Blood Properties and Flow Measurement Homework
BE-382, Winter '08-'09, Dr. C. S. Tritt

1. Estimate the expected yield stress and apparent Newtonian viscosity for blood having a hematocrit of 30% (assume the blood is otherwise normal and is at 37°C).

2. Estimate the pressure loss expected when blood, having typical properties and at 37°C, is pumped through a 1.50 cm diameter, 2.00 m long smooth plastic tube at a rate of 4.00 L/min. If the flow regime is transitional, provide upper and lower limits of the expected pressure drop based on laminar or turbulent conditions.

3. For each of the following circumstances, recommend what general type of flow meter you would recommend:

    a. Expired respiratory gases.

    b. Cooling water flow to the heat exchanger of a blood oxygenator in a “heart-lung machine.”

    c. Blood flow in the descending aorta of a rabbit during an experimental procedure involving open surgery.

    d. Gas flows in an anesthesia machine.

    Please provide brief rationale for each of your answers. There are no particular correct or incorrect answers to this problem, but the validity and/or creativity of your rationale will be evaluated. In addition to the course slide show, you may have to do some library and/or internet research to answer this question.