PHTN9120 Test #3 Overview

Quantum
As applied to a specific laser system
Applying selection rules to transitions (both desired and forbidden)
Calculating cross-section from CRC/NIST data
Given probabilities (A), and basic data compute cross-section
Calculating saturation intensity/power
Calculation of saturation power based on physical laser parameters
Optics calculations
Calculating optics reflectivities from experimental data, tube lengths
Threshold Gain
Formulation of both the unity gain equation and threshold gain equation
Applied to a variety of laser cavities and configurations
Induced loss via a glass slide
Use of the Fresnel equations
Determination of small-signal gain
Gain saturation
Calculation of saturated gain, inclusion of forward and reverse powers
Simple model for predicting output power
Thermal Energy
Predicting ULL population required
Calculation of re-absorption loss
Minimum pump power calculations
For a solid-state laser (optical pump) as well as a semiconductor (electrical pump)
Pass-by-pass model
Basic equations for calculating saturated gain, power gain, and reflection from a mirror
Round-trip, single-pass, and half-pass modifications (e.g. from lab #5)
Rigrod model
Output power calculations with attenuation “lumped” onto a mirror (e.g. from lab #5)