REVIEW PROBLEMS

MIDTERM PREP

THERMODYNAMICS 1

Created By:	Approved By:	Approved By:	Approved By:
User Satu	User Satu	User Dua	User Tiga
2025-11-04 02:49:04	2025-11-04 02:50:36	2025-11-04 02:52:37	2025-11-04 03:22:27

Lengkapi tabel untuk H2O berikut:

T (°C)	P (kPa)	h (kJ/kg)	v (m^3/kg)	x	Fasa
	225	1000			
150	800				

Lengkapi tabel untuk Refrigerant-134a berikut:

T (°F)	P (Psia)	h (Btu/lbm)	v (ft^3/lbm)	x	Fasa
110				1	
					Superheated vapor

Created By:
User Satu
2025-11-04 02:49:04

Approved By:
User Satu
2025-11-04 02:50:36

Approved By:
User Dua
2025-11-04 02:52:37

Approved By:
User Tiga
2025-11-04 03:22:27

3–31 Complete this table for refrigerant-134a:

T, °C	P, kPa	v, m^3/kg	Phase description
−8	320		
30		0.015	
	180		Saturated vapor
80	600		

Created By:
User Satu
2025-11-04 02:49:04

Approved By:
User Satu
2025-11-04 02:50:36

Approved By:
User Dua
2025-11-04 02:52:37

Approved By:
User Tiga
2025-11-04 03:22:27

Sebuah piston yang berisi 3 kg refrigerant-134a pada suhu 70^{o}C dan tekanan 800 kPa didiamkan di udara terbuka pada tekanan konstan hingga suhunya turun menjadi 16^{o}C. Hitung besarnya kalor yang dilepas dari sistem ke lingkungan dan gambarkan proses tersebut dalam diagram P-v. (*Jawaban = -669.45 kJ)*

Created By:
User Satu
2025-11-04 02:49:04

Approved By:
User Satu
2025-11-04 02:50:36

Approved By:
User Dua
2025-11-04 02:52:37

Approved By:
User Tiga
2025-11-04 03:22:27

Berapa besar perubahan energi internal 10 kg gas karbon monoksida yang dipanaskan dari suhu 500 K ke 800 K?
(Jawaban: 2413.5 kJ)

Created By: **User Satu** **2025-11-04 02:49:04**	**Approved By:** **User Satu** **2025-11-04 02:50:36**	**Approved By:** **User Dua** **2025-11-04 02:52:37**	**Approved By:** **User Tiga** **2025-11-04 03:22:27**

Determine the change of enthalpy of *oxygen* in kJ/kg as it is heated from 600 to 800 K, using:

a. Average heat capacity (Table A-2b)
b. Heat capacity as a function of temperature (Table A-2c)
c. Ideal-gas properties of oxygen (Table A-19)

Created By:
User Satu
2025-11-04 02:49:04

Approved By:
User Satu
2025-11-04 02:50:36

Approved By:
User Dua
2025-11-04 02:52:37

Approved By:
User Tiga
2025-11-04 03:22:27

3–59 A piston–cylinder device initially contains 50 L of liquid water at 40°C and 200 kPa. Heat is transferred to the water at constant pressure until the entire liquid is vaporized.

(*a*) What is the mass of the water?
(*b*) What is the final temperature?
(*c*) Determine the total enthalpy change.
(*d*) Show the process on a *T*-*v* diagram with respect to saturation lines.

Answers: (*a*) 49.61 kg, (*b*) 120.21°C, (*c*) 125,943 kJ

Created By:	Approved By:	Approved By:	Approved By:
User Satu	User Satu	User Dua	User Tiga
2025-11-04 02:49:04	2025-11-04 02:50:36	2025-11-04 02:52:37	2025-11-04 03:22:27

A mass of 15 kg of air in a piston–cylinder device is heated from 25 to 77°C by passing current through a resistance heater inside the cylinder. The pressure inside the cylinder is held constant at 300 kPa during the process, and a heat loss of 60 kJ occurs. Determine the electric energy supplied, in kWh and plot the process on a P-v diagram. *(Ans. 845 kJ or 0.235 kWh)*

Created By:
User Satu
2025-11-04 02:49:04

Approved By:
User Satu
2025-11-04 02:50:36

Approved By:
User Dua
2025-11-04 02:52:37

Approved By:
User Tiga
2025-11-04 03:22:27

Consider an ordinary shower where hot water at 60°C is mixed with cold water at 10°C. If it is desired that a steady stream of warm water at 45°C be supplied, determine the ratio of the mass flow rates of the hot to cold water. Assume the heat losses from the mixing chamber to be negligible and the mixing to take place at a pressure of 150 kPa.

Created By:	Approved By:	Approved By:	Approved By:
User Satu	User Satu	User Dua	User Tiga
2025-11-04 02:49:04	2025-11-04 02:50:36	2025-11-04 02:52:37	2025-11-04 03:22:27

5–209 Steam is compressed by an adiabatic compressor from 0.2 MPa and 150°C to 2.5 MPa and 250°C at a rate of 1.30 kg/s. The power input to the compressor is

(*a*) 144 kW
(*b*) 234 kW
(*c*) 438 kW
(*d*) 717 kW
(*e*) 901 kW

5–210 Refrigerant-134a is compressed by a compressor from the saturated vapor state at 0.14 MPa to 1.2 MPa and 70°C at a rate of 0.108 kg/s. The refrigerant is cooled at a rate of 1.10 kJ/s during compression. The power input to the compressor is

(*a*) 5.54 kW
(*b*) 7.33 kW
(*c*) 6.64 kW
(*d*) 7.74 kW
(*e*) 8.13 kW

4–160 3 kg of liquid water initially at 12°C is to be heated at 95°C in a teapot equipped with a 1200-W electric heating element inside. The specific heat of water can be taken to be 4.18 kJ/kg · °C, and the heat loss from the water during heating can be neglected. The time it takes to heat water to the desired temperature is

(*a*) 4.8 min
(*b*) 14.5 min
(*c*) 6.7 min
(*d*) 9.0 min
(*e*) 18.6 min

Created By:
User Satu
2025-11-04 02:49:04

Approved By:
User Satu
2025-11-04 02:50:36

Approved By:
User Dua
2025-11-04 02:52:37

Approved By:
User Tiga
2025-11-04 03:22:27