PHSA SEM 3 CC7 PRACTICAL

Answer ***any one*** question from the following.

Full Marks: 1 × 30 = 30

1. (a) Write down the theory for verification of Stefan's law using torch bulb. 8

(b) Draw the circuit diagram for verification of Stefan's law. 5

(c) Draw the nature of the calibration curve of a torch bulb filament (R_t/R_d vs. T graph). 3

(d) Draw a graph by plotting $\log_{10}$ T along x-axis and $\log_{10}$ P along Y-axis and find the slope of the curve at higher temperature. Why the value of this slope is never exactly 4? 5+2+2

(e) Make a table for taking data for filament temperature and corresponding power dissipation. 5

2. (a) What is Planck's constant? What is LED? 1+2

(b) Explain using concept of direct and indirect band gap the difference between ordinary semiconductor diode and LED. 4

or

(b) Draw the circuit diagram for determination of Planck's constant using LED. 4

(c) Draw the I- V characteristics of LED. Explain how wavelength of emitted radiation is related to minimum voltage (V_0) required to emit a photon from LED. How this minimum voltage required to emit a photon from LED is obtained from the I- V characteristics of LED? 5+5+2

(d) How can you get different λ and corresponding different turn on voltages for plotting $V_0 - \lambda^{-1}$ graph. Plot the nature of graph $V_0 - \lambda^{-1}$. How from this graph you can find the Planck constant? 1+5+5

3. (a) What is photoelectric effect? What are the drawbacks of classical theory to explain the photo electric effect? 1+4

(b) What is Einstein's photoelectric equation? How it explains the characteristics of photoelectric effect? 5

(c) What is work function? How can you determine work function of the material of the photo electric material from this experimental arrangement? 5

(d) Draw the circuit diagram to study the photoelectric effect: variation of photocurrent versus intensity and wavelength of light. 5

(e) Draw the nature of the curve depicting variation of photocurrent versus intensity. What is the physical significance of the graph? 4+1

(f) Draw the nature of the curve depicting variation of photocurrent versus wavelength. What is the physical significance of the graph? 4+1