ME-382

Exp-1

INSTRUCTION MANUAL
FOR
STEFAN'S CONSTANT LAW
MODEL NO. ME 823

Exp. No 1

'MARS' made Stefan's Constant apparatus has been designed to study the Stefan's law of radiation.

The instrument comprises of the following built in parts:

1. Continuously variable, over load & short circuit protected DC regulated power supply of 0 to 12 Volt.
2. Voltmeter & Current meter are mounted on the front panel to measure the voltage & current.
3. One bulb holder with bulb (12 volt) is mounted on the front panel.

THEORY

Stefan's Law of radiation states that the amount of energy radiated through unit time from the surface of a perfectly black body is directly proportional to the fourth power of its absolute temperature. The electric power dissipated from a bulb is taken to be proportional to the nth power of the absolute temperature of its filament. The temperature of the filament in turn is directly proportional to the resistance. Hence, by measuring the resistance corresponding to different powers, n can be calculated.

By plotting a graph taking log P along X-axis and log R along Y-axis, the slope of the graph is calculated which gives n.

P = Power dissipated from the bulb
P = VI
R = Resistance of the filament ($R=\frac{V}{I}$)

V = Voltage across the bulb
I = Current through the bulb

PROCEDURE

1. Connect the circuit as shown in figure (1) through patch cords.
2. Switch on the instrument using ON/OFF toggle switch provided on the front panel.
3. Now increase the DC voltage till the bulb begins to glow.

For various values of current note down the voltage from volt meter.

Calculate the power by using formula

$$P = VI$$

and also calculate the filament resistance

$$R = V/I \text{ respectively.}$$

Plot a graph by taking Log P along X-axis and Log R along Y-axis. The slope of the graph is calculated which gives the value of n.

STANDARD ACCESSORIES

1. Instruction Manual DOC 825
2. Five single point patch cords for interconnections.

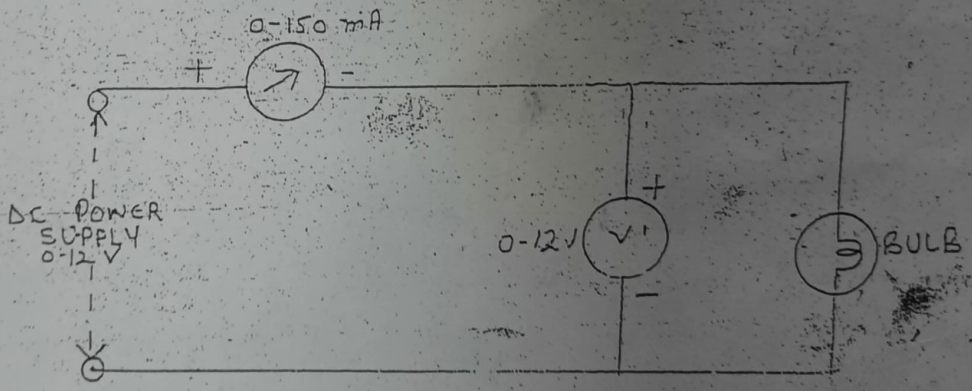

FIG (1)

$P = R^n$

$\log P = n \log R$