Nd:YAG Laser: GCR-150-10

These questions have been designed to ensure that the users of the laser system understand the underlying principles of laser operation, that the laser is not damaged, and that it is used safely. Read and understand the manual before you answer these questions. The important point is for each user to know the answer to each of these questions. Therefore, if you cannot find an answer in the manual, please ask the person responsible for the laser. These questions must be answered fully and discussed with the person responsible for the laser before you will be trained on the laser. Copies of the manual can be found next to the laser.

General

(1) What is the purpose of signing the logbook? What information should one write in the logbook?

(2) Why is it important to measure the power of the laser each time one uses it?

(3) What are two other performance tests that one should perform routinely? How are they perfomed?

(4) What should you do if the power is low or if any the above tests do not show optimal performance?

(5) List at least four safety precautions during laser operation.

(6) List at least three practices that will reduce (or eliminate) the burning of optics, such as dichroic mirrors.

Operation

(1) Draw the energy level diagram of Nd^{3+}, showing the lasing transition. What is the energy of this transition? What is the lasing wavelength?

(2) What other wavelengths are available from the laser? How are these obtained?

(3) Draw optical layout of the laser, showing the major components. Which parts need to be replaced periodically? How often should they be replaced?

(4) Explain Q-switching. What purpose does it serve in our laser?

(5) What are the bandwidth and duration of the fundamental laser pulses.

(6) How can we obtain shorter pulses from our laser. How short are they?

(6) Why do flow nitrogen through the laser cavity and harmonic generator assembly? How much nitrogen should be flowing during use and when the laser is not used?

(7) Explain the cooling water system in the laser. Why is it important to turn on the internal circulating water of the laser for at least 4 hours per week? Which water should be used for the internal source?

(8) Describe turn-on procedure.

(9) Describe shut-down procedure.

(10) List three ways in which the harmonic generation crystals can be damaged.