Chapter 1 (Black Body Radiation)
PYQ [IIT-JAM]

Q1. The black body spectrum of an object O_1 is such that its radiant intensity (i.e., intensity per unit wavelength interval) is maximum at a wavelength of $200\,nm$. Another object O_2 has the maximum radiant intensity at $600\,nm$. The ratio of power emitted per unit area by O_1 to that of O_2 is

(a) $\frac{1}{81}$ (b) $\frac{1}{9}$ (c) 9 (d) 81

IIT-JAM 2007

Q2. When the temperature of a blackbody is doubled, the maximum value of its spectral energy density, with respect to that at initial temperature, would become

(a) $\frac{1}{16}$ times (b) 8 times (c) 16 times (d) 32 times

IIT-JAM 2012

Q3. A blackbody at temperature T emits radiation at a peak wavelength λ. If the temperature of the blackbody becomes $4T$, the new peak wavelength is

(a) $\frac{1}{256}\lambda$ (b) $\frac{1}{64}\lambda$ (c) $\frac{1}{16}\lambda$ (d) $\frac{1}{4}\lambda$

IIT-JAM 2013

Q4. In the radiation emitted by a black body, the ratio of the spectral densities at frequencies 2ν and ν will vary with ν as:

(a) $\left[e^{h\nu/k_BT}-1\right]^{-1}$ (b) $\left[e^{h\nu/k_BT}+1\right]^{-1}$ (c) $\left[e^{h\nu/k_BT}-1\right]$ (d) $\left[e^{h\nu/k_BT}+1\right]$

IIT-JAM 2017

Q5. A red star having radius r_R at a temperature T_R and a white star having radius r_w at a temperature T_w, radiate the same total power. If these stars radiate as perfect black bodies, then

(a) $r_R > r_w$ and $T_R > T_w$ (b) $r_R < r_w$ and $T_R > T_w$

(c) $r_R > r_w$ and $T_R < T_w$ (d) $r_R < r_w$ and $T_R < T_w$

IIT-JAM 2019

Q6. Consider two spherical perfect blackbodies with radii R_1 and R_2 at temperatures $T_1 = 1000K$ and $T_2 = 2000K$, respectively. They both emit radiation of power $1kW$. The ratio of their radii R_1/R_2 is given by__________

IIT-JAM 2020

PYQ [GATE]

Q1. The total power emitted by a spherical black body of radius R at a temperature T is P_1. Let P_2 be the total power emitted by another spherical black body of radius $\frac{R}{2}$ kept at temperature $2T$. The ratio, $\frac{P_1}{P_2}$ is _______. (Give your answer upto two decimal places)

GATE 2016

PYQ [NET-JRF]

Q1. Consider black body radiation contained in a cavity whose walls are at temperature T. The radiation is in equilibrium with the walls of the cavity. If the temperature of the walls is increased to $2T$ and the radiation is allowed to come to equilibrium at the new temperature, the entropy of the radiation increases by a factor of

(a) 2 (b) 4 (c) 8 (d) 16

NET/JRF (JUNE- 2012)

Q2. A gas of photons inside a cavity of volume V is in equilibrium at temperature T. If the temperature of the cavity is changed to $2T$, the radiation pressure will change by a factor of

(a) 2 (b) 16 (c) 8 (d) 4

NET/JRF (JUNE- 2017)

Q3. The maximum intensity of solar radiation is at the wavelength of $\lambda_{sun} \sim 5000\,\AA$ and corresponds to its surface temperature $T_{sun} \sim 10^4\,K$. If the wavelength of the maximum intensity of an X-ray star is $5\,\AA$, its surface temperature is of the order of

(a) $10^{16}\,K$ (b) $10^{14}\,K$ (c) $10^{10}\,K$ (d) $10^7\,K$

NET/JRF (JUNE- 2018)

Q4. The temperatures of two perfect black bodies A and B are $400\,K$ and $200\,K$, respectively. If the surface area of A is twice that of B, the ratio of total power emitted by A to that by B is

(a) 4 (b) 2 (c) 32 (d) 16

NET/JRF (JUNE-2020)