



**UNIVERSITI KUALA LUMPUR
Malaysia France Institute**

**FINAL EXAMINATION
JANUARY 2010 SESSION**

SUBJECT CODE : FRD 20502
SUBJECT TITLE : RAC CONTROL
LEVEL : DIPLOMA
TIME / DURATION : 4.00 pm – 6.00 pm
(2 HOURS)
DATE : 26 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 question 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 6 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (60 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

Based on Figure Q1, answer the following questions:

- a) Name a control device on the refrigeration loop (cycle). (2 marks)
- b) Explain how the control device (in question a) functions (8 marks)
- c) Name a control device on the process loop (room). (2 marks)
- d) Explain how the control device (in question c) functions (8 marks)

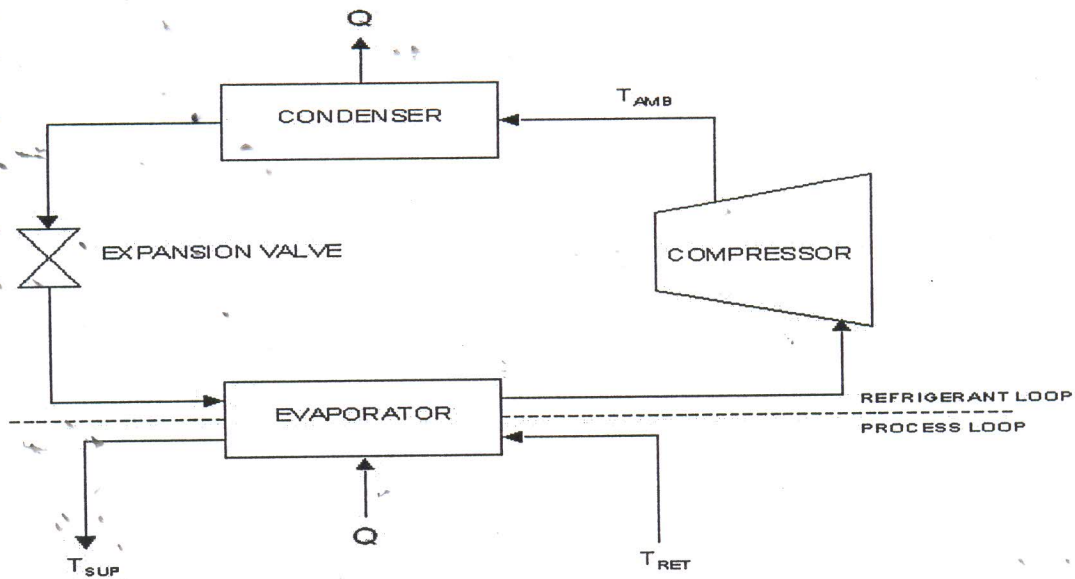


Figure Q1: Refrigeration cycle of air-cooled split air conditioner

Question 2

Based on Figure Q2, answer the following questions:

- a) Name two types of control mode. (2 marks)
- b) Name the type of control mode that is represented by the curve. (2 marks)
- c) What is the value of the set point. (2 marks)
- d) What is the value of differential. (2 marks)
- e) Name the item X. (2 marks)

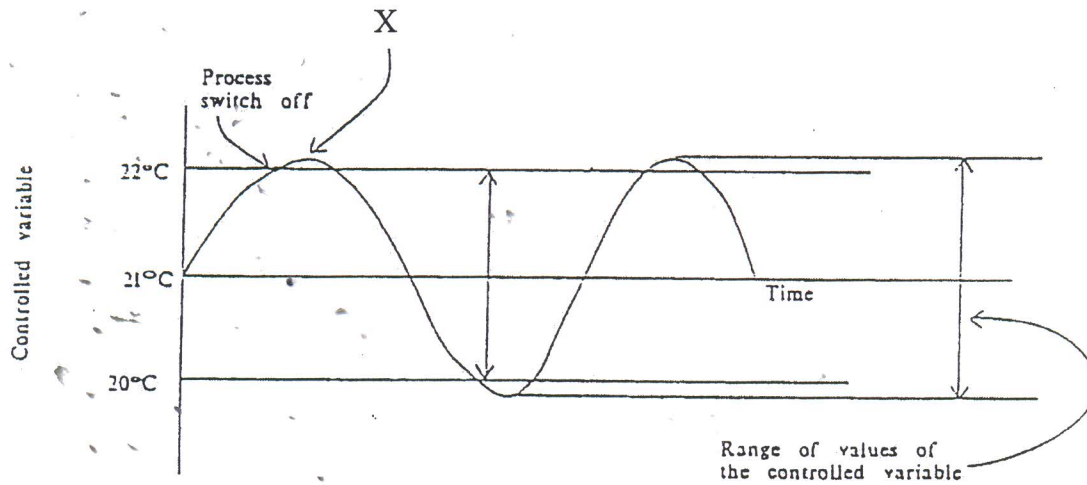


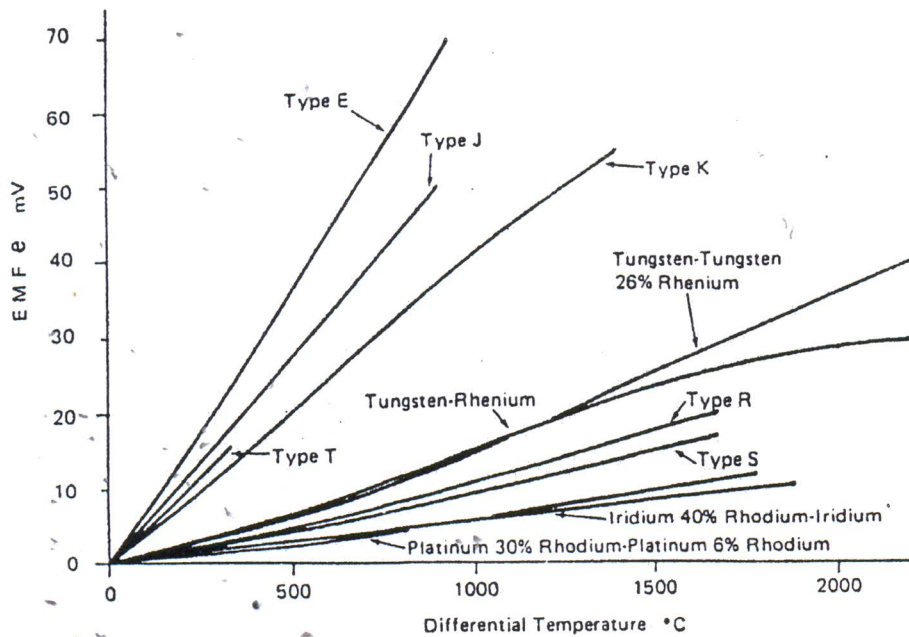
Figure Q2: Curve of a control mode

Question 3

There are some control components in an air conditioning and refrigeration system. State the location and purpose of the following control components:

- a) Solenoid valves (2 marks)
- b) LP and HP controls (2 marks)
- c) Oil separators and safety controls (2 marks)
- d) Receivers and accumulators (2 marks)
- e) Filter driers and sight glasses (2 marks)

Question 4



FigureQ4: Graph of characteristic of different sensor materials

In electrical transduction thermometers, temperature is converted into an electrical quantity: that is resistance, current or voltage. Answer the following:

- a) Give three of the most commonly used of this class of thermometer / sensor. (6 marks)
- b) By referring to the calibration curve of an electrical transduction thermometer material as per **Figure Q4**, select a preferable type of the thermometer and explain why? (8 marks)
- c) What is it a type of application or equipment in air conditioning and refrigeration suitable to use the selected thermometer / sensor in question (b) with the temperature range -184 to 1260 °C. (2 marks)
- d) Explain the principle of measurement of the sensor in question (b). (4 marks)

SECTION B (40 marks)

Answer only TWO (2) questions.

Please use the answer booklet provided.

Question 5

The capacity of a compressor must be controlled because refrigerant loads are seldom constant. Match the following methods of control compressor capacity with each respective statement and rewrite on your answer script.

- | | |
|-------------------------|--|
| a) Compressor cycling | 1) Once cylinder have a suction pressure above and below, the valve plate so the cylinder does not work. (4 marks) |
| b) Cylinder unloaders | 2) Its electrical contacts open or closed and the compressor stops or energizes. (4 marks) |
| c) Cylinder Bypass | 3) The most efficient method. The compressor turns off only if the evaporator load continues to fall. (4 marks) |
| d) Hot gas bypass | 4) No refrigerant supply from compressor but requires very little power from the motor. (4 marks) |
| e) Variable speed motor | 5) The compressor sees the equivalent of full load all the time. (4 marks) |

Question 6

Figure Q6 shows that the HVAC system is interfaced with Building Automation System (BAS). Base the figure Q6 below, explain the control systems as in the following list:

- a) Air filter alarm. (differential pressure = 100 psi) (10 marks)
- b) Auto / Manual switch (10 marks)

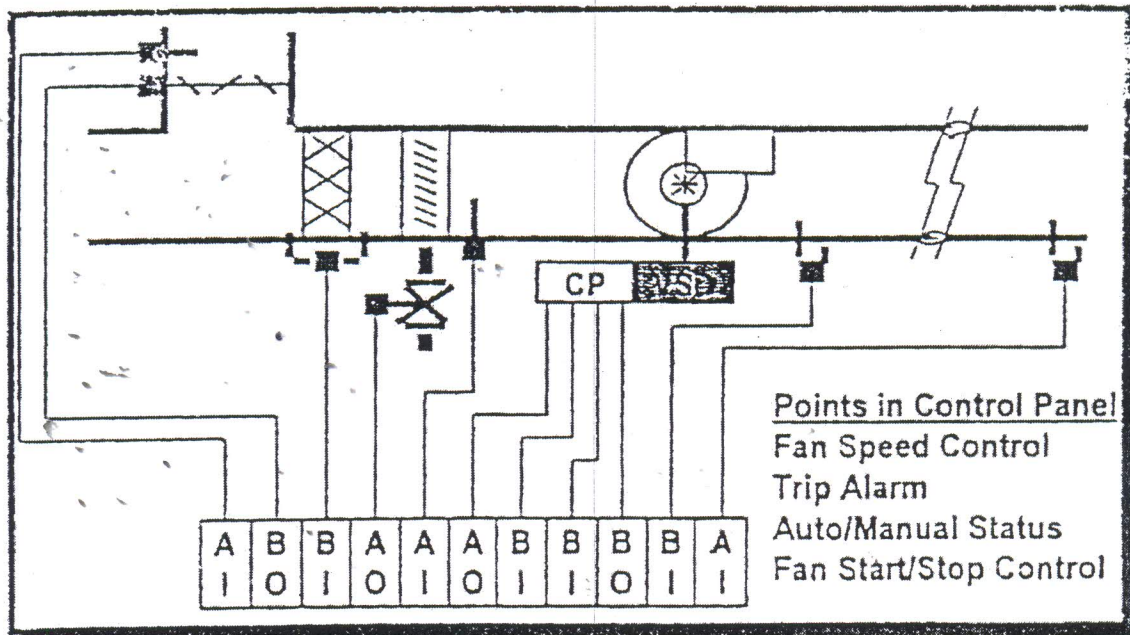


Figure Q6: Interfacing schematic between Air conditioning components and BMS

Question 7

Figure Q7 shows that the HVAC system is interfaced with Building Automation System (BAS). Based on the figure below, explain the control systems as in the following:

- a) Variable Speed Drive (VSD) (10 marks)
- b) Control damper in mixing box (10 marks)

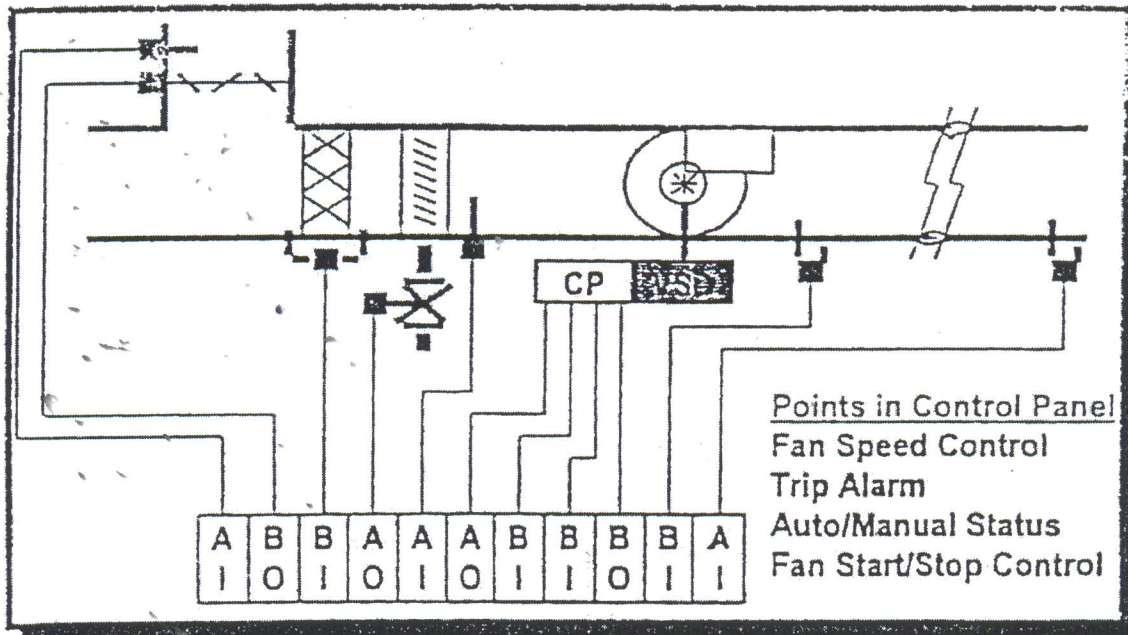


Figure Q7: Interfacing schematic between Air conditioning components and BMS

END OF QUESTION