



UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION
JANUARY 2010 SESSION

SUBJECT CODE : FRD 20702
SUBJECT TITLE : INTRODUCTION TO COLD ROOM
LEVEL : DIPLOMA
TIME / DURATION : 4.00pm – 6.00pm
(2 HOURS)
DATE : 27 APRIL 2010

INSTRUCTIONS TO CANDIDATES

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 questions paper consists of TWO (2) sections. Section A and B. Answer ALL questions 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.

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 room. (5 marks)
- c) List six places where cold store is used. (6 marks)

Question 2

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

- a) Name of component (4 marks)
- b) Function of component (10 marks)

Question 3

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

- a) Good and poor air circulation (10 marks)
- b) Freezer defrost problem. (10 marks)

Question 4

There are many parts, materials and components which are used in cold room installation.

Give a function of the following:

- a) Pressure relief port (2 marks)
- b) Digital thermostat (2 marks)
- c) High and low pressure switch (2 marks)
- d) Thermal overload (2 marks)
- e) Heater safety control. (2 marks)

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

- a) Complete the table below with a control and performance parameter for respective applications of cold store. Choose the right value range as stated below 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 1: Cold store specification

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

- b) Explain in detail about hot gas defrost system of cold room. Sketching is required.

(15 marks)

Question 6

- a) Sketch to show the installation of P-trap for refrigeration piping.

(10 marks)

- b) Sketch to show one of the right installations of multiple evaporators.

(10 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 chicken nugget
- Electric light = 300 watt for 8hrs/day
- People = 2 people/day
- Specific heat of chicken nugget, C = 2340 J/kg.

In designing a cold room, the above information and table 2 must be considered. Calculate for the following:

- 1) Cooling load due to a wall. (10 marks)
- 2) Product load. (10 marks)

Typical Values :-
 h_120 W/m²K (for normal wind exposure 3 to 5 m/s)
 h_28 W/m²K
 C_1 for brickwork 100 mm thick7.20 W/m²K
 C_2 for concrete blocks 100 mm thick7.95 W/m²K
 k for corkboard..... 0.042 W/mK (density 145 kg/m³)
 k for expanded polystyrene.... 0.034 W/mK (density 25 kg/m³)
 k for foamed polyurethane..... 0.026 W/mK (density 30 kg/m³)

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
150 mm	32 K TD	38 K TD up	50 K TD up
200 mm	43 K TD up	---	---

Table 2: Insulation details

END OF QUESTION