

**UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY**

**FINAL EXAMINATION
JANUARY 2016 SEMESTER**

COURSE CODE : JFB 20703

COURSE TITLE : HVAC 2: TECHNOLOGY OF INDUSTRIAL REFRIGERATION

PROGRAMME LEVEL : BACHELOR

DATE : 30 MAY 2016

TIME : 2.30 PM – 5.30 PM

DURATION : 3 HOURS

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. This question paper consists of TWO (2) sections.
 4. Answer ALL questions in Section A. Choose THREE (3) questions in section B.
 5. Please write your answers on the answer booklet provided.
 6. Please answer all questions in English only.
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THERE ARE 4 PAGES OF QUESTIONS EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)**INSTRUCTION: Answer all questions.****Please use the answer booklet provided.****Question 1**

Heat exchangers are practical devices used to transfer energy from one fluid to another medium. In principle heat exchangers have the purpose to transfer heat from a flowing substance to another flowing substance of a lower original temperature.

- (a) There are two main categories of exchanger which is recuperators and regenerators. Clarify each of it.

(6 marks)

- (b) Based on your understanding in heat exchangers. Determine **TWO (2)** types of heat exchanger used in refrigeration system with appropriate diagram.

(10 marks)

- (c) The selection of the proper type of heat exchangers is one of critical importance. Selecting the wrong type can lead to sub-optimum plant performance, operability issues and equipment failure. List out **FOUR (4)** criteria in selecting the type of heat exchanger.

(4 marks)

Question 2

There are several heat transfer loops in a refrigeration system as shown in Figure 1. Thermal energy moves from left to right as it is extracted from the space and expelled into the outdoors through five loops of heat transfer.

- (a) Explain in details through **FIVE (5)** loops of heat transfer.

(10 marks)

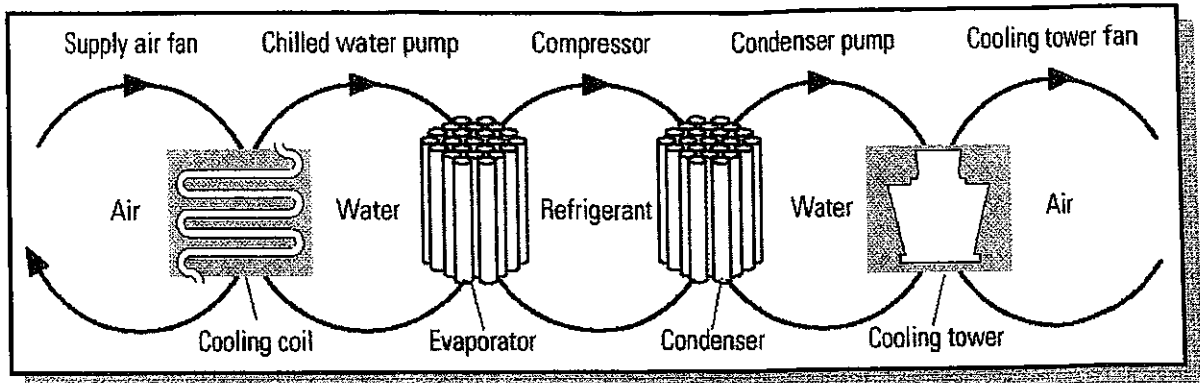


Figure 1: Thermal energy moves.

- (b) Oil separators are used on refrigeration systems where it's difficult for the oil to return from the evaporator. These typically are field built-up systems. With the aid of a diagram, explain the process of oil separator.

(10 marks)

SECTION B (Total: 60 marks)**INSTRUCTION: Answer THREE (3) question only.****Please use the answer booklet provided.****Question 1**

Synthetic oil is a lubricant consisting of chemical compounds that are artificially made (synthesized). Synthetic lubricants can be manufactured using chemically modified petroleum components rather than whole crude oil, but can also be synthesized from other raw materials.

- (a) Identify **THREE (3)** synthetic oil benefit in rotary screw air compressor and **THREE (3)** synthetic oil benefit in centrifugal compressor.

(6 marks)

- (b) There are three basic oil cooling systems in refrigeration which is water cooled, air cooled, and refrigerant cooled. Distinguish each of them.

(14 marks)

Question 2

The heart of a central air conditioner is the compressor, a motor-driven component that is responsible for circulating refrigerant through the system.

- (a) Briefly the meaning of a refrigeration compressor and explain in details principle of dynamic compressor.

(10 marks)

- (b) With the aid of a diagram, demonstrate the principle of operation for screw compressor.

(10 marks)

Question 3

A chilled beam system is a type of method in Heat Ventilation Air Conditioning (HVAC) system designed to heated or cooled large buildings. Based on your understanding on this topic, distinguish the working mechanism of active chilled beam system and passive chilled beam system. You may use any suitable diagram for supporting your answer.

(20 marks)

Question 4

Condenser is an important component of any refrigeration system. In a typical refrigerant condenser, the refrigerant enters the condenser in a superheated state and then rejecting heat to an external medium. One of the condenser type is air cooled condenser.

(a) Identify **THREE (3)** symptoms and possible causes occurred in air cooled condenser system.

(10 marks)

(b) Propose the prevention to the symptoms in order to troubleshooting condenser problem.

(10 marks)

END OF EXAMINATION PAPER

