**Q10:**

**Answers**

Seven years later, in 1900, Max Planck derived Planck’s Law, which describes the spectral density of electromagnetic radiation from a black body, formulated as:

--- (1)

Planck’s Law produces a continuous function unique to each black body temperature. Wien’s Law determines the wavelength of peak emission, so deriving Wien’s Law involves finding the maximum value of Planck’s Law as a function of temperature.

The first step is to take the partial derivative of Planck’s Law (1) with respect to wavelength, λ.

---(2)

Next, setting (2) equal to zero and simplifying:

---(3)

Defining , equation (3) becomes:

---(4)

Rearranging equation (4) gives:

---(5)



This is the said compact transcendental equation from which Wien’s displacement constant *b*, can be calculated as given in question

Since, , we can get the value of b from numerically calculated value of , by

NIST database value for the following constants:

Newton-Raphson’s method is used to solve (5) and use that value of to obtain value of to 10 decimal places:

