

# TECHNOBLAST - Photonics and Physics Exploration Workshop

*Tuesday, March 2, 2004*

## DETAILED PROGRAM

School of Advanced Technology, Algonquin College

**MORNING WORKSHOPS**

9:30 am – 11:30 am

**LUNCH**

12:00 pm – 12:45 pm

**AFTERNOON WORKSHOPS**

1:30 pm – 3:20 pm

### a) Introduction to Safety in the Photonics and Physics Laboratories

Our lives are filled with hazards generated for electrical supply, lasers, chemicals, and diversity of equipment, which are used in every laboratory and classroom<sup>1</sup>. Before students proceed with the experiments, they first are introduced to the laboratory environment, which contains many hazardous chemicals and equipment. Secondly, the Photonics team at SAT provide them with ways on how to protect themselves from these every day hazards.

### b) Labs

#### ***Experiment No. 1                      Optical Fiber Cable Inspection and End Preparation***

##### **Purpose**

To show how to inspect, strip, clean, handle and precisely cleave fiber optic cable ends. To prepare fiber optic cable ends for further test and manufacturing processes.

#### ***Experiment No. 2      Light Loss through Optical Components***

##### **Purpose**

To measure the power loss of light as it passes through a single glass microscope slide. To measure the power loss of light as it passes across the air gap between two glass microscope slides. To determine the light power loss of the light after epoxy has been applied between two glass microscope slides. To calculate and compare the power loss of the light for the above cases.

#### ***Experiment No. 3      Fiber Optics Circuit for Telecommunications***

##### **Purpose**

To practice building a simple transmission circuit and measuring the output intensity of the laser beam at a distance (L) from the fiber cable end using a laser light sensor. To understand how the intensity on the card varies with distance. To determine the laser beam intensity on the card as a function of distance.

#### ***Experiment No. 4      Fiber Optic Lighting***

##### **Purpose**

To introduce new applications for fiber optic cable in lighting. Fiber optic cables may be used to guide light from a source to a remote location. Fiber optic lighting systems can be improved by coupling the light source and light output with a light fixture.

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<sup>1</sup> Algonquin College, *Laboratory Manual*

### ***Experiment No. 5 Laser Light and Optical Components***

#### **Purpose**

To practice aligning laser light passing through the laser optics. The optic kit contains different types of optical components. Each optical component is colour-coded for ease-of-use and creates a unique beam or pattern effect. To observe the laser light image exiting from each optical component.

### ***Experiment No. 6 Flat and Curved Mirrors***

#### **Purpose**

To observe the image(s) and laser beam path created when a candle or a laser beam source is placed in front of mirror(s) for the following cases:

- a) A candle placed in front of a plane mirror
- b) A candle placed between two plane mirrors at right angle with each other
- c) A laser beam passed between two plane mirrors at an acute angle with each other
- d) A laser beam passed between two plane mirrors at an obtuse angle with each other
- e) A laser beam passed between three plane mirrors at different angles with each other
- f) Image creation using two curved mirrors

### ***Experiment No. 7 Lenses (Camera, Microscope, and Telescope)***

#### **Purpose**

To observe the image created when an object is placed in front of a lens and combination of two lenses. To show the different types of lenses that comprises optical instruments. The lens applications are shown in the following cases:

- a) Image formed by a lens
- b) Image formed by a combination of two lenses
- c) The camera
- d) The compound microscope
- e) The telescope

### ***Experiment No. 8 Waves (Ripple Tank, Tuning Forks and Sound Tube)***

#### **Purpose**

To determine the speed of sound using their knowledge of resonance in a pipe which is open at one end, closed at the other and has a variable length. To practice the generation of transversal and longitudinal waves using a ripple tank and wave sticks.

### ***Experiment No. 9 Velocity and Acceleration***

#### **Purpose**

To learn how to measure the average speed, the instantaneous speed of a glider and the instantaneous acceleration.

### ***Experiment No. 10 Friction on Flat and Inclined Surfaces***

#### **Purpose**

To measure the static and dynamic coefficient of friction of a material using an inclined plane.