

**Name**

**TITLE OF EXPERIMENT**

**STEFAN BOLTZMANN'S RADIATION LAW:  
EXPERIMENT No 1**

**MODERN PHYSICS LAB**

**PHYS 393 COURSEWORK**

**REPORTING SHEET**

**PART A: SCIENTIFIC KNOWLEDGE AND PLANNING [30 MARKS]**

Aim:

Methodology - Draw your set up, explaining the use of the different components you will use to achieve your aim

**5**

How do you predict the plot between  $U_{therm}$  and T (temperature) to look like according to your knowledge of Stefan Boltzmann's radiation Law?

**4**

<p>Draw the intensity radiated by a blackbody versus the wavelength for different temperatures according to Wien.</p>	<b>4</b>
<p>Introduce graphs that describe the comparison between experimental evidence and the Rayleigh-Jeans Law in describing the black-body spectrum. What is meant by the ‘ultraviolet catastrophe’?</p>	<b>4</b>

<p>How did Planck explain the above controversy? Show that Planck's formula reduces to the Rayleigh Jeans law at short wavelengths.</p>	<b>4</b>
<p>A small hole in the wall of a cavity in an object of any kind behaves like an ideal body. At what rate does radiation escape from a hole <math>10 \text{ cm}^2</math> in area in the wall of a furnace whose interior is at temperature of <math>700^\circ \text{ C}</math>? You are given <math>\sigma = 5.67 \times 10^{-8} \text{ W/m}^2 \text{ K}^2</math></p> <p>(i) 53.56 W/s (ii) 13.60 W</p>	<b>4</b>

<p>(iii) 1.00 J/s (iv) 50.81 W</p>	
<p>Going to the lab to perform the above experiment, you found that the space was very little and had to set up the equipment vertically. Sketch the equipment and give reasons for your choice of ordering.</p>	<p><b>5</b></p>
<p><b>PART B: OBTAINING EVIDENCE</b></p>	
<p>Your data. Use the correct units and convert appropriately.</p>	

--	--

**PART C: ANALYSING AND CONSIDERING YOUR EVIDENCE**

Graph (use graph paper)

Calculations

My evidence leads to the following result.

Compare your results with theoretical values.

<b>PART D: EVALUATION [10 MARKS]</b>	
<b>What was good or bad about the experiment you did was ...</b>	2
<b>Some ways you could improve the experiment were...</b>	2
<b>You had the following anomalies.</b>	2
<b>The explanation for your anomalies was</b>	2
<b>You believe my evidence is reliable/unreliable for the following reasons.</b>	2