Document No :UniKL MFI_SD_AC01
Revision No: 02
Effective Date: 01 December 2008

CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR

MALAYSIA FRANCE INSTITUTE

FINAL EXAMINATION

JANUARY 2014 SESSION

SUBJECT CODE	:	FRB 40302
SUBJECT TITLE	:	BIOLOGICAL APPLICATION OF REFRIGERATION
LEVEL	:	BACHELOR
TIME/DURATION	:	09:00 AM – 11:00 AM 2 HOURS
DATE	:	6 JUNE 2014

INSTRUCTIONS TO CANDIDATES

1. All questions carry equal marks. Answer ANY FOUR (4) questions.
2. This question paper consist one section only.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. Answer all questions in English.

THERE ARE 3 PRINTED PAGES OF QUESTIONS EXCLUDING THIS PAGE.

INSTRUCTION: Answer ONLY FOUR (4) questions
Please use the answer booklet provided.

Question 1

A portion of meat is to be transported by land from a farm to a shop. The distance between the farm and the shop is 500 km. The processes involved are as below:

- The meat is not chilled before it leaves the farm and transported at the ambient temperature of 30 °C.
- The meat is handled by the personnel who do not wear appropriate clothing.
- At the shop, the meat is kept at 15 °C for another two days

a) Discuss SIX (6) inappropriate procedures in the processes above.

(12 marks)

b) Then, construct FIVE (5) steps complete with justifications on the proper meat handling practice

(13 marks)

Question 2

Onion, banana and leaf vegetables are to be transported to a city (2000 km away) using a refrigerated container. You are the technical advisor who is responsible in the design of this refrigerated container.

a) Discuss and justify FIVE (5) aspects that you need to consider in the design process of this refrigerated container.

(15 marks)

b) Sketch and explain the likely design of your refrigerated container.

(10 marks)

Question 3

Bacteria are one of the microorganisms that can cause problems in food industries. Reproduction rate of bacteria can be controlled through few mechanisms including controlling the food temperature.

a) Provide a detail explanation complete with a sketch of graph of bacteria growth rate against temperature on how the rate of bacteria growth can be controlled through the temperature manipulation

(15 marks)

b) Also, briefly explains FIVE (5) other methods of controlling the bacteria growth rate.

(10 marks)

Question 4

Individually Quick Frozen enables the improvement on food quality since consumer only need to de-frost the food that they wish to consume. Answer the following question:

a) State FIVE(5) advantages of Individually Quick Frozen

(5 marks)

b) Discuss FIVE(5) technologies that could be used in Individually Quick Frozen process

(15 marks)

c) Rate of freezing can be calculated using Equation 1.

$$\frac{dr}{dt} = -\frac{\frac{T_{cc}-T_m}{\rho\,\Delta H}}{\frac{R-r}{k}+\frac{1}{h}} \qquad \text{Equation 1}$$

Discuss THREE (3) parameters in Equation 1 that may Important in Individually Quick Frozen process.

(5 marks)

Question 5

Evaporation of water could increase the rate of cooling of food. For food such as leaf vegetables, vacuum chilling is one of the good options in chilling process. Answer the following questions:

a) Desoribe THREE(3) processes involves in vacuum chilling

(6 marks)

b) Discuss THREE(3) reasons why vacuum chilling does not suitable for meat

(6 marks)

c) Calculate the mass of evaporated water to reduce the temperature of 20 kg food by 1 Kelvin if its specific heat is 3.5 kJ/kgK. You may use the latent heat of evaporation of water as 2400 kJ/kg. Comment on the effect of mass reduction on the price of meat.

(8 marks)

d) It is suggested that a thin (~ 5 mm thickness) of fish fillet is to be cooled using

i. vacuum cooling
ii. air blast cooling

Evaluate TWO (2) advantages and TWO (2) disadvantages for these technologies.

(5 marks)

END OF QUESTION