



**UNIVERSITI KUALA LUMPUR**  
**Malaysia France Institute**

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**FINAL EXAMINATION**  
**JANUARY 2011 SESSION**

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**SUBJECT CODE** : FRD 20702  
**SUBJECT TITLE** : INTRODUCTION TO COLD ROOM  
**LEVEL** : DIPLOMA  
**TIME / DURATION** : 9.00am – 11.00am  
( 2 HOURS )  
**DATE** : 03 MAY 2011

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**INSTRUCTIONS TO CANDIDATES**

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1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
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. This question paper consists of TWO (2) sections. Section A and B. Answer ALL question in section A. For section B, answer TWO (2) questions only.
6. Answer all questions in English.

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THERE ARE 3 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

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**SECTION A (60 MARKS)****INSTRUCTION: Answer ALL questions.****Please use the answer booklet provided.****Question 1**

- a) Give a definition of cold store. (5 marks)
- b) What is the difference between a cold room and a freezer rooms. (5 marks)
- c) List down five (5) places where the cold store is normally used. (5 marks)

**Question 2**

State four main components of refrigeration system and explain briefly the function for each component. Sketches is required.

(15 marks)

**Question 3**

There are some important features to consider for a cold store. Explain about the following aspects in term of causes and effect. Suggest a correction method to the problem. Show your sketch if necessary.

- a) Door misalignment. (10 marks)
- b) Drain problem. (10 marks)

**Question 4**

There are many parts, materials and components which are used in cold room installation. Describe the function of the following items:

- a) Polyurethane foam (2 marks)
- b) Sandwich panel (2 marks)
- c) A dual gasket (2 marks)
- d) Self- closing hinge (2 marks)
- e) Heater wire inside door (2 marks)

**SECTION B (40 MARKS)****INSTRUCTION: Answer only TWO questions****Please use the answer booklet provided.****Question 5**

- a) Complete table Q5 below with a control and performance parameter for respective applications of cold store. Choose the right value range as the following for the right application: Temperature: 0°C to 60°C, 25°C to 50°C, -10° to -30 °C, 2° to 10 °C.

(5 marks)

Table Q5: Cold store specification

Type of cold store	Temperature range	Noise level
Cold room		
Freezer room		
Incubator room		
Environmental room		

- b) Explain in detail the electric heater defrost system of freezer room. Show your sketches

(15 marks)

**Question 6**

- a) Sketch to show three of the correct installations of multiple evaporators

(20 marks)

**Question 7**

- Internal temperature = -24°C
- Ambient temperature = 32°C
- Internal dimension = 5m W x 6m L x 6m H
- Insulation thickness = 150mm
- Material = foam polyurethane
- External dimension = 5.3m W x 6.3m L x 6.3m H
- Product load = 10,000 kg lean beef
- Specific Heat Above Freezing, 3.52 kJ/(kg·K)
- Specific Heat Below Freezing, 2.12kJ/(kg·K)
- Initial Freezing Point, - 2 °C

Using the information above and table Q7 below in the design of a cold room, calculate the following:

- 1) Heat transmission through the walls (10 marks)
- 2) Product refrigeration load (10 marks)

Typical Values :-  
 h<sub>i</sub> ..... 20 W/m<sup>2</sup>K (for normal wind exposure 3 to 5 m/s)  
 h<sub>e</sub> ..... 8 W/m<sup>2</sup>K  
 C<sub>1</sub> for brickwork 100 mm thick ..... 7.20 W/m<sup>2</sup>K  
 C<sub>2</sub> for concrete blocks 100 mm thick ..... 7.95 W/m<sup>2</sup>K  
 k for corkboard..... 0.042 W/mK (density 145 kg/m<sup>3</sup>)  
 k for expanded polystyrene.... 0.034 W/mK (density 25 kg/m<sup>3</sup>)  
 k for foamed polyurethane..... 0.025 W/mK (density 30 kg/m<sup>3</sup>)

For COLD ROOM calculations it is normal commercial practice to ignore the insulating value of air film coefficients and normal building materials, using only the thermal property of the insulating material.  
 Thus, in practice :-  $Q = A \times k/x \times T.D.$

Suggested Relationship Between Thickness of Insulant and T.D.

Thickness of Insulation	Corkboard	Expanded Polystyrene	Foamed Polyurethane
50 mm	11 K TD	13 K TD	17 K TD
75 mm	16 K TD	19 K TD	25 K TD
100 mm	22 K TD	25 K TD	33 K TD
125 mm	27 K TD	32 K TD	42 K TD
<b>150 mm</b>	32 K TD	38 K TD up	<b>50 K TD up</b>
150 mm	43 K TD up	---	---

Table Q7: Insulation details

END OF QUESTION