INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

MECHANICAL ENGINEERING

COURSE DESCRIPTOR

Course Title	ENGINEERING PHYSICS LABORATORY				
Course Code	AHSB10				
Programme	B.Tech				
Semester	I	AE | ME | ECE			
	II	CSE | IT | EEE | CE			
Course Type	Foundation				
Regulation	IARE - R18				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	-	-	-	3	1.5
Chief Coordinator	Mr. K Saibaba, Assistant Professor				
Course Faculty	Dr. Rizwana , Professor Ms. S Charvani , Assistant Professor Dr. B Manikya Pratima, Assistant Professor Dr. P Koteswara Rao, Assistant Professor Mr. A Chandra Prakash , Assistant Professor Ms. S Sujani, Assistant Professor Mr. T Srikanth, Assistant Professor				

I. COURSE OVERVIEW:

This lab provides hands on experience in a number of experimental techniques and develops competence in the instrumentation typically used in physics. This also develops student's expertise in applying physical concepts to practical problem and in learning about experimental techniques and advanced equipment. This laboratory includes experiments involving basic principles of interference diffraction, electromagnetism, optoelectronic devices, magnetism and propagation of wave. After completing this course, students will be well prepared for the advanced laboratory.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites
-	-	-	Basic principles of physics

III. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Engineering Physics Laboratory	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✘	Chalk & Talk	✘	Quiz	✘	Assignments	✘	MOOCs
✔	LCD / PPT	✘	Seminars	✘	Mini Project	✔	Videos
✔	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

Each laboratory will be evaluated for a total of 100 marks consisting of 30 marks for internal assessment and 70 marks for semester end lab examination. Out of 30 marks of internal assessment, continuous lab assessment will be done for 20 marks for the day to day performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end lab examination for 70 marks shall be conducted by two examiners, one of them being Internal Examiner and the other being External Examiner, both nominated by the Principal from the panel of experts recommended by Chairman, BOS.

The emphasis on the experiments is broadly based on the following criteria:

20 %	To test the preparedness for the experiment.
20 %	To test the performance in the laboratory.
20 %	To test the calculations and graphs related to the concern experiment.
20 %	To test the results and the error analysis of the experiment.
20 %	To test the subject knowledge through viva – voce.

Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 20 marks for continuous lab assessment during day to day performance, 10 marks for final internal lab assessment.

Table 1: Assessment pattern for CIA

Component	Laboratory		Total Marks
Type of Assessment	Day to day performance	Final internal lab assessment	
CIA Marks	20	10	30

Continuous Internal Examination (CIE):

One CIE exams shall be conducted at the end of the 16th week of the semester. The CIE exam is conducted for 10 marks of 3 hours duration.

Preparation	Performance	Calculations and Graph	Results and Error Analysis	Viva	Total
2	2	2	2	2	10

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	Calculations of the observations
PO 2	**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	2	Characteristic curves
PO 4	**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.	1	Open ended experiments

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	**Professional Skills:** To produce engineering professional capable of synthesizing and analyzing mechanical systems including allied engineering streams.	2	Presentation on real world problems
PSO 2	**Software Engineering Practices:** An ability to adopt and integrate current technologies in the design and manufacturing domain to enhance the employability.	-	-
PSO 3	**Successful Career and Entrepreneurship:** To build the nation, by imparting technological inputs and managerial skills to become Technocrats.	-	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES:

The course should enable the students to:	
I	Upgrade practical knowledge in optics.
II	Analyze the behavior and characteristics of various materials for its optimum utilization.
III	Enrich the knowledge of electric and magnetic properties.

IX. COURSE LEARNING OUTCOMES (CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AHSB10.01	CLO 1	Evaluate the carrier density of a semiconductor using the principle of Hall Effect	PO 1 , PO 2	3
CLO Code	**CLO's**	**At the end of the course, the student will have the ability to:**	**PO's Mapped**	**Strength of Mapping**
AHSB10.02	CLO 2	Perform Melde's experiment to understand propagation of longitudinal and transverse waves.	PO 1 , PO 4	3
AHSB10.03	CLO 3	Examine the magnetic field produced in a coil to verify the Tangent's law.	PO 1 , PO 4	3
AHSB10.04	CLO 4	Analyse the hysteresis property of a ferromagnetic material.	PO 1 , PO 2	2
AHSB10.05	CLO 5	Evaluate the energy gap of a semiconductor diode.	PO 1 , PO 2	2
AHSB10.06	CLO 6	Determine the numerical aperture of an optical fiber.	PO 1 , PO 2	2
AHSB10.07	CLO 7	Understand the phenomena of diffraction to determine wavelength of laser.	PO 1 , PO 4	1
AHSB10.08	CLO 8	Estimate the value of planck's constant using light emitting diode.	PO 2 , PO 4	1
AHSB10.09	CLO 9	Examine the behavior of LED by studying its V-I characteristics.	PO 2 , PO 4	2
AHSB10.10	CLO 10	Apply the concept of Newton's rings to determine the radius of curvature of convex lens.	PO 1 , PO 2	2
AHSB10.11	CLO 11	Determine the slit width using the phenomena of diffraction.	PO 1 , PO 4	3
AHSB10.12	CLO 12	Understand the sensitivity of photo diode to light intensity.	PO 1 , PO 2	3
AHSB10.13	CLO 13	Evaluate time constant of a RC circuit.	PO 1	2
AHSB10.14	CLO 14	Verify L-I characteristics of a solar cel.	PO 2	2
AHSB10.15	CLO 15	Correlate the basic principles of physics with laboratory experiments.	PO 4	1

3 = High; 2 = Medium; 1 = Low

X. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

CLOs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 1	3	2											2		
CLO 2	2			2									1		
CLO 3	3			1									2		

CLOs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO 4	1	3													
CLO 5	3	2													
CLO 6	3	2											2		
CLO 7	2			1									2		
CLO 8		2		1											
CLO 9		1		1									2		
CLO 10	3	2											1		
CLO 11	2			1											
CLO 12	3	2											2		
CLO 13	2														
CLO 14		2											1		
CLO 15				1											

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO1,PO2, PO4,PSO1	SEE Exams	PO1,PO2, PO4,PSO1	Assignments	-	Seminars	-
Laboratory Practices	PO1,PO2, PO4,PSO1	Student Viva	-	Mini Project	-	Certification	-
Term Paper	-	-	-	-	-	-	-

XII. ASSESSMENT METHODOLOGIES - INDIRECT

✔	Early Semester Feedback	✔	End Semester OBE Feedback
✘	Assessment of Mini Projects by Experts		

XIII. SYLLABUS

LIST OF EXPERIMENTS	
Week-l	**INTRODUCTION TO PHYSICS LABORATORY**
Do's and Don'ts in physics laboratory. Precautions to be taken in laboratory.	
Week-2	**HALL EFFECT (LORENTZ FORCE)**

Determination of charge carrier density.	
Week-3	**MELDE'E EXPERIMENT**
Determination of frequency of a given tuning fork.	
Week-4	**STEWART GEE'S APPARATUS**
Magnetic field along the axis of current carrying coil-Stewart and Gee's method.	
Week-5	**B-H CURVE WITH CRO**
To determine the value of retentivity and coercivity of a given magnetic material.	
Week-6	**ENERGY GAP OF A SEMICONDUCTOR DIODE**
Determination of energy gap of a semiconductor diode.	
Week-7	**PIN AND AVALANCHE DIODE**
Studying V-I characteristics of PIN and Avalanche diod	
Week-8	**OPTICAL FIBER**
Evaluation of numerical aperture of a given optical fiber.	
Week-9	**WAVE LENGTH OF LASER LIGHT**
Determination of wavelength of a given laser light using diffraction grating.	
Week-10	**PLANK'S CONSTANT**
Determination of Plank's constant using LED.	
Week-11	**LIGHT EMITTING DIODE**
Studying V-I characteristics of LED	
Week-12	**NEWTONS RINGS**
Determination of radius of curvature of a given plano-convex lens.	
Week-13	**SINGLE SLIT DIFFRACTION**
Determination of width of a given single slit.	
Text Books:	
1. C. L. Arora, "Practical Physics", S. Chand & Co., New Delhi, 3rd Edition, 2012. 2. Vijay Kumar, Dr. T. Radhakrishna, "Practical Physics for Engineering Students", S M Enterprises, 2nd Edition, 2014.	
Web Reference:	
http://www.iare.ac.in	

XIV. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Week No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1	Do's and Don'ts in physics laboratory. Precautions to be taken in laboratory.	CLO 15	T1:13.5
2	Determination of charge carrier density.	CLO 1	T1:13.5

Week No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
3	Determination of frequency of a given tuning fork.	CLO 2	T1:13.5
4	Magnetic field along the axis of current carrying coil-Stewart and Gee's method.	CLO 3	T1:14.7
5	To determine the value of retentivity and coercivity of a given magnetic material.	CLO 4	T1:15.7
6	Determination of energy gap of a semiconductor diode.	CLO 5	T1:16.8
7	Studying V-I characteristics of PIN and Avalanche diode.	CLO 6	T1:16.9
8	Evaluation of numerical aperture of a given optical fiber.	CLO 7	T1:17.9
9	Determination of wavelength of a given laser light using diffraction grating.	CLO 8	T1:18.10
10	Determination of Plank's constant using LED.	CLO 9	T1:19.10
11	Studying V-I characteristics of LED	CLO 10	T1:19.9
12	Determination of radius of curvature of a given plano-convex lens.	CLO 11	T1:23.10
13	Determination of width of a given single slit.	CLO 12	T1:23.10
14	Evaluate time constant of a RC circuit.	CLO 13	T1:25.10
15	Study L-I characteristics of a solar cell.	CLO 14	T1:27.10

XV. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S No	Description	Proposed Actions	Relevance With POs	Relevance With PSOs
1	To improve standards and analyze the concepts.	Open ended experiments	PO 1	PSO 1
2	Encourage students to solve real time applications and prepare towards competitive examinations.	Open ended experiments	PO 4	PSO 1

Prepared by:
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