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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
(ONLINE)
SEMESTER I
SESSION 2020/2021**

COURSE NAME : THERMODYNAMICS
COURSE CODE : DAK 20703
PROGRAMME CODE : DAK
EXAMINATION DATE : JANUARY / FEBRUARY 2021
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF THREE (3) PAGES

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Q1 (a) Define the Zeroth Law of Thermodynamics. (2 marks)

(b) Determine the missing properties and the phase descriptions in the following table for refrigerant 134a.

	P, kPa	T, °C	v, m ³ /kg	Phase Description
(i)	320	-8		
(ii)		30	0.015	
(iii)	180			Saturated vapor
(iv)	600	80		

(8 marks)

(c) Determine the missing properties and the phase descriptions in the following table for water.

	P, kPa	T, °C	x	U, kJ/kg	Phase Description
(i)	200		0.6		
(ii)		125		1600	
(iii)	1000			2950	
(iv)	500	75			
(v)	850		0.0		

(15 marks)

Q2 (a) Thermodynamic is the science of energy that concerned with the ways energy is stored within a body.

(i) Explain **three (3)** examples of various application of thermodynamic in real life. (9 marks)

(ii) Sketch a diagram to support your answer in Q2 (a)(i) (6 marks)

(b) A 1.8 m³ rigid tank contains steam at 220 °C. One-third of the volume is in liquid phase and the rest is in the vapor form. Determine

(i) The pressure of the steam. (1 marks)

(ii) The quality of the saturated mixture. (6 marks)

(iii) The density of the mixture.

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(3 marks)

- Q3** (a) Describe the phase change process of pure substances exist in many practical situations of thermodynamic application. (5 marks)
- (b) An insulated tank is divided into two parts by a partition. One part of the tank contains 2.5 kg of compressed liquid water at 600 kPa at 60 °C, while the other part is evacuated. The partition is now removed, and the water expands to fill the entire tank. Determine
- (i) The final temperature of the water. (14 marks)
- (ii) The volume of the tank for a final pressure of 10 kPa (6 marks)
- Q4** (a) List the purpose of the First Law of Thermodynamics, which is commonly used in engineering systems (3 marks)
- (b) Distinguish the function of mixing chamber and heat exchanger in terms of thermodynamic system. (4 marks)
- (c) Steam of 5 MPa at 400 °C enters a nozzle steadily with the velocity of 80 m/s, and it leaves with the pressure of 2 MPa at 300 °C. The inlet area of the nozzle is 50 cm², and heat is being lost at a rate of 120 kJ/s. Determine
- (i) The mass flow rate of the steam. (8 marks)
- (ii) The exit velocity of the steam. (7 marks)
- (iii) The exit area nozzle (3 marks)

-END OF QUESTIONS-