Programme	BS Science Education (1-8)	Course Code	SE-305AL	Credit Hours	1
Course Title	**PHYSICS LAB-III**				

Course Introduction

This lab course provides experimental understanding of heat and thermodynamics. Students perform practical work to verify thermal laws and develop skills in measurement, data analysis, and report writing.

Learning Outcomes

Upon successful completion of this lab course, students will be able to:

1. Perform experiments related to heat, thermodynamics, and thermal properties of matter using standard laboratory apparatus.
2. Measure physical quantities accurately and analyze experimental data with proper error estimation.
3. Verify fundamental thermal laws such as Stefan–Boltzmann law and thermoelectric effects experimentally.
4. Plot graphs, interpret results, and prepare systematic laboratory reports.
5. Demonstrate safe laboratory practices and proper handling of equipment.

Course Content		Assignments/Readings
Week 1	Introduction to laboratory work; Safety rules; Familiarization with instruments.	Lab orientation and notebook preparation.
Week 2	**Exp-1:** Determination of temperature coefficient of resistance of a given wire.	Completion of experiment write-up.
Week 3	**Exp-2:** Determination of Stefan's constant	Checking of practical notebooks.
Week 4	**Exp-3:** Calibration of thermocouple by potentiometer.	Graph plotting and calculations.
Week 5	**Exp-4:** Principle of thermocouple; Thermoelectric EMF and temperature diagram.	Submission of lab report.
Week 6	**Exp-5:** Verification of Stephen-Boltzmann's law of radiation.	Completion of pending write-ups.
Week 7	**Exp-6:** Determining the specific heat capacities of solids	Notebook checking.
Week 8	**Exp-7:** Study of thermal expansion of solids and liquids.	Error analysis practice.
Week 9	Viva voce and final practical examination	Lab report submission.
Week 10	**Exp-8:** Determination of thermal and electrical conductivity of metals	Graph checking and corrections.
Week 11	**Exp-9:** To determine thermal emf and plot temperature diagram	Completion of practical record.

Week 12	**Exp-10:** To determine the Thermal conductivity of good and bad conductors using Lee's apparatus	Notebook checking.
Week 13	**Exp-10:** To determine the Thermal conductivity of good and bad conductors using Searl's apparatus	Submission of complete practical file.
Week 14	**Exp-12:** Determination of "J" by Callender – Barnes method	Correction and improvement of record.
Week 15	Repeat/Improvement of experiments and completion of record.	Final checking of notebooks.
Week 16	Repeat/Improvement of experiments and completion of record.	Viva voce preparation.

Textbooks and Reading Material

Textbooks.

1. *Physics laboratory experiments by J. D. Wilson, Cengage Learning (2014).*
2. *General Physics Laboratory I Experiments by K. Clara Castoldi, Kendall Hunt, (2015).*
3. *Physics Lab Experiments by M. French, Mercury Learning & Information, (2016).*
4. *Experiments And Demonstrations In Physics: Bar-ilan Physics Laboratory by Kraftmakher Yaakov, World Scientific (2014).*

Suggested Readings

1. *Physics Lab Experiments by M. French*, *Mercury Learning & Information*, Journal Articles/ Reports

Teaching Learning Strategies

1. Brief pre-lab lecture explaining theory and procedure
2. Demonstration of apparatus and experimental techniques
3. Hands-on performance of experiments by students
4. Supervised data collection and error analysis
5. Maintenance of laboratory notebook/record
6. Post-lab discussion and result evaluation
7. Viva voce to assess conceptual understanding

Assignments: Types and Number with Calendar

Total Assignments: 3

1. **Assignment–1:** Lab Report Writing (Temperature Coefficient / Thermocouple Experiment) – **Week 5**
2. **Assignment–2:** Numerical Problems & Error Analysis (Stefan–Boltzmann Law / Specific Heat) – **Week 9**
3. **Assignment–3:** Complete Practical File Submission & Viva Preparation – **Week 14**
4. Submission of each assignment will be within one week of issuance and will contribute to sessional marks as per Institute policy.