



**UNIVERSITI KUALA LUMPUR  
Malaysia France Institute**

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**FINAL EXAMINATION  
JANUARY 2014 SESSION**

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**SUBJECT CODE** : FCB 40602  
**SUBJECT TITLE** : TRANSPORTATION AIR CONDITIONING AND REFRIGERATION  
**LEVEL** : DEGREE  
**TIME / DURATION** : ( 2 HOURS )  
**DATE** :

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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 ONE (1) section only. Answer ALL questions.
  6. Answer all questions in English.
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**THERE ARE 3 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.**

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**INSTRUCTION: Answer ALL questions.**

**Please use the answer booklet provided.**

### Question 1

An air conditioning module (ACM), provide air to the passenger cabin. It incorporates the following basic components: heater core, evaporator coil, blower motor, air-distribution control, ram air control, body vents, and air temperature controls. There are three basic modes in most vehicles:

- (a) Base as per ACM module above, list what are the three basic modes (6 Marks)
- (b) Explain in detail the three basic modes (15 Marks)
- (c) What are the 2 classification for controlling the ACM. (4 Marks)

### Question 2

*“Moisture Penetration - All exterior surfaces of an insulated body must be made as airtight and water vaportight as possible”.*

*Refrigerated vehicles leak air even when they are stationary probably because of the stack effect of the temperature difference between inside and outside. This driving force for air infiltration for a body 2.4 in high and a temperature difference of 55 K is about 7 Pa.*

- (a) Base on the 2 statement above, list the 8 possible problems which will occur in transport refrigeration. (8 marks)
- (b) Give 3 method of how to control the above problem. (17 marks)

**Question 3**

A Refrigerated truck is loaded with **15000 kg** of peaches at: in average pulp temperature of **12°C**. The load will be delivered **72 h** later at an average product temperature of **1°C**. Average ambient temperature is **33°C**.

The refrigerated truck U-factor is **80 W/K**.

The specific heat of peaches (above freezing) is **3.82 kJ/ (kg.K)**.

The average temperature of peaches during transit is assumed to be **5°C**.

The heat of respiration of peaches at **5°C** is **23 W/Mg**.

Calculate:

- a) Total Heat Load (3 marks)
- b) Product Heat Load (3 marks)
- c) Heat of respiration Heat Transmitted (2 marks)
- d) Total Heat Load for 72 Hrs (2marks)

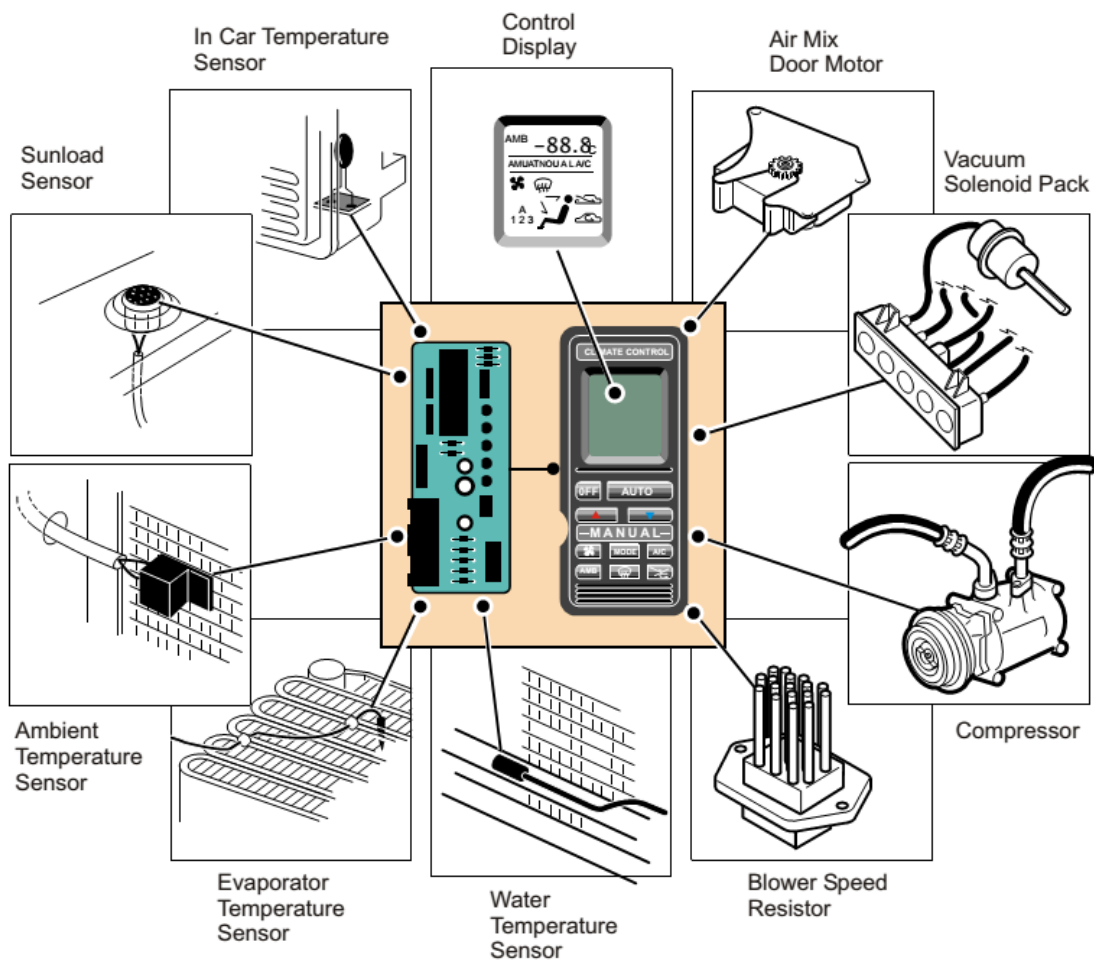
**Question 4**

Air Circulation is one most important factor in protecting refrigerated load. Due to the to the installation requirement and in order to maintain the quality of the product during transportation. Explain in detail two (2) methods of recirculation of air for transport refrigeration.

(15 marks)

**Question 5**

- (a) Refer to figure Q5 below, Explain briefly what are the functions of Electronic temperature control (ECC). (5 marks)
- (b) What are the different between Electronic temperature control (ECC) and manual control? (8 marks)
- (c) Base on your answer above; list 6 adjusting control parameters of air conditioning in order to achieve comfort in your car. Describe your answer clearly. (12 marks)



**Figure Q5 - Electronic Temperature Control (ECC)**

**END OF QUESTION**