Uva Wellassa University, Sri Lanka

End Semester Examination – June/July 2010

SCT 314-3 Cereal Science and Technology

Time: Three (03) hours

Total 07 Questions

Answer **five (05)** questions only

All questions carry equal marks

Answer in English language

Use a separate booklet to answer questions

1. A rice miller has decided to build a silo to store paddy in an area where usually warm climatic condition is prevailing. He thought that the warm climatic condition is favorable for better keeping quality of paddy. Thus, the miller constructed a silo and stored 1000 metric tonne of paddy for the off season. However, after sometimes from storage he has observed that the quality of paddy in the bottom of the Silo is fast deteriorating due to accumulation of moisture. As a student with good knowledge in serial science, explain the miller what is taking place in the silo and suggest him possible remedial action to overcome the issue.

(20 marks)

2. Normal atmospheric air is to be processed or conditioned to an appropriate level before used in grain drying.

i. What are the methods usually being used to condition the air used in grain drying?

ii. Out of the methods you give in (i) which is the most popular method and explain how the air is processed to absorbed more water from the grain.

iii. An air current which has dry bulb temperature and relative humidity of 20^0C and 40% respectively, was passed through a heat exchanger in order to raise dry bulb temperature to 40^0C.

a). What is the relative humidity of hot air.

b). Calculate heat gained by 100 kg of dry air after passing through the heat exchanger.

c). Briefly explain water holding capacity of the air after passing through the heat exchanger.

(20 marks)

3. A small scale bakery owner wants to improve the quality of his bakery products, particularly the bread that he produces for highly competitive urban market, because he has encountered a series of quality problems that contributed to downgrade his product in the dynamic market. The moisture content, crust color, pH value, crumb softness, crumb smell and crumb cell distribution were not attractive in his products when compared to the competitors. Therefore, the baker has decided to get your advice to improve the overall quality of bread. What advice would you give to the baker to improve the quality of his bread and explain the reasons for recommending those advices?

(20 marks)

4. A small scale bakery owner has conducted a market survey with the view to find out which bakeries produce high quality and consumer attractive bread for the market. However, he has found that bread produced by almost all the bakeries are not in good quality, sub standard and somewhat poor in consumer perception.

   i. What do you mean by "poor in quality" of bread?

   ii. Explain what type of processing techniques to be adapted to boost the consumer perception towards the bread.

   iii. Assuming that the baker has decided to get your advice to improve the quality of his bread, explain how you are going to accomplish this task.

(20 marks)

5. Write short notes on the followings

   i. Humidity ratio of air and its contribution to drying of grain.

   ii. Heating and humidifying drying system is not efficient as sensible heating at constant humidity ratio.

   iii. Cooling with dehumidifying drying system is better to dry products containing high volatile materials.

   iv. Hygroscopic behavior of food products merely depends on the vapor pressure of the surrounding environment.

(20 marks)

6. 500 kg of paddy with 20% moisture content was purchased by a small scale grain processer with the view to produce high quality rice for the off season. Since, the initial moisture content of the paddy is not desirable for long term storage; he has been advised to bring it down at least to 14%. To reduce moisture

content in paddy grains, the grain processer has used a warm air current produce by sending the air through a heat exchanger. Suppose that the dry bulb temperature and relative humidity of incoming air and outgoing air (after passing through the wet grains) were 15^0C & 20% and 30^0C & 90% respectively. Calculate how long the drying process will takes place to dry the paddy from 20% moisture content to 14%. The air flow rate is 0.8 m^3/s and the specific volume of incoming air is 0.82 m^3/kg.

(20 marks)

7. A store keeper has purchased 100 metric tonne of paddy at 16% moisture content and stored them in his warehouse for 6 months. A random sample of paddy was drawn after 6 months from storage and the measured moisture content was, 12%.

   i. Calculate the weight loss due to dryness after 6 months.

   ii. 10 metric ton of paddy at 12% moisture was subjected to parboiling process and moisture content of parboiled paddy was 14%. Calculate the weight gain due to parboiling process.

   iii. Explain hygroscopic behavior of paddy in weight gain as well as weight loss at different relative humidity levels.

   iv. Briefly explain water holding capacity of air after passing through a heat exchanger.

(20 marks)