ENGINEERING PHYSICS

LAB MANUAL

B.Tech I Semester

Year	**:**	**Course Code**	**:**
Regulations	**:**	**Class**	**:** B.Tech I Semester
Branch	**:**		

Prepared by

Dr. Rizwana

Professor

FRESHMAN ENGINEERING

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

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Vision
To bring forth professionally competent and socially sensitive engineers, capable of working across cultures meeting the global standards ethically.

Mission
To provide students with an extensive and exceptional education that prepares them to excel in their profession, guided by dynamic intellectual community and be able to face the technically complex world with creative leadership qualities. Further, be instrumental in emanating new knowledge through innovative research that emboldens entrepreneurship and economic development for the benefit of wide spread community.

Quality Policy
Our policy is to nurture and build diligent and dedicated community of engineers providing a professional and unprejudiced environment, thus justifying the purpose of teaching and satisfying the stake holders. A team of well qualified and experienced professionals ensure quality education with its practical application in all areas of the Institute.

Philosophy
The essence of learning lies in pursuing the truth that liberates one from the darkness of ignorance and Institute of Aeronautical Engineering firmly believes that education is for liberation. Contained therein is the notion that engineering education includes all fields of science that plays a pivotal role in the development of world-wide community contributing to the progress of civilization. This institute, adhering to the above understanding, is committed to the development of science and technology in congruence with the natural environs. It lays great emphasis on intensive research and education that blends professional skills and high moral standards with a sense of individuality and humanity. We thus promote ties with local communities and encourage transnational interactions in order to be socially accountable. This accelerates the process of transfiguring the students into complete human beings making the learning process relevant to life, instilling in them a sense of courtesy and responsibility.

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ENGINEERING PHYSICS LABORATORY

OBJECTIVE

The objective of this lab is to teach students,the importance of physics through involvement in experiments. This lab helps to have knowledge of the world due to constant interplay between observations and hypothesis, experiment and theory in physics. Students will gain knowledge in various areas of physics so as to have real time applications in all engineering streams.

OUTCOMES

After completing this course the student must demonstrate the knowledge and ability to:

1. Understand the world around us.
2. Understand the concept of error and its analysis.
3. Develop experimental skills
4. Design new experiments in Engineering.
5. Compare the theory and correlate with experiment.
6. Identify the appropriate application of particular experiment.
7. Understand and apply fundamental electronic circuits.
8. Analyze the experimental result.
9. Understand the applications of physics experiments in day to day life.
10. Examine ideas about the real world.

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Certificate

This is to certify that it is a bonafied record of Practical work done by Sri/Kum. _____ _____ bearing the Roll No. _____ of _____ class _____ _____ branch in the _____ _____ laboratory during the academic year _____ under our supervision.

Head of the Department **Lecture In-Charge**

External Examiner **Internal Examiner**

Program Outcomes	
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

AERONAUTICAL ENGINEERING	
PSO1	**Professional Skills:** Able to utilize the knowledge of aeronautical/aerospace engineering in innovative, dynamic and challenging environment for design and development of new products.
PSO2	**Practical Implementation and Testing Skills:** Providing different types of in house and training and industry practice to fabricate and test and develop the products with more innovative technologies.
PSO3	**Successful Career and Entrepreneurship:** To prepare the students with broad aerospace knowledge to design and develop systems and subsystems of aerospace and allied systems and become technocrats.
CIVIL ENGINEERING	
PSO1	**ENGINEERING KNOWLEDGE:** Graduates shall demonstrate sound knowledge in analysis, design, laboratory investigations and construction aspects of civil engineering infrastructure, along with good foundation in mathematics, basic sciences and technical communication
PSO2	**BROADNESS AND DIVERSITY:** Graduates will have a broad understanding of economical, environmental, societal, health and safety factors involved in infrastructural development, and shall demonstrate ability to function within multidisciplinary teams with competence in modern tool usage
PSO3	**SELF-LEARNING AND SERVICE:** Graduates will be motivated for continuous self-learning in engineering practice and/ or pursue research in advanced areas of civil engineering in order to offer engineering services to the society, ethically and responsibly.
MECHANICAL ENGINEERING	
PSO1	To produce engineering professional capable of synthesizing and analyzing mechanical systems including allied engineering streams.
PSO2	An ability to adopt and integrate current technologies in the design and manufacturing domain to enhance the employability.
PSO3	To build the nation, by imparting technological inputs and managerial skills to become Technocrats.
ELCTRICAL AND ELECTRONICS ENGINEERING	
PSO1	Able to utilize the knowledge of high voltage engineering in collaboration with power systems in innovative, dynamic and challenging environment, for the research based team work.
PSO2	To explore the scientific theories, ideas, methodologies and the new cutting edge technologies in renewable energy engineering, and use this erudition in their professional development and gain sufficient competence to solve the current and future energy problems universally.
PSO3	To be able to utilize of technologies like PLC, PMC, process controllers, transducers and HMI and design, install, test , maintain power systems and industrial applications.

COMPUTER SCIENCE ENGINEERING	
PSO1	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.
PSO2	**Problem-Solving Skills:** The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.
PSO3	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.
INFORMATION AND TECHNOLOGY ENGINEERING	
PSO1	**Professional Skills:** The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient analysis and design of computer - based systems of varying complexity.
PSO2	**Software Engineering Practices:** The ability to apply standard practices and strategies in software service management using open-ended programming environments with agility to deliver a quality service for business success.
PSO3	**Successful Career and Entrepreneurship:** The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.
ELECTRONICE AND COMMUNICATION ENGINEERING	
PSO1	**Professional Skills:** An ability to understand the basic concepts in Electronics & Communication Engineering and to apply them to various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of complex systems.
PSO2	**Problem-Solving Skills:** An ability to solve complex Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.
PSO3	**Successful Career and Entrepreneurship:** An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.

ATTAINMENT OF PROGRAM OUTCOMES & PROGRAM SPECIFIC OUTCOMES

Expt. No.	Program Outcomes Attained	Program Specific Outcomes Attained						
		AERO	CIVIL	MECH	ECE	EEE	CSE	IT
1	PO1, PO9, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3
2	PO1, PO9, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3
3	PO1, PO9, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3
4	PO1, PO2, PO4, PO9, PO11, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3
5	PO1, PO9, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3
6	PO1, PO9, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3
7	PO1, PO9, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3
8	PO1, PO9, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3
9	PO1, PO9, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3
10	PO1, PO9, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3
11	PO1, PO9, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3
12	PO1, PO9, PO12	PSO3	PSO2	PSO3	PSO3	PSO2	PSO3	PSO3

ENGINEERING PHYSICS LABORATORY

DO's

1. Conduct in a responsible manner at all times in the laboratory.
2. Keep the work area clean, neat and free of any unnecessary objects.
3. Read the description, procedure and precautions of the experiment in the lab manual.
4. Place all sensitive electronic equipment safely on experimental table.
5. Before using the equipment one must read the labels and instructions carefully.
6. Set up and use the equipment as directed by the labinstructor.
7. Circuit connections are to be done only in power off mode.
8. Checkout the circuit connections before switching on the power.
9. Increase the power readings from minimum to maximum.
10. All procedures and experimental data should be recorded in the lab observation notebook.
11. Switch of the power in the circuit after completion of the experiment.
12. Any failure / break-down of equipment must be reported to the instructor.
13. Return the material properly after the completing the experiment.
14. Replace the materials in proper place after work.
15. Be careful when handling optical items like prisms, gratings etc.

DON'Ts

1. Do not wear loose clothing and do not hold any conducting materials in contact with skin when the power is on.
2. Do not touch any equipment or other materials in the laboratory area until instructed by instructor.
3. Do not modify or damage the laboratory equipment in any way unless the modification is directed by the instructor.
4. Do not handle electrical equipment and connections with wet hands.
5. Do not try to connect power in to the circuit without proper understanding of the circuit diagram.

6. Do not look directly into laser source.
7. Do not short any battery box or power supply, it may damage retina in your eye.
8. Never switch on the power button of the circuit until it has been approved by instructor.

SAFETY NORMS

1. The lab must be equipped with fire extinguisher.
2. Never rewire or adjust any element of a closed circuit.
3. Avoid dangling electrical cords as they can cause electrical shocks and injuries.
4. Make sure all heating devices and gas valves are turned off before leaving the laboratory.
5. Exercise caution when handling liquids in the vicinity of electrical equipment.
6. Use gloves to pick broken pieces of glass or ceramics.
7. Handle hot equipment with tongs, safety gloves and other appropriate aids.
8. Follow all other safety measures provided on the instrument.

S. No.	List of Experiments	Page No.	Date	Remarks
I	Determination of charge carrier density – Hall effect.			
II	Determination of frequency of a given tuning fork – Melde's experiment.			
III	Magnetic field along the axis of current carrying coil - Stewart and Gee's method			
IV	Determination of the value of retentivity and coercivity of a given magnetic material usinf B-H curve.			
V	Determination of energy gap of a semiconductor diode.			
VI	Evaluation of numerical aperture of a given optical fiber.			
VII	Determination of wavelength of a given laser light using diffraction grating.			
VIII	Determination of Plank's constant using LED.			
IX	Studying V-I characteristics of LED			
X	Determination of radius of curvature of a given plano-convex lens – Newton's rings			
XI	Studying V-I characteristics of PIN and Avalanche diode.			
XII	Determination of width of a given single slit using diffraction.			