyze the properties of modern semiconductor materials and propose their use in designing next- generation electronic and optoelectronic devices.

UNIT-I

Lasers: Characteristics of Lasers, Absorption, Spontaneous and stimulated emissions, Pumping process, Population inversion, Einstein's A and B Coefficients, Ruby Laser, He-Ne Laser, Semiconductor Laser, Applications of Lasers, Barcode Scanner.

Fiber Optics: Propagation of light through an optical fiber, Acceptance angle, Numerical aperture (NA), Types of Optical fibers and Refractive index profiles, Attenuation Losses in optical fibers, Applications of optical fibers, fiber sensors.

UNIT-II

Wave Mechanics: Introduction to matter wave, de-Broglie's hypothesis, properties of wave function and its physical significance, Davisson and Germer Experiment, Time independent wave equation, Particle in a one-dimensional box.

Quantum Computing: Introduction to Quantum Computing, Moore's law and its end, Differences between Classical and Quantum computing. Gates - Hadamard and CNOT (Qualitative) Concept of qubit and its properties, Challenges and application of Quantum Computing.

UNIT-III

Magnetic Materials: Classification of magnetic materials – dia, para, ferro, antiferro and ferri magnetic materials. Domain Theory, Hysteresis curve, Soft and hard magnetic materials and their applications, Magnets in Electric Vehicles (EVs)

Superconductors: Properties of superconductors, Meissner effect, Type I and Type II superconductors, BCS theory (qualitative), High Tc superconductors, Applications of superconductors, Superconducting qubits.

UNIT-IV

Crystallography: Types of crystal systems, Bravais lattices, Lattice planes and Miller indices, Inter planar spacing (Cubic system), Bragg's law, Powder diffraction method.

Semiconductor Physics: Introduction, Intrinsic and extrinsic semiconductors, carrier concentration in intrinsic semiconductors, formation of p-n junction diode and its V-I characteristics, Thermistor, Hall effect and its applications, Solar cell, LED and QLED.

UNIT-V

Nano Materials: Introduction, Properties of materials at reduced size, Surface to volume ratio at nano scale, Classification of nano materials, Preparation of nano materials – Bottom-up methods (sol-gel & CVD) and Top-down method (ball milling), Applications of nano materials.

Digital Electronics: Introduction of Digital Electronics, Number Systems and their conversions (Decimal. Binary) Logic Gates (AND, OR, NOT, NAND, NOR, XOR) NAND and NOR as Universal gates, Truth tables, Basic circuit symbols, De-Morgan's Theorem and Karnaugh Map.

Text Books:

T1. S.L. Gupta and Sanjeev Gupta, Modern Engineering Physics, Dhanpat Rai publications, 2011Edition, Reprint 2025. (Unit 1-4)

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- Fiber Optics - NPTEL – *Optical Communication* - https://nptel.ac.in/courses/117101054
- **Wave Mechanics – Course** NPTEL – *Quantum Mechanics*- https://nptel.ac.in/courses/122106034
- Quantum Computing - Quantum Computation - https://nptel.ac.in/courses/106106168
- Magnetic Materials - Magnetic Materials and Devices - https://nptel.ac.in/courses/113104096
- Superconductors - NPTEL – *Introduction to Superconductivity* - https://nptel.ac.in/courses/115102024

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Course code	Course title				Core/Elective	
U26PH1L1	**ENGINEERING PHYSICS LAB (Common to CSE, CSD, CIVIL & MECH)**				**Core**	
Pre-requisites	Contact Hours Per Week				CIE	SEE
	L	T	D	P	Credits	
--	-	-	-	3	25	50

Course Objectives:

1. Enhance the experience of fundamental functioning, analyzing and characterization of different experiments.
2. Develop skills in the design and development of various electronic devices.
3. Create interest in working with lasers and semiconductor devices.
4. To gain the knowledge on mechanical properties.
5. Acquire the knowledge of communication through optical fiber.

Essential Course Outcomes:

1. Apply the basic principles of lasers and optical fibers to determine wavelength and numerical aperture.
2. Apply the electrical properties to evaluate the energy band gap of the semiconductors.
3. Estimate the carrier concentration of semiconductor materials by applying Hall effect principle.
4. Analyze the temperature dependence of resistance using a thermistor experiment and build foundational knowledge of Classical Logic gates, semiconductor devices (V–I characterization of p–n junction diodes, solar cells, and LEDs.)
5. Demonstrate Sol-Gel method for the preparation of nano materials.

Advance Course Outcomes:

1. Investigate complex optical and semiconductor properties by designing and modifying experimental setups (e.g., laser diffraction, Hall effect, V-I analysis) to enhance measurement accuracy and experimental insight.
2. Correlate experimental data with theoretical models to critically evaluate material properties and device performance, enabling learners to bridge the gap between fundamental physics and practical engineering applications.

List of Experiments:

1. Determination of wavelength of a Laser by using diffraction Grating.
2. Determination of Numerical aperture of an optical fiber.
3. To draw the V-I Characteristics of a p-n junction diode.
4. Determination of carrier concentration and Hall Effect of Ge crystal using Hall Effect experiment.
5. To determine the constants of A and B using Thermistor Characteristics.
6. Determine the Energy gap of semiconductor diode.
7. To draw the V-I Characteristics of Solar Cell and to calculate the:
   i) Fill factor Efficiency ii) Series resistance
8. Photoelectric Effect: To determine the work function of a given material.
9. Plot the V-I characteristics of LED/QLED.
10. Verify Logic gates (AND, OR, NOT, NAND, NOR).
11. Verify De-Morgans 1st and 2nd Law.
12. Synthesis of Nanomaterial using Sol-Gel Method.

Note: *Minimum 8 experiments should be conducted in the semester.*

Text books:

1. Satya Sai Srikant, Prakash Kumar Chaturvedi, "Basic Electrical Engineering" Springer Singapore, 2020.
2. Joseph Thomas Andrews, Vipin Kumar Kaushik, "Physics Laboratory Manual" Shri Govindram Seksaria Institute of Technology and Science 2022.
3. K. A. Navas, "Electronics Lab Manual" PHI Learning Pvt. Ltd., 2018.

Course code	Course title				Core/Elective		
U26PH2L2	**ENGINEERING PHYSICS LAB (Common to AIML, CSM, INF, ECE)**				**Core**		
Pre-requisites	Contact Hours Per Week				CIE	SEE	Credits
	L	T	D	P			
--	-	-	-	3	25	50	1.5

Course Objectives:

1. Enhance the experience of fundamental functioning, analyzing and characterization of different experiments.
2. Develop skills in the design and development of various electronic devices.
3. Create interest in working with lasers and semiconductor devices.
4. To gain the knowledge on mechanical properties.
5. Acquire the knowledge of communication through optical fiber.

Essential Course Outcomes:

1. Apply the basic principles of lasers and optical fibers to determine wavelength and numerical aperture.
2. Apply the electrical properties to evaluate the energy band gap of the semiconductors.
3. Estimate the carrier concentration of semiconductor materials by applying Hall effect principle.
4. Analyze the temperature dependence of resistance using a thermistor experiment and build foundational knowledge of Classical Logic gates, semiconductor devices (V–I characterization of p–n junction diodes, solar cells, and LEDs.)
5. Demonstrate Sol-Gel method for the preparation of nano materials.

Advance Course Outcomes:

1. Investigate complex optical and semiconductor properties by designing and modifying experimental setups (e.g., laser diffraction, Hall effect, V-I analysis) to enhance measurement accuracy and experimental insight.
2. Correlate experimental data with theoretical models to critically evaluate material properties and device performance, enabling learners to bridge the gap between fundamental physics and practical engineering applications.

List of Experiments:

1. Determination of wavelength of a Laser by using diffraction Grating.
2. Determination of Numerical aperture of an optical fiber.
3. To draw the V-I Characteristics of a p-n junction diode.
4. Determination of carrier concentration and Hall Effect of Ge crystal using Hall Effect experiment.
5. To determine the constants of A and B using Thermistor Characteristics.
6. Determine the Energy gap of semiconductor diode.
7. To draw the V-I Characteristics of Solar Cell and to calculate the:
   i) Fill factor Efficiency ii) Series resistance
8. Photoelectric Effect: To determine the work function of a given material.
9. Plot the V-I characteristics of LED/QLED.
10. Verify Logic gates (AND, OR, NOT, NAND, NOR).
11. Verify De-Morgans 1st and 2nd Law.
12. Synthesis of Nanomaterial using Sol-Gel Method.

Note: *Minimum 8 experiments should be conducted in the semester.*

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2. Joseph Thomas Andrews, Vipin Kumar Kaushik, "Physics Laboratory Manual" Shri Govind ram Seksaria Institute of Technology and Science 2022.
3. K. A. Navas, "Electronics Lab Manual" PHI Learning Pvt. Ltd., 2018.