



**UNIVERSITI KUALA LUMPUR  
Malaysia France Institute**

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**FINAL EXAMINATION  
JANUARY 2014 SESSION**

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**SUBJECT CODE** : FCB 30902  
**SUBJECT TITLE** : CONTROL OF REFRIGERATION SYSTEM  
**LEVEL** : BACHELOR  
**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 4 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.**

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

**QUESTION 1**

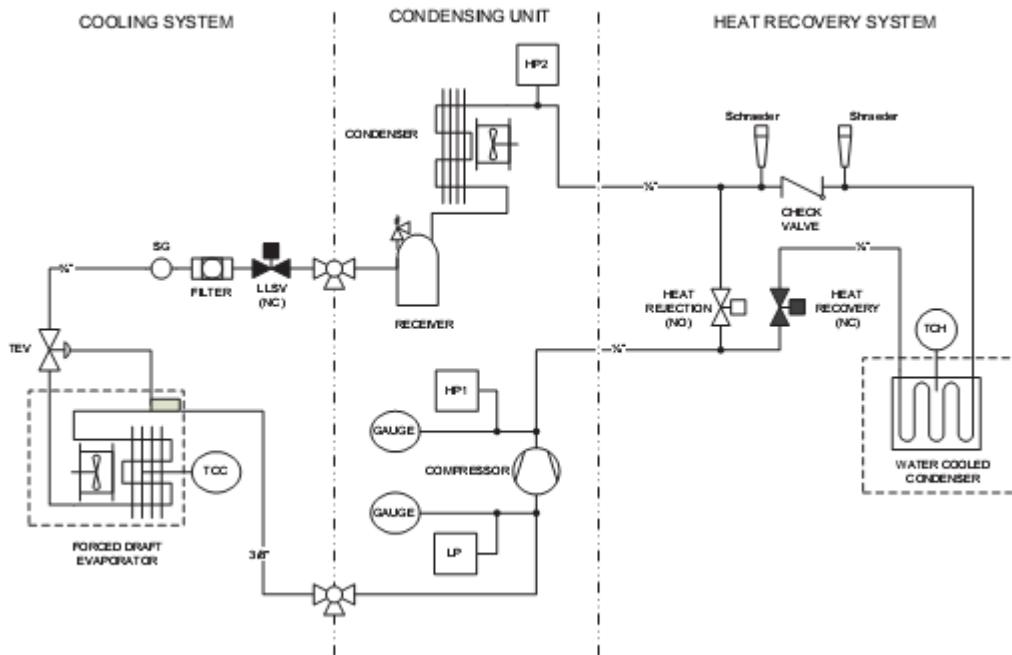


Figure Q1 – Refrigeration System Flow Schematic

**SYSTEM SPECIFICATIONS**

- Refrigerant = R134A
- Maximum ambient temperature = 33°C Db, 28°C Wb
- Condensing temperature difference at design ambient = 12 K
- Design saturated suction temperature = -12 °C
- Design space temperature = -3 °C
- Design evaporator temperature difference = 7 K
- Suction line pressure drop = 1 K

(a) Base on the drawing in Figure Q1 list all the control devices and valves. Describe briefly the function of each components (12 marks)

(b) Design and draw an electrical control and load diagram for the refrigeration installation as in Figure Q1 (6 marks)

- (c) Design and define the control & setting parameters also value for the installation. Your control setting must be base on the system specification above; it must include time, duration, cut in and cut out of every parameters which you specified.

(7 marks)

**QUESTION 2**

Refer to fig 1 and fig 2 below; describe the

- (a) Different of the two control system. (3 marks)
- (b) List the advantages between the two system (3 marks)
- (c) Explain the operation of AKS41 and EKC 347 in Figure Q2-2.(C) (6 marks)

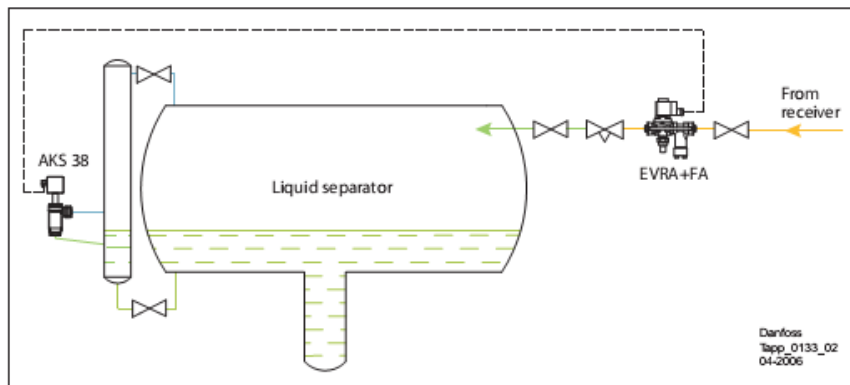


Figure Q2-1

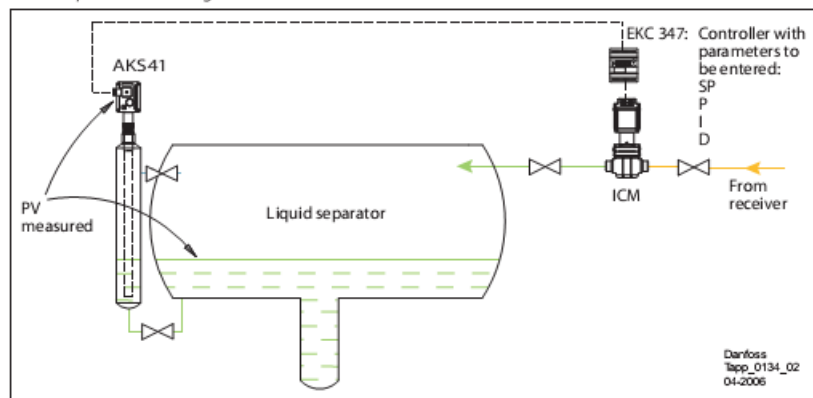


Figure Q2-2. (C)

- (d) Give what are two main principles different when designing high pressure liquid level control and low pressure liquid level control system. (5 marks)

- (e) Describe in the operation of high pressure liquid level control system, draw the diagram and list the components required for the process. (8 marks)

**QUESTION 3**

*Hot gas defrost is simple and effective, it removes ice rapidly and inexpensive to install. The control of valve selection and sequence of operation must be correct for reliable and efficient defrost.*

- (a) Refer to figure Q3-1. (A) below write down the sequence of operation and time taken to complete each process. (25 marks)

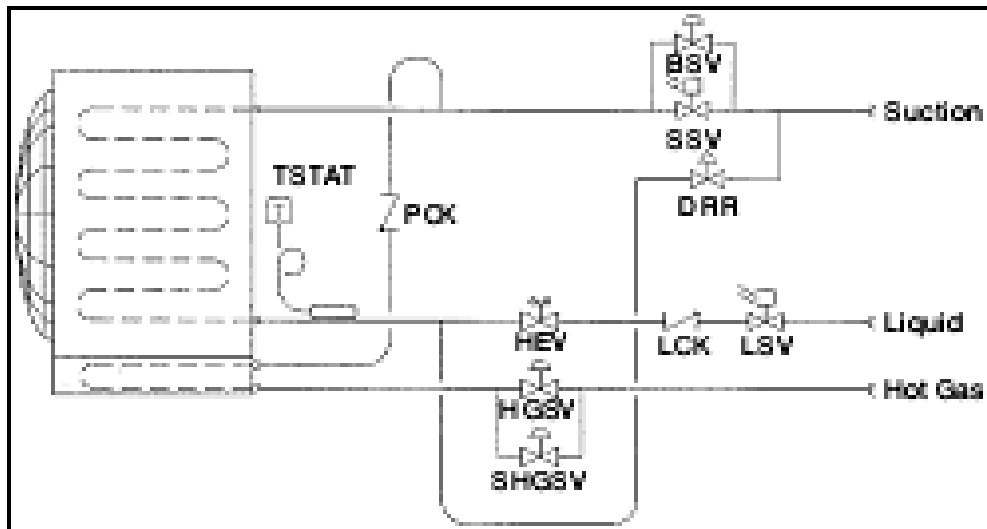


Figure Q3-1. (A)

**QUESTION 4**

- a. Describe very briefly, in one or two sentences, the following methods of refrigeration capacity control:
- i. Cylinder un-loader for reciprocating compressor (3 marks)
  - ii. Hot gas bypass (3 marks)
  - iii. Variable speed drive for scroll compressors (3 marks)
  - iv. Draw the schematic of a simple refrigeration system with hot gas bypass (6 marks)

- b. Answer the following question as TRUE/FALSE
- i. The appropriate location of temperature sensor in a split unit air conditioner is near the air filter  
(2 marks)
  - ii. Refrigeration systems with automatic pump-down require two solenoid valves.  
(2 marks)
  - iii. Capillary tube can be used as metering device for systems with constant or nearly constant loads  
(2 marks)
  - iv. Units with anti-short cycle protection will only ON back 30 minutes after every shut OFF.  
(2 marks)
  - v. A 3 –wire temperature sensor is more accurate than a 2-wire temperature sensor because it use a compensating bridge circuit  
(2 marks)

**END OF QUESTION**