INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

AERONAUTICAL ENGINEERING

COURSE DESCRIPTOR

Course Title	ENGINEERING PHYSICS LABORATORY				
Course Code	AHS105				
Programme	B.Tech				
Semester	II	AE | ME | CE			
Course Type	Foundation				
Regulation	IARE - R16				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	-	-	-	3	2
Chief Coordinator	Mr. K Saibaba, Assistant Professor				
Course Faculty	Dr. Rizwana , Professor Ms. S Charvani , Assistant Professor Dr. P Koteswara Rao, Assistant Professor Mr. A Chandra Prakash , Assistant Professor Mr. V S K Prasada Rao, 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, optoelectronic devices, magnetism and propagation of wave. After completing this course, students will be well prepared for the advanced laboratory.

COURSE PRE-REQUISITES:

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

II. MARKS DISTRIBUTION:

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

III. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

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

IV. 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

V. 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

VI. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	**Professional skills:** Able to utilize the knowledge of aeronautical/aerospace engineering in innovative, dynamic and challenging environment for design and development of new products	2	Presentation on real world problems
PSO 2	**Problem-solving Skills**: Imparted through simulation language skills and general purpose CAE packages to solve practical, design and analysis problems of components to complete the challenge of airworthiness for flight vehicles.	-	-
PSO 3	**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.	-	-
PSO 4	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.	-	-

3 = High; 2 = Medium; 1 = Low

VII. COURSE OBJECTIVES (COs):

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.

VIII. 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
AHS105.01	CLO 1	Examine the least count values of Vernier calipers and Screw guage.	PO 1 , PO 2	3
AHS105.02	CLO 2	Apply the concept of hook's law and determine the rigidity modulus of wire.	PO 1 , PO 4	3
AHS105.03	CLO 3	Examine the magnetic field produced in a coil to verify the Tangent's law.	PO 1 , PO 4	3
AHS105.04	CLO 4	Perform Melde's experiment to understand propagation of longitudinal waves.	PO 1 , PO 2	2
AHS105.05	CLO 5	Perform Melde's experiment to understand propagation of transverse waves.	PO 1 , PO 2	2
AHS105.06	CLO 6	Understand the phenomena of diffraction to determine wavelength of laser	PO 1 , PO 2	2
AHS105.07	CLO 7	Understand the method of minimum deviation and adjust the spectrometer to minimum deviation position	PO 1 , PO 4	1
AHS105.08	CLO 8	Determine the dispersive power of prism by using spectrometer	PO 2 , PO 4	1
AHS105.09	CLO 9	Apply the concept of Newton's rings to determine the radius of curvature of convex lens	PO 2 , PO 4	2
AHS105.10	CLO 10	Determine the numerical aperture of an optical fiber	PO 1 , PO 2	2
AHS105.11	CLO 11	Examine the behavior of LED by studying its V-I characteristics.	PO 1 , PO 4	3
AHS105.12	CLO 12	Verify L-I characteristics of a solar cel..	PO 1 , PO 2	3
AHS105.13	CLO 13	Evaluate time constant of a RC circuit.	PO 1	2
AHS105.14	CLO 14	Evaluate the energy gap of a semiconductor diode	PO 2	2
AHS105.15	CLO 15	Correlate the basic principles of physics with laboratory experiments.	PO 4	1

3 = High; 2 = Medium; 1 = Low

IX. 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	PSO4
CLO 1	3	2											2			
CLO 2	2			2									1			

CLOs	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO 3	3			1									2			
CLO 4	1	3														
CLO 5	3	2														
CLO 6	2	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

X. ASSESSMENT METHODOLOGIES – DIRECT

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

XI. ASSESSMENT METHODOLOGIES - INDIRECT

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

XII. 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	**MEASUREMENT OF THICKNESS OF A WIRE AND RADIUS OF DISC**
To determine the thickness of a wire and radius of a disc using screw gauge and vernier calipers .	
Week-3	**TORSIONAL PENDULUM**
Determination of rigidity modulus of the material of given wire using a torsional pendulum .	
Week-4	**STEWART GEE'S APPARATUS**
Magnetic field along the axis of current carrying coil-Stewart and Gee's method.	
Week-5	**DETERMINATION OF FREQUENCY OF LONGITUDINAL WAVES**
Determination of frequency of a given tuning fork in longitudinal mode.	
Week-6	**DETERMINATION OF FREQUENCY OF TRANSVERSE WAVES**
Determination of frequency of a given tuning fork in transverse mode.	
Week-7	**WAVELENGTH OF LASER SOURCE-DIFFRACTION GRATING**
To determine the wavelength of given source of laser using a plane transmission grating.	
Week-8	**ADJUSTMENT AND MINIMUM DEVIATION IN SPECTROMETER**
To study about spectrometer and to adjust spectrometer in minimum deviation position.	
Week-9	**DISPERSIVE POWER OF A MATERIAL OF PRISM**
Determination of the dispersive power the material of the given prism.	
Week-10	**NEWTONS RINGS**
Determination of radius of curvature of a given plano-convex lens.	
Week-11	**NUMERICAL APERTURE OF GIVEN FIBER**
To determine the numerical aperture of a given optical fiber.	
Week-12	**LIGHT EMITTING DIODE**
Studying V-I characteristics of LED	
Week-13	**CHARACTERISTICS OF LASER DIODE**
To study L-I characteristics of a laser diode.	
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.	
Reference Books:	
1 .C.F. Coombs,"Basic Electronic Instrument Handbook", McGraw-Hill Book Co., 1972. 2 .C.H. Bernard and C.D. Epp, John Wiley and Sons, ."Laboratory Experiments in College Physics" Inc., New York, 1995.	

XIII. 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	To determine the thickness of a wire and radius of a disc using screw gauge and vernier calipers .	CLO 1	T1:13.5
3	Determination of rigidity modulus of the material of given wire using a torsional pendulum	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	Determination of frequency of a given tuning fork in longitudinal mode.	CLO 4	T1:15.7
6	Determination of frequency of a given tuning fork in transverse mode.	CLO 5	T1:16.8
7	To determine the wavelength of given source of laser using a plane transmission grating	CLO 6	T1:16.9
8	To study about spectrometer and to adjust spectrometer in minimum deviation position.	CLO 7	T1:17.9
9	Determination of the dispersive power the material of the given prism.	CLO 8	T1:18.10
10	Determination of radius of curvature of a given plano-convex lens.	CLO 9	T1:19.10
11	To determine the numerical aperture of a given optical fiber	CLO 10	T1:19.9
12	Studying V-I characteristics of LED	CLO 11	T1:23.10
13	To study L-I characteristics of a laser diode.	CLO 12	T1:23.10
14	Evaluate time constant of a RC circuit.	CLO 13	T1:25.10
15	Evaluate the energy gap of a semiconductor diode	CLO 14	T1:27.10

XIV. 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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