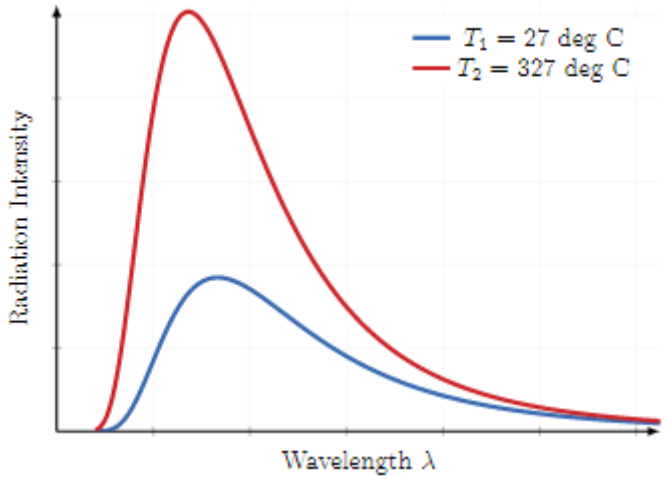
Sheet (1)

1- Two bodies *A* and *B* have thermal emissivities of 0.01and 0.81, respectively. The outer surface area of the two bodies are the same. The two bodies emit total radiant power at the same rate. The wavelength λ_B corresponding to maximum spectral radiance in the radiation from *B* is shifted from the wavelength corresponding to maximum spectral radiance in the radiation from *A* by 1.00μm. If the temperature of *A* is 5802 K. calculate λ_B and T_B.

2- Two spherical bodies A (radius 6 cm) and B (radius 18 cm) are at temperatures T_1 and T_2, respectively. The maximum intensity in the emission spectrum of A is at 500 nm and in that of B is at 1500 nm. Considering them to be black bodies, what will be the ratio of the rate of total energy radiated by A to that of B?

3- The figure shows intensity spectrum of a blackbody at two different temperatures T_1=27deg C and T_2=327deg C. If A_1 and A_2 are the areas under these curves then the ratio A_1/A_2 is



4- The temperature of the human body is 37 deg C. The intensity of radiation emitted by the human body is maximum at a wavelength? Wien's displacement constant is $b=2.9\times10^{-3}$ m.K .

5- Three discs, A, B and C having radii 2 m, 4 m and 6 m, respectively are coated with carbon black on their outer surfaces. The wavelengths corresponding to maximum intensity are 300 nm, 400 nm and 500 nm, respectively. What's the power radiated by them (QA : QB : QC).

6- A thin metal plate 0.2 × 0.2 m is placed in an evacuated container whose walls are kept at 400 K. The bottom surface of the plate is insulated, and the top surface is maintained at 600 K using electric heating. If the emissivity of the surface of the plate is 0.1, what is the rate of heat exchange between the plate and the walls of the container? Take Boltzmann's constant to be $\sigma = 5.6 \times 10^{-8}$ W / ($m^2.k^4$).