INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad -500 043

CIVL ENGINEERING

COURSE DESCRIPTOR

Course Title	**ENGINEERING CHEMISTRY LABORATORY**				
Course Code	AHS103				
Programme	B.Tech				
Semester	I	AE | CE | ME			
Course Type	Foundation				
Regulation	IARE - R16				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	1	4	3	2
Chief Coordinator	Mr. M Praveen, Assistant Professor				
Course Faculty	Dr. C Mahendar, Professor Dr. V Anitha Rani, Associate Professor Mr. B Raju, Assistant Professor Mr. G Mahesh Kumar, Assistant Professor Ms. T Mallika, Assistant Professor Ms. M Lakshmi Prasanna, Assistant Professor Ms. M Swathi, Assistant Professor				

I. COURSE OVERVIEW:

The aim of this Engineering Chemistry laboratory is to develop the analytical ability of the students by better understanding the concepts experimental chemistry. The experiments carried out like preparation of aspirin, thiokol rubber, conductometry, potentiometry, physical properties like viscosity and surface tension of liquids. The volumetric analytical experiments like determination of hardness of water, dissolved oxygen and copper in brass can be carried out in the laboratory.

II. COURSE PRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
	-	-	Basic principles of chemistry laboratory	-

III. MARKSDISTRIBUTION:

Subject	SEE Examination	CIA Examination	Total Marks
Engineering Chemistry 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 forinternal assessment and 70 marks for semester end lab examination. Out of 30 marks ofinternal assessment, continuous lab assessment will be done for 20 marks for the day today performance and 10 marks for the final internal lab assessment.

Semester End Examination (SEE): The semester end labexamination for 70 marks shall be conducted by two examiners, one of them beingInternal Examiner and the other being External Examiner, both nominated by thePrincipal 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.	2	Calculations of the observations

Program Outcomes (POs)		Strength	Proficiency assessed by
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	Characteristics curves
PO 7	**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.	1	-

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	**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.	1	Open ended experiments
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.	-	-
PSO 3	**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.	-	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES (COs):

The course should enable the students to:	
I	The course intends to provide an overview of the working principles and mechanism of reactions.
II	This course relies on elementary treatment and qualitative analysis and makes use of simple models and equation to illustrate the concepts involved.
III	To provide an overview of preparation and identification of organic compounds.
IV	To gain the knowledge on existing future upcoming devices, materials and methodology.

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
AHS103.01	CLO 1	Extrapolate the knowledge of preparation of acetyl salycilic acid.	PO 1, PO 7	2
AHS103.02	CLO 2	Use innovative methods to improve the quality of soft water for industrial purpose at cheaper cost.	PO 1, PO 2, PO 7	2
AHS103.03	CLO 3	Evaluate conductometry and conductometric titrations	PO 1	1

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AHS103.04	CLO 4	Estimate potentiometry and potantiometric titrations.	PO 1	1
AHS103.05	CLO 5	Compare the results of experiments with conductometry	PO 1	1
AHS103.06	CLO 6	Describe potentiometry and potantiometric titrations	PO 1	1
AHS103.07	CLO 7	Explain certain properties of water using the concepts of cohesive forces and surface tension.	PO 1, PO 7	3
AHS103.08	CLO 8	Identify the formula for viscosity, and explain each variable	PO 1, PO7	3
AHS103.09	CLO 9	Understand the analysis of water to improve the quality of soft water	PO 1, PO2, PO 7	2
AHS103.10	CLO10	Extrapolate the knowledge of preparation of artificial rubber	PO 1	1
AHS103.11	CLO11	Examine the amount of percentage by volumetric analysis	PO 1	1
AHS103.12	CLO 12	Estimate the composition by volumetric analysis	PO 1	1

3 = High; 2 = Medium; 1 = Low

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

Course Learning 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	2						2								
CLO 2	2	2											1		
CLO 3	1														
CLO 4	1														
CLO 5	1														
CLO 6	1														
CLO 7	3						2						2		
CLO 8	3						2						2		
CLO 9	2	2					2						1		
CLO 10	1						2								
CLO 11	1														
CLO 12	1														

3 = High; 2 = Medium; 1 = Low

XI. ASSESSMENT METHODOLOGIES–DIRECT

CIE Exams	PO 1	SEE Exams	PO 1	Assignments	-	Seminars	-
Laboratory Practices	PO 1, PO 7	Student Viva	PO 1	Mini Project	-	Certification	-

XII. ASSESSMENT METHODOLOGIES-INDIRECT

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

XIII. SYLLABUS

LIST OF EXPERIMENTS	
Week-1	**PREPARATIONS OF ORGANIC COMPOUNDS**
Preparation of Aspirin	
Week-2	**VOLUMETRIC ANALYSIS**
Estimation of hardness of water by EDTA method	
Week-3	**CONDUCTOMETRIC TITRATIONS**
Conductometric titration of strong acid Vs strong base	
Week-4	**POTENTIOMETRIC TITRATIONS**
Potentiometric titration of strong acid Vs strong base	
Week-5	**CONDUCTOMETRIC TITRATIONS**
Conductometric titration of mixture of acid Vs strong base	
Week-6	**POTENTIOMETRIC TITRATIONS**
Potentiometric titration of weak acid Vs strong base	
Week-7	**PHYSICAL PROPERTIES**
Determination of surface tension of a given liquid using stalagmometer	
Week-8	**PHYSICAL PROPERTIES**
Determination of viscosity of a given liquid by using Ostwald's viscometer	
Week-9	**VOLUMETRIC ANALYSIS**
Estimation of dissolved oxygen in water	
Week-10	**PREPARATIONS OF RUBBER**

Preparation of Thiokol rubber	
WeeK-11	**VOLUMETRIC ANALYSIS**
Determination of percentage of copper in brass	
Week-12	**VOLUMETRIC ANALYSIS**
Estimation of MnO_2 in pyrolusite	
Reference Books:	
1. A text book on experiments and calculation Engg. S.S. Dara. 2. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications.	

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	Preparation of Aspirin	CLO1	R1,R2
2	Estimation of hardness of water by EDTA method	CLO 2	R1,R2
3	Conductometric titration of strong acid Vs strong base	CLO 3	R1,R2
4	Potentiometric titration of strong acid Vs strong base	CLO 4	R1,R2
5	Conductometric titration of mixture of acid Vs strong base	CLO 5	R1,R2
6	Potentiometric titration of weak acid Vs strong base	CLO 6	R1,R2
7	Determination of surface tension of a given liquid using stalagmometer	CLO 7	R1,R2
8	Determination of viscosity of a given liquid by using Ostwald's viscometer	CLO 8	R1,R2
9	Estimation of dissolved oxygen in water	CLO 9	R1,R2
10	Preparation of Thiokol rubber	CLO 10	R1,R2
11	Determination of percentage of copper in brass	CLO 11	R1,R2
12	Estimation of MnO_2 in pyrolusite	CLO 12	R1,R2

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 1	PSO 1

Prepared by:
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