

**Government of Karnataka**  
**Department of Technical Education**  
**Board of Technical Examinations, Bengaluru**

Course Title : <b>APPLIED SCIENCE LAB</b>	Course Code : <b>15SC04P</b>
Semester : <b>I / II</b>	Course Group : <b>Core</b>
Teaching Scheme in Hrs (L:T:P) : <b>0:2:4</b>	Credits : <b>3 Credits</b>
Type of course : <b>Tutorial &amp; Practical</b>	Total Contact Hours : <b>78</b>
CIE : <b>25 Marks</b>	SEE : <b>100 Marks</b>
Programme : <b>Common to all Engineering Diploma Programmes</b>	

**Prerequisite:**

Applied Science theory in the current semester.

**Course objective:**

1. Learn to measure different dimensions of objects accurately using measuring instruments.
2. Enhance the vectorial concepts of concurrent forces.
3. Learn the concepts of properties of fluids.
4. Enhance the practical concept of resonance.

**Experiments:**

**PART- A**

**1. Vernier Calipers:**

- a) To determine the dimensions of given solid cylinder and hence calculate its volume.
- b) To determine the dimensions of given hollow cylinder and hence calculate its volume

**Activity:** To calculate the density of material of given solid/hollow cylinder knowing its volume and mass.

**2. Screw Gauge:**

- a) To determine the thickness of given metal and glass plate.
- b) To determine the diameter of given thin wire and hence to calculate its volume.
- c) To determine the diameter of given metallic sphere and hence to calculate its volume.

- Activity:** 1. To calculate volume of such half meter length wire.  
2. To calculate volume of such number (50 or 75etc) of spheres.

### 3. Laws of concurrent forces:

- Verify the law of parallelogram of forces.
- Verify the converse law of triangle of forces.
- Verify Lami's theorem.

**Activity:** To determine the weight of given body using law of parallelogram of forces.

### 4. Moment bar:

To verify the conditions of equilibrium of coplanar parallel forces acting on a body.

**Activity:** To determine the weight of given body using moment bar.

## PART-B

### 5. Viscosity:

- To determine the co-efficient of viscosity of water by poiseuille's method (for a given radius of capillary tube)

**Activity:** To plot a graph of  $ht$  versus  $V$  and to find  $ht/V$  from slope.

### 6. Sonometer:

- To determine the frequency of given tuning fork by comparison method.
- To determine the frequency of given tuning fork by absolute method.

**Activity:** 1. Plot a graph of 'n' versus 'l' from the graph, find the frequency unknown  
Tuning fork  
2. Plot a graph of  $\sqrt{T}$  versus 'l' from the slope of graph find  $\sqrt{T}/l$   
3. To calculate linear density 'm' by knowing  $\sqrt{T}/l$  and 'n'

### 7. Resonance:

- To determine the velocity of sound in air at room temperature by using resonance air column apparatus. (for single resonating length)

- Activity:** 1. To calculate velocity of sound in air at 0<sup>0</sup> C.  
2. To determine the unknown frequency of tuning fork.

**8. Surface Tension:**

- a) To determine the Surface Tension of water by capillary rise method using Travelling Microscope. (radius of capillary tube is given )

**Activity:** Calculate radius of the capillary tube by knowing the surface tension of the liquid and height of liquid column in capillary tube.

**9. Boyle’s law:**

- a) To verify Boyle’s law using Boyle’s law apparatus.

**Activity:** 1.To plot a graph of pressure versus volume  
2. To plot a graph of 1/pressure versus volume.

**Course outcome:**

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

1. Measure the various dimensions of given objects using instruments.
2. Apply the vector concepts in engineering.
3. Apply the acquired knowledge of fluid dynamics in the field of engineering.
4. Apply the concepts of wave motion in engineering.

**Mapping Course Outcomes with Program Outcomes:**

Course outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
1	S	M							M			
2	S	S							M			
3	S	M							M			
4	S	S							M			

**S: Strong relationship**

**M: Moderate relationship**

## Course Assessment and Evaluation:

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
<b>Direct Assessment</b>	<b>CIE</b> (Continuous Internal Evaluation)	I A Tests	Students	Two IA tests for Practical  (Average of Two Test marks will be computed)	10	Blue Books	1 to 4
		Record Writing		Record Writing (Average of Marks allotted for each expt.)	10	Record Book	1 to 4
		Class room Assignments		Two Assignments (Average of Two Assignments to be computed)	05	Log of Activity	1 to 3
				TOTAL	25		
	<b>SEE</b> (Semester End Examination)	End Exam	Students	End of the Course	50	Answer Scripts at BTE	All the CO's
<b>Indirect Assessment</b>	Student Feedback on course		Students	Middle Of The Course	Feedback forms		1 to 2 delivery of the course
	End Of Course Survey			End Of The Course	Questionnaire		1 to 4 Effectiveness of delivery of instructions and assessment

**Note:** I.A. test shall be conducted as per SEE scheme of valuation. However the obtained marks shall be reduced to 10 marks. (Any decimals shall be rounded off to next higher digit).

## Composition of Educational Components:

Questions for CIE and SEE will be designed to evaluate the various educational components (Bloom's Taxonomy) such as:

Sl. No.	Educational Component	Weightage (%)
1	Remembering and Understanding	15
2	Applying the knowledge acquired from the course	20
3	Analysis	25
4	Evaluation	30
5	Creating new knowledge	10

## Reference Books:

1. Practical physics by pro. J.D. Belani and N.J. Belani. Published by Nebhandas Hiranand.
2. Practical physics by C.L. Arora. Published by S. Chand and company.
3. [www.jac-production.co.za](http://www.jac-production.co.za)

## Model Question Bank:

Course: **APPLIED SCIENCE LAB**

Course Code: **15SC04P**

### PART- A

1. Determine the dimensions of given Solid Cylinder using Vernier Caliper and hence calculate its volume.
2. Determine the dimensions of given Hollow Cylinder using Vernier Caliper and hence calculate its volume.
3. Determine the thickness of given metal and glass plate using screw gauge.
4. Determine the diameter of given thin wire using screw gauge and hence, to calculate its volume.
5. Determine the diameter of given metallic sphere using screw gauge and hence, calculate its volume.
6. Verify the law of parallelogram of forces.
7. Verify the converse of triangle law of forces.
8. Verify lami's theorem.
9. Verify the conditions of equilibrium of coplanar parallel forces using Moment bar.

### PART- B

10. Determine the coefficient of viscosity of water by Poiseuille's method  
(For a given radius of capillary tube)
11. Determine the frequency of given tuning fork by comparison method using sonometer.
12. Determine the frequency of given tuning fork by absolute method using sonometer.
13. Determine the velocity of sound in air at room temperature by using resonance Air column Apparatus.
14. Determine the Surface Tension of water by capillary rise method.  
(For a given radius of capillary tube)
15. Verify Boyle's law using Boyle's law apparatus.

## Scheme of Valuation for SEE (Semester End Examination)

Sl. no.	Performance	Max. Marks
1	Writing Observation, Tabular column, formula.	05x2=10
2	Conduction of experiment.	10x2=20
3	Calculation and Result.	05x2=10
4	Viva Voce.	10
<b>TOTAL</b>		<b>50</b>

**Note:** The students will submit record books at the time of semester end exam.

## Guidelines for Question Paper Setting

The question paper must be prepared by selecting **ONE** experiment from **PART – A** and **ONE** question from **PART – B**.

## Specification of the Apparatus Required for Applied Science Lab

The following are the specification of the apparatus required for science lab, and number of apparatus required for the batch of 20 students.

Sl. No.	Name of the Apparatus	Specification	Required Number
1	Vernier calipers	With L.C 0.01cm having Metallic scale marked in cm, with objects :solid cylinder &hollow cylinder	10
2	Screw gauge	U-Shaped metallic frame with L.C 0.01mm with objects :glass plate, metal plate, thin wire and metallic sphere	10
3	Law of concurrent forces apparatus	Vertical Drawing Board fixed with pulleys. Weights 50g each with weight hangers set	10

4	Moment bar	Having two vertical metallic stands, two spring balances measuring up to 500 g . horizontal bar.	10
5	Surface tension apparatus	Traveling microscope, having L.C 0.005cm, both horizontal and vertical movement of telescope, eye piece with fine cross-wire, slow moving stand, beaker, with capillary tube	10
6	Viscosity apparatus	Aspiratory bottle, cork, capillary tube, stopwatch, measuring jar. With stand to keep Aspiratory bottle	10
7	Boyle's law apparatus	<i>Wide bore glass tube mounted vertically in front of a scale graduated 0 to 60cm Zero corresponds to the inside of the closed (top) end of the tube Air is confined in the tube by a coloured oil contained in a metal pressure chamber Pressure chamber is fitted with a Bourdon type gauge calibrated 0 to 3.5kg cm<sup>2</sup> (0 to 50 lb/in<sup>2</sup>) actual pressure A valve is fitted to the air inlet tube from the pump As the pressure in the oil chamber is increased, oil level and its actual (total) pressure are directly indicated Tube is made of extra strong glass and is securely covered with transparent plastic on the front Overall height of apparatus approx. 690mm</i>	05
8	Sonometer	Wooden box fixed with meter scale, pulley, metallic string, weight with weight hanger ( 500g each)	10
9	Resonance air column apparatus	Consists of a resonance tube brass N.P. 100cms, reservoir brass N.P. 250ml & meter scale both sides millimeters, which are mounted on	10



		wooden polished board. The reservoir is caged in wooden block that has sliding facility.	
10	Electronic balance	0.1g accuracy 500g capacity	01
11	Tuning fork set	Set of eight tuning forks of different frequency blue steel( Ragg's type)	06

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**Curriculum Drafting Committee 2015-16**

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