Please answer all of the following questions. Explanations and descriptions should be in the form of complete sentences and paragraphs. In some cases, a limited number of diagrams are also appropriate and helpful. Each question is worth 10 pts.

1. Absorption measurements rely on Beer’s “Law”. While absorption is proportional to path length, there are deviations from Beer’s “law” with a constant path length. Explain 3 limitations in UV-Vis experiments for accurate quantitative results.

2. What is a Michaelson Interferometer (diagram suggested) and why is this not used for spectroscopy with UV-Vis frequencies?

3. Describe an approach to measuring pH with a fiber optic probe. What are the advantages/disadvantages over the more common glass pH electrodes?

4. Why is fluorescence detection often used with capillary-based separations? Why are lasers typically used as sources?

5. What are two options for light transducer components in a multiplexed UV-Vis spectrophotometer? Describe how each operates and any advantages or disadvantages.

6. Draw a diagram and label the components of a Czerny-Turner monochromator.

7. Optical emission spectroscopy is often performed with inductively coupled plasma sources. Describe the plasma source. Why use a plasma?

8. Immunoassays often incorporate an optical readout. Describe two immunoassays with different spectroscopic readout modes.

9. Describe an instrument that can be used to collect a Raman spectrum. A well-labeled diagram would be sufficient.

10. How could an evanescent wave be used for a quantitative measurement?