Name:___________________________ Section:__________ ENGR 222 - Quiz 2

Allowed Materials: *pencils and/or pens.*

THIS IS YOUR EXAM FORM # --> ExamForm := 25

Honor Statement: *On my honor, I promise that I have not received any unauthorized assistance on this exam (I didn't look at another student's paper, I didn't view any unauthorized written materials, I didn't talk or listen to another student, I didn't use an unauthorized calculator, I didn't use any electronic device, any visual or auditory signals, or any other techniques of exchanging information with others.) I have maintained the highest standards of academic integrity while completing this exam.*

*Signed:*____

Bubble:
01
02
03

For Course Section:	
001	Hollins
002	Reeves
003	Reis

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1. *(2 point deduction for failure to complete this problem!)*

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- Write in all of the indicated information in the boxes of your response form.
- Darken the appropriate circles to encode the corresponding information.
- Write your name on this exam and sign the Honor Statement.

Notes:

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- **"F.I."** and **"M.I."** are your first and middle initials, respectively
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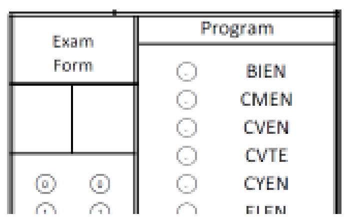
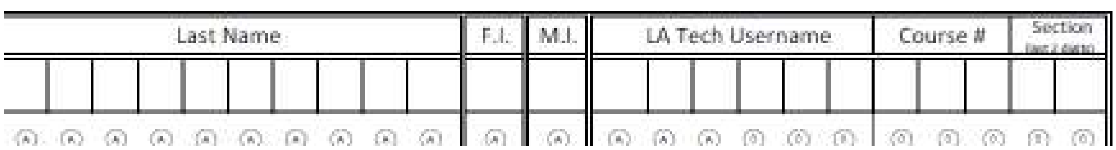




$$\text{Choices} = \begin{pmatrix} \text{"A"} & \text{"I properly completed all required items in problem 1, so I will not lose these points"} \\ \text{"B"} & \text{"I did not properly complete problem 1 because I am fine with losing these points."} \end{pmatrix}$$

Please put your final answers on the answer sheet that was given to you. You must show your work to receive full credit.

The words "steam" and "water" may be used interchangably. Check the tables to determine the phase of the system.

Unless the problem states otherwise, assume that the atmospheric pressure is 101.325 kPa or 14.7 psia.

Read the questions carefully and CHECK YOUR UNITS.

You may write on the exam. There is additional space on the back if you need it.

If you made any marks in your steam table, please erase them before turning in your packet.

Good luck!

2. (10 points) The value located at the peak of the saturated curve on a T-v diagram where the saturated liquid and vapor states are identical is called:

$$\text{Choices} = \begin{pmatrix} \text{"A"} & \text{"latent heat of vaporization"} \\ \text{"B"} & \text{"absolute temperature"} \\ \text{"C"} & \text{"saturation pressure"} \\ \text{"D"} & \text{"saturation temperature"} \\ \text{"E"} & \text{"critical point"} \\ \text{"F"} & \text{"absolute pressure"} \\ \text{"G"} & \text{"reduced temperature"} \\ \text{"H"} & \text{"reduced pressure"} \end{pmatrix}$$

3. (10 points) The amount of energy released when a vapor condenses is:

$$\text{Choices} = \begin{pmatrix} \text{"A"} & \text{"specific entropy"} \\ \text{"B"} & \text{"specific internal energy"} \\ \text{"C"} & \text{"latent heat of fission"} \\ \text{"D"} & \text{"latent heat of plasma"} \\ \text{"E"} & \text{"latent heat of fusion"} \\ \text{"F"} & \text{"latent heat of vaporization"} \\ \text{"G"} & \text{"condensation energy"} \\ \text{"H"} & \text{"specific heat capacity"} \end{pmatrix}$$

4. (10 points) If the pressure of a system is greater than the saturated pressure at a given temperature, the phase of the system is likely:

$$\text{Choices} = \begin{pmatrix} \text{"A"} & \text{"subcooled liquid"} \\ \text{"B"} & \text{"saturated vapor"} \\ \text{"C"} & \text{"superheated vapor"} \\ \text{"D"} & \text{"saturated mixture"} \\ \text{"E"} & \text{"saturated liquid"} \end{pmatrix}$$

5. (10 points) What is the final temperature of ammonia (chemical formula NH_3) in a rigid tank, if the tank initially contains $m_{NH3} = 28\,kg$ of ammonia at a temperature $T_{init} = 50\,°C$ and an initial pressure of $P_{init} = 740\,kPa$, and then half of the ammonia is released, reducing the pressure to 350 kPa?

$$\text{Choices} = \begin{pmatrix} \text{"A"} & 27.58 \\ \text{"B"} & 29.22 \\ \text{"C"} & 30.87 \\ \text{"D"} & 32.53 \\ \text{"E"} & 34.19 \\ \text{"F"} & 35.84 \\ \text{"G"} & 37.47 \\ \text{"H"} & 39.16 \end{pmatrix} \cdot °C$$

6. (10 points) The density of water at $\text{temperature} = 125\,°C$ and $\text{pressure} = 290\,kPa$ is closest to:

$$\text{Choices} = \begin{pmatrix} \text{"A"} & 939 \\ \text{"B"} & 968 \\ \text{"C"} & 997 \\ \text{"D"} & 1025 \\ \text{"E"} & 1055 \\ \text{"F"} & 1084 \\ \text{"G"} & 1112 \\ \text{"H"} & \text{"not enough information"} \end{pmatrix} \frac{kg}{m^3}$$

7. (10 points) What is the volume of a tank if the tank contains water with a mass of ($m_{tank} = 32 \cdot kg$) at a temperature of 200 °C and a pressure of 2 MPa?

$$Choices = \begin{pmatrix} "A" & 32.49 \\ "B" & 34.01 \\ "C" & 35.51 \\ "D" & 37.02 \\ "E" & 38.54 \\ "F" & 40.02 \\ "G" & 41.57 \\ "H" & "not\ enough\ information" \end{pmatrix} \cdot L$$

8. (10 points) A 50-ft^3 container of helium has a (absolute) $pressure = 90 \cdot psia$ and a $temperature = 75 \cdot °F$. The mass of helium in the tank is closest to:

$$Choices = \begin{pmatrix} "A" & 2.629 \\ "B" & 2.754 \\ "C" & 2.883 \\ "D" & 3.012 \\ "E" & 3.139 \\ "F" & 3.267 \\ "G" & 3.394 \\ "H" & 3.524 \end{pmatrix} \cdot lbm$$

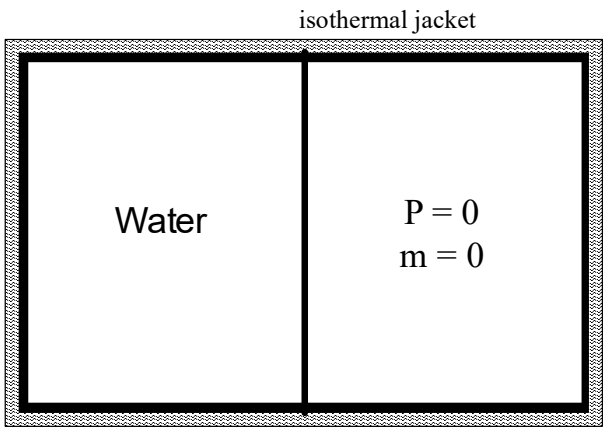
9. (10 points) Carbon dioxide is contained at $\text{pressure} = 0.813 \cdot \text{MPa}$ and $\text{temperature} = 258.57 \cdot \text{K}$. Accounting for the "compressibility" of carbon dioxide at these conditions, the density is closest to:

$$\text{Choices} = \begin{pmatrix} \text{"A"} & 14.63 \\ \text{"B"} & 15.73 \\ \text{"C"} & 16.81 \\ \text{"D"} & 17.90 \\ \text{"E"} & 18.98 \\ \text{"F"} & 20.07 \\ \text{"G"} & 21.15 \\ \text{"H"} & 22.24 \\ \text{"I"} & 23.33 \\ \text{"J"} & 24.42 \end{pmatrix} \cdot \frac{\text{kg}}{\text{m}^3}$$

10. (10 points) R-134a at $\text{temperature} = -10 \cdot °\text{C}$ has a $\text{mass} = 21 \cdot \text{kg}$ and a $\text{volume} = 880 \cdot \text{L}$. The quality of the refrigerant is closest to:

$$\text{Choices} = \begin{pmatrix} \text{"A"} & 0.383 \\ \text{"B"} & 0.400 \\ \text{"C"} & 0.417 \\ \text{"D"} & 0.434 \\ \text{"E"} & 0.451 \\ \text{"F"} & 0.468 \\ \text{"G"} & \text{"it is not saturated"} \\ \text{"H"} & \text{"not enough information"} \end{pmatrix}$$

11. (10 points) A large tank is divided into two equal volumes. One half of the tank is filled with saturated water of unknown quality at $\text{temperature} = 320 \cdot °F$. The other half of the tank is evacuated (i.e there is nothing in it). When the partition separating the two halves breaks, the water will expand to fill the entire tank. The temperature is unchanged, and the final pressure is given below. Determine the quality of the water before the partition broke.



$$P_{final} = 80 \cdot psia$$

$$Choices = \begin{pmatrix} "A" & 40.36 \\ "B" & 44.35 \\ "C" & 48.31 \\ "D" & 52.28 \\ "E" & 56.25 \\ "F" & 60.22 \\ "G" & 64.22 \\ "H" & 68.18 \end{pmatrix} \cdot \%$$

END OF EXAM

Bubble:	For Course Section:	
01	001	Hollins
02	002	Reeves
03	003	Reis

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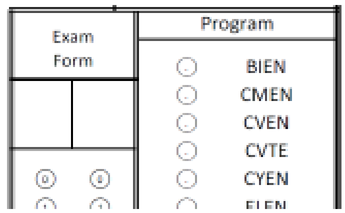

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Good luck!

ExamForm = 25

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Key =

	1
1	"A"
2	"E"
3	"F"
4	"A"
5	"D"
6	"A"
7	"D"
8	"E"
9	"D"
10	"C"
11	"E"