

Date
18/02/26

SEM-VI Paper-11 Unit-03.

* Quantum Theory of Radiation :-

(1) Classical Background of Blackbody Radiation.

→ What is a Blackbody?

• A blackbody is an ideal body that :-

- (a) Absorbs all incident radiation
- (b) Emits maximum possible radiation at every temperature.
- (c) Radiation depends only on temperature, not on material.

(2) Failure of Classical Theory —

(A) Wien's Law (Short wavelength region)

→ Correct at high frequency fails at low frequency.

(B) Rayleigh - Jeans Law (Long wave-length region).

→ Correct at low frequency predicts infinite energy at high frequency.

(3) Planck's Quantum Hypothesis (

→ To solve this, Max Planck proposed :-

Postulate (1)

Energy is not emitted continuously.

Postulate (2)

Energy of an oscillator is quantised.

$$[E = nh\nu]$$

Where:-

$$n = 0, 1, 2, 3 \dots$$

$$h = 6.626 \times 10^{-34} \text{ Js}$$

ν = frequency.

Postulate (3)

Energy exchange occurs in discrete packets called quanta.

This was the birth of Quantum Theory.
