



UNIVERSITY OF JORDAN
SCHOOL OF ENGINEERING
MECHANICAL ENGINEERING DEPARTMENT
First Exam

Course Name: Thermal and Fluid Sciences

Course No.: 0904248

Instructor: Prof. Mahmoud Irshidat & Prof. Mohammad Alrbai

Summer Semester 2024/2025

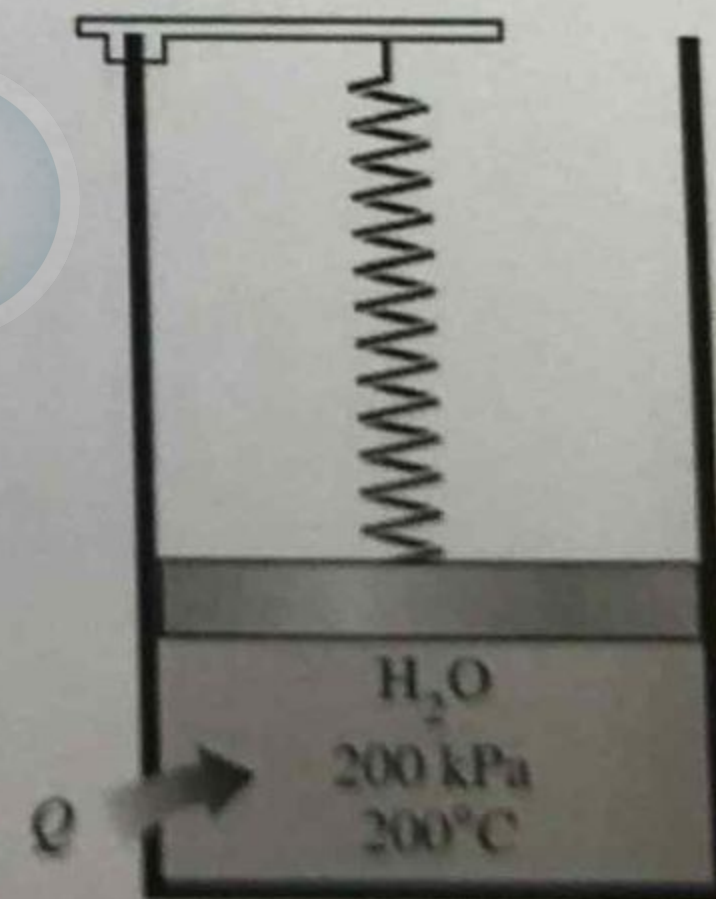
Date: Aug 6, 2025

Time: 60 min

Please solve with detailed answers the following problems. The exam is closed book and notes.

Q1: A piston–cylinder device initially contains steam at 200 kPa, 200°C, and 0.5 m. At this state, a linear spring ($F=k \cdot \Delta x$) is touching the piston but exerts no force on it. Heat is now slowly transferred to the steam, causing the pressure and the volume to rise to 500 kPa and 0.6 m³, respectively. Determine the following (9 points)

- (a) the final temperature,
- (b) the work done by the steam,
- (c) the total heat transferred.



Q2: Complete the following table for water. (13 points)

$T, ^\circ\text{C}$	P, kPa	$h, \text{kJ/kg}$	x	Phase description
	200		0.7	Mixture
140		1800		
	950		0.0	Sat. Liq
80	500			
	800	3162.2		

Q3: Two tanks (Tank A and Tank B) are separated by a partition. Initially Tank A contains 2-kg steam at 1 MPa and 300°C while Tank B contains 3-kg saturated liquid–vapor mixture with a vapor mass fraction of 50 percent. Now the partition is removed and the two sides are allowed to mix until the mechanical and thermal equilibrium are established. If the pressure at the final state is 300 kPa, (9 points)

Determine:

- (a) The temperature at the final state.
- (b) The quality of the steam
- (b) The amount of heat lost from the tanks.

