

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

Course Title	: APPLIED SCIENCE LAB	Course Code	: 15SC04P
Semester	: I / II	Course Group	: Core
Teaching Scheme in Hrs (L:T:P)	: 0:2:4	Credits	: 3 Credits
Type of course	: Tutorial & Practical	Total Contact Hours	: 78
CIE	: 25 Marks	SEE	: 50 Marks
Programme	: Common to all Engineering Diploma Programmes		

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 75 etc) of spheres.

3. Laws of concurrent forces:

- a) Verify the law of parallelogram of forces.

b) Verify the converse law of triangle of forces.

c) 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:

a) 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:

a) To determine the frequency of given tuning fork by comparison method.

b) 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:

a) 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°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 $1/\text{pressure}$ 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:

CO –PO mapping

	Course Outcome	Experiment linked	PO Mapped	Cognitive Level	Lab Sessions
CO1	Measure the various dimensions of given objects using instruments.	1,2	1,2,3,4,9	U/A	24
CO2	Apply the vector concepts in engineering.	3,4	1,2,9	U	16
CO3	Apply the acquired knowledge of fluid dynamics in the field of engineering.	5,8,9	1,2,3,9	A	24
CO4	Apply the concepts of wave motion in engineering.	6,7	1,2,3,9	U	14
Total Hours of instruction					78

U-Understanding; A-Application;

Course outcomes –Program outcomes mapping strength

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
Applied Science lab	3	3	3	1	-	-	-	-	3	-

Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.

Method is to relate the level of PO with the number of hours devoted to the COs which address the given PO.

If $\geq 40\%$ of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3

If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2

If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1

If $< 5\%$ of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.

Course Assessment and Evaluation:

	What		To Whom	Frequency	Max Marks	Evidence Collected	Course Outcomes
Direct Assessment	CIE (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 based on CO's (Average marks of Two Assignments shall be rounded off to the next higher digit.)	05	Log of Activity	1 to 4
				TOTAL	25		
	SEE (Semester End Examination)	End Exam	Students	End of the Course	50	Answer Scripts at BTE	All the CO's
Indirect Assessment	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 obtained marks shall be reduced to 10 marks. Average marks of two tests shall be rounded off to the 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	35
2	Applying the knowledge acquired from the course	45
3	Analysis	05
4	Evaluation	05
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

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
TOTAL		50 Marks

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	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 ² (0 to 50 lb/in ²) 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	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 wooden polished board. The reservoir is caged in wooden block that has sliding facility.	10
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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