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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR

MALAYSIA FRANCE INSTITUTE

FINAL EXAMINATION

JANUARY 2011 SESSION

SUBJECT CODE	:	FRB 30203
SUBJECT TITLE	:	APPLIED THERMODYNAMICS
LEVEL	:	BACHELOR
TIME/DURATION	:	9.00am – 12.00pm (3 HOURS)
DATE	:	11 MAY 2011

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 only one section. Answer ALL questions.
6. Answer all questions in English.
7. This is an opened book examination.

THERE ARE 3 PRINTED PAGES OF QUESTIONS, EXCLUDING THIS PAGE

INSTRUCTION: Answer ALL questions.

Please use the answer booklet provided.

Question 1

Comparison of the adiabatic compression of a liquid and a vapour

(a) Adiabatic compression of a liquid.

Consider the reversible adiabatic compression of R-134a between 2 bar and 10 bar. R-134a is initially at -10°C. It's given that for R134a at -10°C, its specific volume is 0.00075 m^3/kg, Cp = 1.288 kJ/kg K and the coefficient of thermal expansion $\beta = 2 \times 10^{-3}/K$. Calculate the compression work in kJ/kg and the isentropic discharge temperature.

(1.7 marks)

(b) Adiabatic compression of a vapour (Use Figure 2 Diagram of R-134a).

Consider the adiabatic compression of R-134a vapour but with an isentropic efficiency $\acute{\eta}_{is} = 0.9$.The vapour initially at saturated vapour at -10 ° C is compressed between 2 bars and 10 bars. Answer the followings:

(1) Sketch the process on Figure 1 and submit it together with your answer sheet.

(0.8 mark)

(2) Calculate the compression work in kJ/kg.

(0.8 mark)

(3) Determine the discharge temperature if the compression process is isentropic and with $\acute{\eta}_{is} = 0.9$. Compare the energies of compression work and discharge temperatures for (a) and (b) and give your comment.

(1.7 marks)