5) $T_\odot = 5800\ K, \qquad R_\odot = 7 \cdot 10^{10}\ cm$

$d_{\odot-E} = 1.5 \cdot 10^{13}\ cm,$

$J_\odot = \sigma_B\ T_\odot^4 \qquad J_E = \frac{\cancel{4\pi} R_\odot^2}{\cancel{4\pi}\ d_{\odot-E}^2} J_\odot = \frac{50 \cdot 10^{20}}{2.25 \cdot 10^{26}} J_\odot =$

$J_E = 2.2\ 10^{-5} J_\odot$

$\Rightarrow J_E = 2.2 \cdot 10^{-5}\ \sigma_B\ T_\odot^4 = 2.2 \cdot 10^{-5} \cdot 5.67 \cdot \cancel{10^{-12}} \cdot (5.8)^4 \cdot \cancel{10^{12}}\ J s^{-1} cm^{-2}$

$= 1.4 \cdot 10^{-1}\ J s^{-1} cm^{-2}$

$\Rightarrow$ Energy received $=$ Energy emitted

$\cancel{\pi} \cancel{R_E^2}\ J_E = 4\cancel{\pi} \cancel{R_E^2}\ \sigma_B T_E^4$

$T_E = \left(\frac{J_E}{\sigma_B}\right)^{1/4} = \left(\frac{1.4 \cdot 10^{-1}\ J s^{-1} cm^{-2}}{5.67 \cdot 10^{-12}\ J s^{-1} cm^{-2} K^{-4}}\right)^{1/4}$

$= \left(\frac{1.4}{4 \cdot 5.67} \cdot 10^{-1}\right)^{1/4} 10^3\ K$

$T_E = \underline{\underline{280\ K}}$