

SC 109 – SCIENCE LAB

Course Title	Science Lab	Course Code	SC 109
Year	I Year	Course Group	Basic Science
Teaching Scheme in Periods (L:T:P)	30:0:60	Credits	2.0
Type of course	Lecture+ Practical	Total Contact Periods	90
CIE	60 Marks	Year End Examination (YEE)	40 Marks

SC 109(A) - Physics Lab

Pre requisites

This course requires the basic knowledge of Science and Mathematics.

Course Outcomes

On completion of the course, the student shall be able to

CO1	Demonstrate the principle of Screw Gauge and calculate accurate measurement of thickness of glass plate and area of cross section of a wire.
CO2	Make use of laws of vector addition to verify Parallelogram law of forces and Triangle law of forces.
CO3	Determine the coefficient of friction between wood and wood and wood and glass surfaces on horizontal plane.
CO4	Calculate coefficient of viscosity of a liquid by capillary method.
CO5	Make use of Quill tube to verify Boyle's law.
CO6	Determine the value of acceleration due to gravity using simple pendulum and verify with $L-T^2$ graph.
CO7	Determine the velocity of sound in air at room temperature and calculate velocity of sound at 0°C .
CO8	Determine the specific resistance of given wire using meter bridge.
CO9	Determine the refractive index of a solid using travelling microscope.

CO10	Draw magnetic lines of force, locate neutral points and calculate magnetic moment of a bar magnet. (Demonstration Experiment)
------	---

CO – PO Mapping Matrix

Course Outcome/ Programme Outcome	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation and Testing	Engineering Practices Engineering Practices for Society, Sustainability and Project Management	Lifelong Learning	Linked PO	
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	3					1	1	1,6,7
CO2	3					1	1	1,6,7
CO3	3					1	1	1,6,7
CO4	3					1	1	1,6,7
CO5	3					1	1	1,6,7
CO6	3					1	1	1,6,7
CO7	3					1	1	1,6,7
CO8	3					1	1	1,6,7
CO9	3					1	1	1,6,7
CO10	3					1	1	1,6,7

Correlation Scale:

1 - Low

2 – Medium

3 - High

Learning outcomes

On successful completion of the course, the student will have ability to:

1. Demonstrate the principle of Screw Gauge and calculate accurate measurement of thickness of glass plate and area of cross section of a wire.
2. Make use of laws of vector addition to verify Parallelogram law of forces and Triangle law of forces.
3. Determine the coefficient of friction between wood and wood and wood and glass on horizontal plane.
4. Calculate coefficient of viscosity of a liquid by capillary method.
5. Make use of Quill tube to verify Boyle's law.
6. Determine the value of acceleration due to gravity using simple pendulum and verify with L-T2 graph..
7. Determine the velocity of sound in air at room temperature and calculate velocity of sound at 00 C.
8. Determine the specific resistance of given wire using meter bridge.
9. Determine the refractive index of a solid using travelling microscope.
10. Draw magnetic lines of force, locate neutral points and calculate magnetic moment of a bar magnet. (Demonstration Experiment Only)

Course Delivery:

The course will be delivered through lectures, class room interaction, group discussions, demonstration and practice.

Tutorial: 1 Period per Experiment:

1. Introduction to Physics practical and its importance, safety precautions in maintenance of equipment in the laboratory.
2. Maintenance of apparatus and equipment.
3. Follow of Do's and Don'ts.
4. Maintenance of data in observation book and record book.
5. Write the procedure of the experiment before the commencement of each experiment.
6. Strictly following of instructions given from time to time by the lecturer-in-charge.
7. Demonstration of each experiment by the lecturer in charge.

Conduction of experiments: 2 periods per Experiment.

Student must perform experiment individually under the supervision of the lecturer-in charge.

EXAMINATION & EXPERIMENTS		
S.NO	EXAMINATION	EXPERIMENTS
1	MID-I	Experiment No 1, 2 & 3
2	MID-II	Experiment No 4, 5 & 6
3	YEAR END EXAMINATION (YEE)	Experiment No 1,2,3,4, 5, 6, 7, 8, 9

Scheme of Valuation of YEE		
S.No	Particulars	Marks
1.	Objective/Aim	01
2.	Apparatus/Equipment	02
3.	Observations	02
4.	Principle including formula	02
5.	Experiment (Tabular form, readings, etc)	05
6.	Calculation and Result	05
7.	Viva Voce	03
	Total	20

Reference Books:

1. Intermediate Physics lab manual – Telugu Academy
2. Laboratory manual for class XI and XII – NCERT

SC 109(B) - Chemistry Lab

Pre requisites

Knowledge of basic concepts of Chemistry of secondary education.

Course Objectives: To provide practical knowledge about the basics of preparation of chemical solutions, volumetric analysis of chemical compounds, construction and measuring the EMF of Daniell Cell, preparation of plastics and determination the pH of solutions.

Course Outcomes

On successful completion of the course, the student will be able to

CO1	Prepare a primary standard solution and determine the concentration of any unknown solution.
CO2	Estimate the concentration and weight of HCl in a given sample solution by volumetric analysis.
CO3	Determine the total hardness of water sample by complexometric titration using a standard EDTA solution
CO4	Estimate Mohr's salt by using a standard KMnO_4 solution and apply this knowledge to determine Fe^{2+} ion concentration in the given samples
CO5	Determine the acidity present in a given water sample.
CO6	Determine the alkalinity present in a given water sample.
CO7	Estimate the chloride content present in a given water sample.
CO8	Construct and measure the electromotive force (EMF) of a Daniell cell
CO9	Prepare urea-formaldehyde resin
CO10	Determine the pH of the solutions collected from different sources and recommend appropriate corrective actions.

CO – PO Mapping Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	-	-	-	-	1	1
CO2	3	-	-	-	-	1	1
CO3	3	-	-	-	2	1	1
CO4	3	-	-	-	2	1	1
CO5	3	-	-	-	2	1	1
CO6	3	-	-	-	2	1	1
CO7	3	-	-	-	2	1	1
CO8	3	-	-	-	-	1	1
CO9	3	-	-	-	-	1	1
CO10	3	-	-	1	2	1	1

Correlation Scale: 1 - Low 2 – Medium 3 - High

List of experiments:

1. Preparation of standard Na_2CO_3 solution.
2. Estimation of hydrochloric acid by using standard Na_2CO_3 solution
3. Determination of total hardness of water sample by EDTA method.
4. Estimation of Mohr's salt by using standard KMnO_4 solution.
5. Determination of acidity of water sample by using standard NaOH solution.
6. Determination of alkalinity of water sample by using standard H_2SO_4 solution.
7. Estimation of chloride content present in a water sample by using standard AgNO_3 solution.
8. Construction of the Daniell cell and measurement of its EMF.
9. Preparation of urea-formaldehyde resin.
10. Determination of pH value of the different solutions by using universal indicator and pH meter. (Demonstration Experiment Only)

Learning Outcomes

Upon completion of the course, the student will have ability to

1. Prepare standard sodium carbonate solution and dilute to desired concentration.
2. Estimate hydrochloric acid present in a given solution by using standard sodium carbonate solution.
3. Determine the total hardness of water sample by using standard EDTA solution.
4. Estimate Mohr's salt by using standard KMnO_4 solution.
5. Determine the acidity of water sample by using standard NaOH solution.
6. Determine the alkalinity of water sample by using standard H_2SO_4 solution.
7. Estimate the chloride content present in a water sample by using standard AgNO_3 solution.
8. Construct and measure the EMF of a Daniel cell.
9. Prepare urea-formaldehyde resin.
10. Determine the pH value of the different solutions by using universal indicator and pH meter.

Course Delivery:

The course will be delivered through lectures, classroom interactions, group discussions, demonstrations and practicals.

Lecture and Demonstration: 1 Period

1. Introduction of chemistry practical and its importance, safety precautions in maintenance of cleanliness and orderliness of chemicals in the laboratory.
2. Maintenance of apparatus and equipment.
3. Follow of Do's and Don'ts.
4. Maintenance of data in record book.
5. Write the procedure of the experiment before the commencement of each experiment.
6. Strict following of instructions given from time to time by the staff-in-charge.
7. Demonstration of each experiment by the staff in charge.

Conduction of experiments: 2 periods per experiment.

Student must perform experiment individually under the supervision of the lecturer-in charge.

EXAMINATION & EXPERIMENTS		
S.NO	EXAMINATION	EXPERIMENTS
1	MID-I	Experiment No1, 2 & 3
2	MID-II	Experiment No4, 5 & 6
3	YEAR END EXAMINATION	Experiment No1,2,3,4, 5, 6, 7, 8, 9

Scheme of Valuation for Year End Exam		
Sl.No.		MARKS
1	Identification of apparatus/equipment/chemical compounds/tools/etc.	2
2	Writing Principle and Procedure	5
3	Experiment and Observations	6
4	Calculation and Results	4
5	Viva-voce	3
Total		20

Reference Books:

1. Intermediate Chemistry Lab manual-Telugu academy (Telangana state)
2. Vogel's Inorganic Qualitative and Quantitative Analysis.
3. Practical Chemistry by O.P. Pande & others.

BOARD DIPLOMA EXAMINATION, (C-26)

MID – I

FIRST YEAR EXAMINATION

SC109 - SCIENCE LAB

TIME: 1 Hour

TOTAL MARKS: 20

Instructions: (1) Answer both PART-A AND PART-B on separate answer sheets.

(2) Each question carries **TEN** marks.

PART-A (PHYSICS LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Determine the thickness of given glass plate using Screw gauge.
2. Find the cross sectional area of given wire using Screw gauge.
3. Verify parallelogram law of forces.
4. Verify triangle law of forces.
5. Determine the coefficient of friction between wooden surface and wooden block.
6. Determine the coefficient of friction between glass surfaces and wooden block.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Prepare 250 ml of 0.05M sodium carbonate solution.
2. Estimate the amount of hydrochloric acid present in one litre of solution by using 0.05M sodium carbonate solution.
3. Determine the total hardness of water sample by using 0.02N disodium salt of EDTA solution.

BOARD DIPLOMA EXAMINATION, (C-26)

MID – II

FIRST YEAR EXAMINATION

SC 109 - SCIENCE LAB

TIME: 1 Hour

TOTAL MARKS: 20

- Instructions:** (1) Answer both PART-A and PART-B on separate answer sheets.
(2) Each question carries **TEN** marks.

PART-A (PHYSICS LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Determine coefficient of viscosity of water using capillary method.
2. Verify Boyle's law using Quill tube.
3. Determine the value of acceleration due to gravity using L-T² graph.
4. Determine the value of acceleration due to gravity using simple pendulum.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 10 = 10

1. Estimate the amount of Mohr's salt present in the given solution by using 0.01M KMnO₄ solution.
2. Determine the acidity of water sample by using 0.02N NaOH solution.
3. Determine the alkalinity of water sample by using 0.02N H₂SO₄ solution.

BOARD DIPLOMA EXAMINATION, (C-26)
YEAR END EXAMINATION
FIRSTYEAR EXAMINATION
SC 109 - SCIENCE LAB

Time: 2 Hours]

[Total Marks: 40

Instructions: (1) Answer both PART-A AND PART-B on separate answer sheets.
(2) Each question carries **TWENTY** marks.

PART-A (PHYSICS LAB)

Perform ONE experiment allotted by the examiner.

1 x 20 = 20

1. Determine the thickness of given glass plate using Screw gauge.
2. Find the cross sectional area of given wire using Screw gauge.
3. Verify parallelogram law of forces.
4. Verify triangle law of forces.
5. Determine the coefficient of friction between wooden surface and wooden block.
6. Determine the coefficient of friction between glass surfaces and wooden block.
7. Determine coefficient of viscosity of water using capillary method.
8. Verify Boyle's law using Quill tube.
9. Determine the value of acceleration due to gravity using L-T² graph.
9. Determine the value of acceleration due to gravity using simple pendulum.
10. Determine the velocity of sound in air at room temperature.
11. Determine the velocity of sound in air at room temperature and calculate velocity of sound at 0⁰ C.
12. Determine the specific resistance of given wire using meter bridge.
13. Determine the refractive index of a solid using travelling microscope.

PART-B (CHEMISTRY LAB)

Perform ONE experiment allotted by the examiner.

1 x 20 = 20

1. Prepare 250 ml of 0.05M sodium carbonate solution.
2. Estimate the amount of hydrochloric acid present in 500ml of solution by using 0.05M sodium carbonate solution.
3. Determine the total hardness of water sample by using 0.02N disodium salt of EDTA solution.
4. Estimate the amount of Mohr's salt present in 500 ml of solution by using 0.1M KMnO₄ solution.
5. Determine the acidity of water sample by using 0.02N NaOH solution.

6. Determine the alkalinity of water sample by using 0.02N H_2SO_4 solution.
7. Estimate the amount of chloride content present in the given water sample by using 0.0141N AgNO_3 solution.
8. Construct the Daniell cell and measure its EMF value.
9. Prepare the urea-formaldehyde resin.