5. Experimental Examples

5.1 Observe the Polarization Phenomenon of Light

Experimental Procedure:

1. Per Figure 2, adjust the laser beam to make it parallel to the optical rail with a height equal to those of the polarizer and the photo detector.

2. Rotate the polarizer with its rotary holder until the transmitted laser intensity reaches a maximum value as detected by the photo detector.

3. Place the analyser on the rail between the polarizer and the photo detector. Adjust the analyser to make it coaxial with the polarizer with the same height.

4. Rotate the analyser until the transmitted laser intensity reaches a minimum value as indicated by the photo detector. Now the axes of the polarizer and the analyser are perpendicular to each other.

5. Continue to rotate the analyser until the transmitted laser intensity reaches another minimum value. Check the angular reading of the analyzer, it should be 180° with respect to its previous reading.

5.2 Observe the Polarization Rotation Characteristics of Glucose Solution

Experimental Procedure:

1. Before putting the sample cell on the rail, make sure the axes of the polarizer and the analyser are still perpendicular to each other as per 5.1. Add glucose solution into the cell and mount the sample cell onto the holder provided, place the sample cell on the rail between the polarizer and the analyser, according to Figure 2.

2. Adjust the sample cell holder to make sure the laser spots incident on the sample cell and transmitted through the sample have the same shape when observed with a piece of white paper. This is to ensure the sample cell is coaxial with the laser beam at the same height.

3. As the sample cell is placed in the optical path, the light transmitting through the analyser increases due to the polarization rotation effect of the glucose solution.

4. Rotate the analyser until the transmitted light intensity reaches a minimum value again to judge if the polarization rotation of the glucose solution is left-handed or right-handed.

5. Read the angular reading of the analyser and the angle rotated by the analyser is the specific rotation angle of the glucose solution under test.

5.3 Measure the Specific Rotatory Power of Glucose Solution

Experimental Procedure:

1. Make glucose solution with five different concentrations of 30% (C_0), 15% ($C_0/2$), 7.5% ($C_0/4$), 3.75% ($C_0/8$), and 0%, respectively.

2. Measure the specific rotation angle with respect to each glucose solution (for each glucose solution, repeat the measurement multiple times and then take the averaged data).

3. Record the ambient temperature during each measurement. Plot the curve of specific rotation angle versus solution concentration using the following table.

4. Calculate the slope of the measured curve by curve-fitting to derive the specific rotatory power of the glucose solution.

	Specific Rotation Angle $\theta(°)$						$\bar{\theta}(°)$
	1	2	3	4	5	6	
C_0							
$C_0/2$							
$C_0/4$							
$C_0/8$							
0（Pure water）							

5.4 Measure the Concentration of Glucose Solution under Test

Per 5.3, if the specific rotatory power of glucose solution is known, then the concentration of a glucose solution under test can be determined once its specific rotation is measured.