INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

INFORMATION TECHNOLOGY

COURSE DESCRIPTOR

Course Title	ENGINEERING PHYSICS AND CHEMISTRY LABORATORY				
Course Code	AHS104				
Programme	B.Tech				
Semester	I	CSE | IT | EEE | ECE			
Course Type	Foundation				
Regulation	IARE - R16				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	1	4	3	2
Chief Coordinator	Mr. K Saibaba, Assistant Professor				
Course Faculty	Dr. Rizwana , Professor Dr. V Anitha Rani, Associate Professor Ms. S Charvani , Assistant Professor Mr. A Chandra Prakash , Assistant Professor Mr. B Raju, Assistant Professor Mr. M Praveen, Assistant Professor Mr. G Mahesh Kumar, 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 laboratory includes experiments involving basic principles of interference diffraction, optoelectronic devices, magnetism. Engineering Chemistry laboratory is to develop the analytical ability of the students by better understanding the concepts experimental chemistry. The experiments carried out like conductometry, potentiometry, physical properties of liquids. 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 and chemistry

II. MARKS DISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Engineering Physics and chemistry 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:** 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.	2	Presentation on real world problems
PSO 2	**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.	-	-
PSO 3	**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.	-	-

3 = High; 2 = Medium; 1 = Low

VII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	Upgrade practical knowledge in electrical circuits.
II	Analyze the behavior and characteristics of various materials for its optimum utilization.
III	To appreciate the need and importance of engineering chemistry for industrial and domestic use.
IV	To impart knowledge of chemical technology and its applications

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
AHS104.01	CLO 1	Examine the behavior of LED by studying its V-I characteristics	PO 1 , PO 2	3
AHS104.02	CLO 2	Examine the magnetic field produced in a coil to verify the Tangent's law..	PO 1 , PO 4	3
AHS104.03	CLO 3	Verify L-I characteristics of a solar cell	PO 1 , PO 4	3
AHS104.04	CLO 4	Evaluate time constant of a RC circuit.	PO 1 , PO 2	2
AHS104.05	CLO 5	Determine the numerical aperture of an optical fiber.	PO 1 , PO 2	2
AHS104.06	CLO 6	Evaluate the energy gap of a semiconductor diode	PO 1 , PO 2	2
AHS104.07	CLO 7	Preparation of aspirin and thiokol rubber	PO 1 , PO 4	1
AHS104.08	CLO 8	Conductometric titration of strong acid Vs strong base	PO 2 , PO 4	1
AHS104.09	CLO 9	Potentiometric titration of strong acid Vs strong base	PO 2 , PO 4	2
AHS104.10	CLO 10	Determination of viscosity and surface tension of liquids	PO 1 , PO 2	2
AHS104.11	CLO 11	Estimation of hardness of water by EDTA method	PO 1 , PO 4	3
AHS104.12	CLO 12	Determination of p^H of solutions by p^H meter	PO 1 , PO 2	3
AHS104.13	CLO 13	Examine threshold frequency by using LCR circuit.	PO 1	2
AHS104.14	CLO 14	Adsorption of acetic acid on charcoal	PO 2	2
AHS104.15	CLO 15	Correlate the basic principles of physics and chemistry 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
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	3	2		1			2						2		
CLO 9	3	1		1			2						2		
CLO 10	2	2					2						1		
CLO 11	1			1											
CLO 12	1	2											1		
CLO 13	1														
CLO 14		1											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 PHYSICSAND CHEMISTRY LABORATORY**
Do's and Don'ts in physics and chemistry laboratory. Precautions to be taken in laboratory.	
Week-2	**LIGHT EMITTING DIODE**

Studying V-I characteristics of LED	
Week-3	**STEWART GEE'S APPARATUS**
Magnetic field along the axis of current carrying coil-Stewart and Gee's method.	
Week-4	**STUDY OF CHARACTERISTICS OF SOLAR CELL**
Studying L-I characteristics of Solar cell	
Week-5	**TIME CONSTANT OF RC CIRCUIT**
Evaluate time constant of a RC circuit.	
Week-6	**OPTICAL FIBER**
Evaluation of numerical aperture of a given optical fiber.	
Week-7	**ENERGY GAP OF A SEMICONDUCTOR DIODE**
Determination of energy gap of a semiconductor diode.	
WeeK-7	**PREPARATIONS OF ORGANIC COMPOUNDS**
Preparation of aspirin and thiokol rubber	
Week-8	**CONDUCTOMETRIC TITRATIONS**
Conductometric titration of strong acid Vs strong base	
Week-9	**POTENTIOMETRIC TITRATIONS**
Potentiometric titration of strong acid Vs strong base	
Week-10	**PHYSICAL PROPERTIES**
Determination of viscosity and surface tension of liquids	
Week-11	**VOLUMETRIC ANALYSIS**
Estimation of hardness of water by EDTA method	
Week-12	**PHYSICAL PROPERTIES**
Determination of p^H of solutions by p^H meter	
Text Books:	
1. C. L. Arora, "Practical Physics", S. Chand & Co., New Delhi, 3rd Edition, 2012. 2. Vogel's, "Quantitative Chemical Analaysis", Prentice Hall, 6th Edition, 2000.	
Reference Books:	
1 .C.F. Coombs,"Basic Electronic Instrument Handbook", McGraw-Hill Book Co., 1972. 2 . Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.	

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 and chemistry laboratory. Precautions to be taken in laboratory.	CLO 15	T1:13.5
2	Studying V-I characteristics of LED	CLO 1	T1:13.5
3	Magnetic field along the axis of current carrying coil-Stewart	CLO 2	T1:13.5

Week No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
	and Gee's method.		
4	Verify L-I characteristics of a solar cell	CLO 3	T1:14.7
5	Evaluate time constant of a RC circuit.	CLO 4	T1:15.7
6	Determine the numerical aperture of an optical fiber.	CLO 5	T1:16.8
7	Evaluate the energy gap of a semiconductor diode	CLO 6	T1:16.9
8	Preparation of aspirin and thiokol rubber	CLO 7	T1:17.9
9	Conductometric titration of strong acid Vs strong base	CLO 8	T1:18.10
10	Potentiometric titration of strong acid Vs strong base	CLO 9	T1:19.10
11	Determination of viscosity and surface tension of liquids	CLO 10	T1:19.9
12	Estimation of hardness of water by EDTA method	CLO 11	T1:23.10
13	Determination of p^H of solutions by p^H meter	CLO 12	T1:23.10
14	Examine threshold frequency by using LCR circuit.	CLO 13	T1:25.10
15	Adsorption of acetic acid on charcoal	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:
Mr. K Saibaba, Assistant Professor
Mr. G Maheshkumar, Assistant Professor

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