



The Abdus Salam
International Centre for Theoretical Physics



SMR 1826 - 5

Preparatory School
to the
**Winter College on Fibre Optics, Fibre Lasers and
Sensors**

5 - 9 February 2007

EXERCISE # 2 (Fundamentals of lasers)

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**Preparatory School to the Winter College on Fibre Optics,
Fibre Lasers and Sensors
5th – 9th February 2007
ICTP, Trieste Italy**

EXERCISE # 1 (Fundamentals of lasers)

Time: 10 minutes

Name: _____

Q.1. At thermodynamic equilibrium and room temperature (300 K), what is the ratio of populations at the upper and lower level of transition with photon energy of 0.1 electronvolt? (Boltzmann Constant 1.38×10^{-23} J/K)

Q. 2. A laser cavity consists of two mirrors with reflectivity $R_2 = 1$ and $R_1 = 0.5$. The length of the active material is $L = 7.5$ cm and the transition cross section is $\sigma = 3.5 \times 10^{-19}$ cm². Calculate the threshold inversion.

GOOD LUCK