



Prifysgol Cymru
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Examination Answer Books

12 Pages

Instructions to Candidates

1. Please give the information requested in the boxes below.
2. Enter your name in the space provided to the right, fold over and seal down (using the label provided) to hide your name.
3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
6. No part of this book is to be torn out; it must be handed in complete.
7. If more books than one are used, fasten them together using the tags available from the invigilator(s).
8. Every book must be handed in. In no circumstances may answer books, used or unused, be taken out of the examination venue.

Complete, fold and seal
(see note 2 below)

SURNAME: JOHNS

FORENAME(S): DARREN LEE

1	Student Number	DJ190410
2	Title of Examination Paper	THERMOFLUIDS 1
3	Module Code	SGDM 4604
4	Date and Time of Examination	16-1-20 9.30am
5	Examination Venue	
6	Seat Number	
7	Number of Answer Books handed in	

List the numbers of the questions you have attempted	Office Use
2	3
3	11
4	13
Total	27/75

36%

Q4, The difference between internal and flow energy

a,

x 0

b, An open system is when you need to keep generating and closed system will keep using the same fluids

①

c,

$$T_1 = 150 + 273 = 423$$

$$P_2 = 1.8 \times 10^5$$

$$P_1 = 10 \times 10^5$$

$$T_2 = 282 \text{ K}$$

$$V_1 = 0.25 \text{ m}^3$$

$$V_2 = 0.85 \text{ m}^3$$

$$R = 1075 - 780 = 295$$

$$PV = MRT$$

$$\frac{P_1 V_1}{RT_1} = M$$

$$\frac{10 \times 10^5 \times 0.25}{295 \times 423} = 2.00 \quad M = 2.00 \text{ kg}$$

④

$$\gamma = \frac{1.075}{0.78} = 1.37$$

$$P_1 V_1^\gamma = P_2 V_2$$

$$10 \times 10^5 \times (0.25)^{1.37} = P_2 \times 0.85^{1.37}$$

$$\frac{149684}{0.85^{1.37}} = 1.8 \times 10^5 \quad P_2 = 1.8 \times 10^5$$

②

$$\frac{T_1}{T_2} = \left(\frac{P_1}{P_2} \right)^{\frac{1.37-1}{1.37}}$$

$$\left(\frac{10 \times 10^5}{1.8 \times 10^5} \right)^{\frac{1.37-1}{1.37}} = 1.5 \quad \frac{423}{1.5} = 282 \text{ K} \quad T_2 = 282 \text{ K}$$

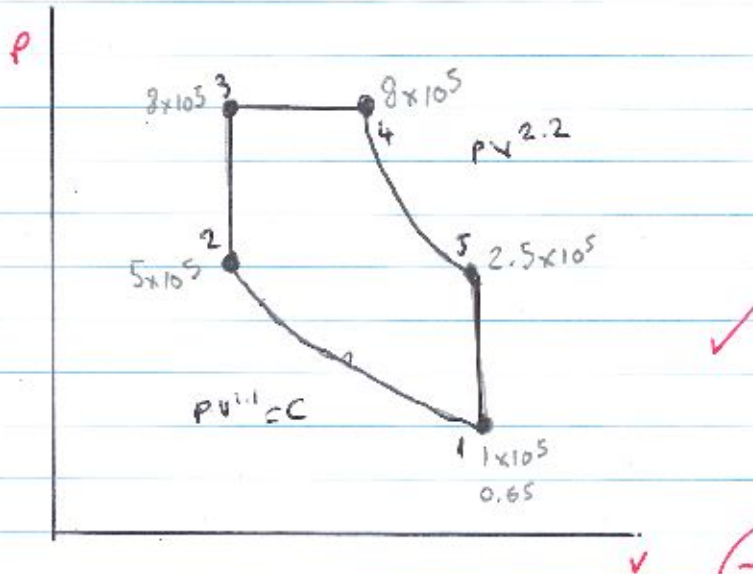
③

$$W.D = \frac{(10 \times 10^5 \times 0.25) - (1.8 \times 10^5 \times 0.85)}{1.37 - 1} = 26216.25$$

③

18

Q2a1



$$P_1 = 1 \times 10^5$$

$$V_1 = 0.65$$

$$P_2 = 5 \times 10^5$$

$$V_2 = 0.12$$

$$P_3 = 8 \times 10^5$$

$$V_3 = 0.07$$

$$P_4 = 8 \times 10^5$$

$$V_4 = 0.06$$

$$P_5 = 2.5 \times 10^5$$

$$V_5 = 2.3$$

$$P_1 V_1^{1.1} = P_2 V_2$$

$$1 \times 10^5 \times (0.65)^{1.1} = 5 \times 10^5 \times V_2$$

$$\frac{62259}{5 \times 10^5} = 0.10 \quad \times \quad \frac{1.1}{\sqrt{0.10}} = 0.12 \text{ m}^3$$

$$V_2 = 0.12 \quad \times$$

$$W_{D1-2} = \frac{P_1 V_1 - P_2 V_2}{1.1 - 1} \quad \text{ECP} \quad = \frac{(1 \times 10^5 \times 0.65) - (5 \times 10^5 \times 0.12)}{1.1 - 1}$$

$$W_{D1-2} = 50,000 \text{ J} \quad \times$$

$$P_2 V_2^{1.1} = P_3 V_3$$

$$5 \times 10^5 \times (0.12)^{1.1} = 8 \times 10^5 \times V_2$$

$$\frac{48536}{8 \times 10^5} = 0.06$$

$$\sqrt[1.1]{0.06} = 0.07 \text{ m}^3 \quad \times$$

$$WD_{2-3} = 0 \quad \checkmark$$

3

$$P_3 V_3^{1.1} = P_4 V_4$$

$$8 \times 10^5 \times (0.07)^{1.1} = 8 \times 10^5 \times V_4$$

$$\frac{42923}{8 \times 10^5} = 0.05$$

$$\sqrt[1.1]{0.05} = 0.06 \text{ m}^3$$

$$WD_{3-4} = \frac{P_3 V_3 - P_4 V_4}{1.1 - 1}$$

$$\frac{(8 \times 10^5 \times 0.07) - (8 \times 10^5 \times 0.06)}{1.1 - 1}$$

$$WD = 80,000 \text{ J} \quad \times$$

0

$$P_4 V_4^{2.2} = P_5 V_5$$

$$8 \times 10^5 \times (0.06)^{2.2} = 2.5 \times 10^5 \times V_5$$

$$\frac{1640}{2.5 \times 10^5} = 6.5$$

$$\sqrt[2.2]{6.5} = 2.3 \text{ m}^3 \quad \times$$

$$WD_{4-5} = \frac{P_4 V_4 - P_5 V_5}{2.2 - 1} = \frac{(8 \times 10^5 \times 0.06) - (2.5 \times 10^5 \times 2.3)}{2.2 - 1} \quad \times$$

0

$$WD_{4-5} = 43916.6$$

$$WD_{Total} = 86,084 \quad \times$$

11

2b, Work done is by the system as it is a complete cycle. ✓

②

Q3a, Its the characteristic gas equation

b, adiabatic = $PV^\gamma = C$

 $\frac{1}{2}$

Enthalpy = When Liquid has Temperature and pressure in a internal a steady flow.

isothermal = $PV = C$

 $\frac{1}{2}$

Absolute temp = temperature in Kelvin

C,

$$P_1 = 7 \times 10^5$$

$$T_1 = 200 + 273 = 473$$

$$P_2 = 1 \times 10^5$$

 $\frac{1}{3}$