SOLUTION

NAME:	Quiz #9a: Phys270
_____	SECTION 0104

[10 pts] A 20.0-cm-diameter blackbody radiating sphere is glowing red, but a spectrum shows that its emission spectrum peaks at an infrared wavelength of 1.0 mm. How much power does the sphere radiate?

diameter = d = 20.0 cm

$\therefore$ r = 10.0 cm = 0.1 m

Emission spectrum peak at λ = 1.0 mm = 1.0×10^6 nm

$\therefore$ Temperature of the blackbody

$$T = \frac{2.90 \times 10^6 \text{ nm K}}{1.0 \times 10^6 \text{ nm}}$$

$$= 2.9 \text{ K}$$

$\therefore$ Power radiated by the sphere = $e \sigma A T^4$

$$= 1 \times (5.67 \times 10^{-8}) \times 4\pi (0.1)^2 \times (2.9)^4$$

$$= 5.04 \times 10^{-7} \text{ Watts.}$$