Welcome to the advanced level course in food dehydration and drying.

In this assignment, you are being asked to complete a number of questions based on the material discussed in Chapter I of the course manual. In all cases, the questions are based on real-life experiences.

Once you have finished reviewing Chapter 1, you should complete the following assignment and submit your answers for marking. This assignment is designed to increase your awareness of the dehydrated foods that are around you.

This assignment will be marked out of 30 marks total.

1. The graph shown below is based on data obtained during a series of tests done in the laboratory. The purpose of these tests was to determine the effects of temperature, air speed (i.e., velocity or flow rate), and thickness on the rate of drying of various products such as apples. The graph you see here is similar to the one presented in the course manual for mangoes. You may want to pattern your solution to this problem after the example in the course manual.

![Graph of Drying of Royal Gala Apples](attachment:image.png)

Figure 1: Drying of Royal Gala Apples (for Question #1)
Answer the following questions:  (12 marks total)

a. How long does the constant drying period last? Your answer will depend on your personal judgment in this case. That is quite acceptable for situations such as this.  (2 marks)

b. Calculate the rate of moisture loss during the constant rate drying period.  (3 marks)

c. What do you estimate as being the critical moisture content (expressed as a dry basis moisture content with units of grams of water per gram of dry solids)?  (2 marks)

d. Convert your estimate of the critical moisture content on a dry basis (from part c) to a wet basis moisture (in % moisture by weight).  (3 marks)

e. Let us assume that we want to reach a final wet basis moisture of 10%. Based on the graph shown in Figure 1, how long will this take? (Hint: You will need to convert the wet basis moisture to a dry basis moisture to do this question).  (2 marks)

2. We will continue using Figure 1 and some of the information calculated in Question 1 to do this question.  (12 marks total)

a. Compare the rate of water removal during the constant rate period which you calculated in Part b for apples with the rate of water removal for the mangoes shown in the manual (i.e., 0.54 g water / g dry solids / hour). Is the rate of water removal from the apples faster, slower, or about the same as for the mangoes?  (2 marks)

b. Use your general knowledge of mangoes and apples (for example, their texture) to support your observation in part a. Does your answer seem to be in agreement with how you would expect the loss of moisture from apples to in comparison to the loss of moisture from mangoes?  (3 marks)

c. If we were to cut the slices of apples thinner than the apple slices used for Figure 1 (for example: 0.6 cm thick slices), what would you expect to happen to the rate of drying during the constant rate drying period?  (2 marks)

d. What would you expect to happen if you decreased the temperature of the air used to dry the apple slices?  (2 marks)

e. What would you expect to happen if you changed the speed of the air? You will need to tell about the situation for both increasing and decreasing the air flow rates.  (3 marks)
3. Papayas contain approximately 91% moisture. What is their dry basis moisture? (3 marks)

4. What is the percent moisture of corn (on a wet basis) if its dry basis moisture content is 2.70 kilograms of water per kilogram of dry solids? (3 marks)