

(Numerical types question)

Date  
20/10/2026

SEM-VI Unit-03 paper-11

Important question and its solution.

Q(4) At temperature 300K, check whether Rayleigh-Jeans law is valid for frequency  $10^{11}$  Hz.

Ans:  $\therefore$   $h\nu \ll kT$

$\therefore h\nu = 6.626 \times 10^{-34} \times 10^{11}$   
 $= 6.626 \times 10^{-23} \text{ J}$

Now

$kT = 1.38 \times 10^{-23} \times 300$   
 $= 4.14 \times 10^{-21} \text{ J}$

$\therefore$   $h\nu \ll kT$

$\therefore$  Rayleigh-Jeans law is valid.

Q(5) Show that Planck's law reduce to Wien's law at high frequency.

Ans: At high frequency

$h\nu \gg kT$

$\therefore e^{h\nu/kT} \gg 1$

So

$$u(\nu) = \frac{8\pi h\nu^3}{c^3} e^{-h\nu/kT}$$

this is Wien's distribution law.

Q(6) A blackbody at 1000K radiates power  $E_1$ . Find power at 2000K.

Ans: Using Stefan's law.

$$\frac{E_2}{E_1} = \left(\frac{T_2}{T_1}\right)^4$$

$$= \left(\frac{2000}{1000}\right)^4 = 2^4 = 16$$

Ans

increase 16 times.