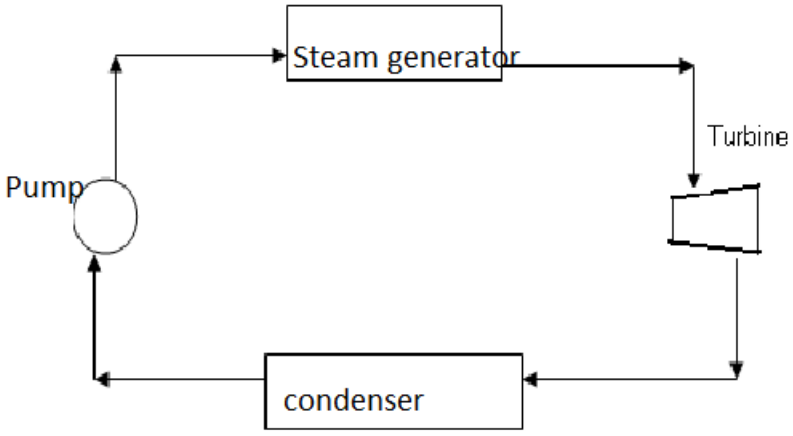
Birzeit University – Faculty of Engineering & Technology
Mechanical & Mechatronics Engineering Department
Thermodynamics ENME 333
Quiz 1 Form A

Instructor: Dr. Afif Akel Hasan **Second semester 2020-2021**

Question 1 (25 points)

Consider device in figure below working in thermodynamic cycle;



a. Write down name of cycle: Steam power cycle
b. What is the function of the cycle? produced shaft work from heat
c. Name the working fluid in the cycle? Steam/water

d. Fill the table below and write name of components on figure.

Name of component	Function of component	Energy transfer and direction (heat: from /to); work by /on)
Turbine	Produce shaft work	work by
Condenser	Reject heat	Heat from
Pump	Increase pressure	Work on
Steam generator	Generate steam from water or change liquid into vapor	Heat to

Question 2 (25 points)

True (T) or false(F) statements, correct the false ones T=5, F=10

T/F	#	Statement/ correction
F	1.	Fuel cell is an example of ~~non –~~ direct energy conversion system.
T	2.	Heat pump can be used for heating.
F	3.	Control mass allows for ~~both mass transfer and~~ energy transfer. Control mass does not allow for both mass transfer but energy transfer
T	4.	Control volume involves mass and energy transfer.
F	5.	Boundary of control mass always fixed and imaginary. Boundary of control mass always real and could be movable
T	6.	State of systems is defined by defining value of its properties.
F	7.	State of system is a path dependent function. State of system is a path **in**dependent function.
T	8.	Molal specific volume is always greater than mass based specific volume.
F	9.	Path of quasi-equilibrium process cannot be defined. Path of quasi-equilibrium process is well defined
T	10.	Pressures given in textbook always absolute unless it states otherwise.
F	11.	Zeroth law of thermodynamics is related to pressure measurements. Zeroth law of thermodynamics is related to temperature measurements
F	12.	Specific volume unit is N/m3. Specific volume unit is kg/m3.
F	13.	Isobaric process is a constant volume process. Isobaric process is a constant pressure process.
F	14.	Control surface is the boundary of control mass. Control surface is the boundary of control volume
F	15.	Absolute pressure is difference between gauge and atmospheric pressure Absolute pressure is sum of gauge and atmospheric pressure

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Quiz 1 Form B
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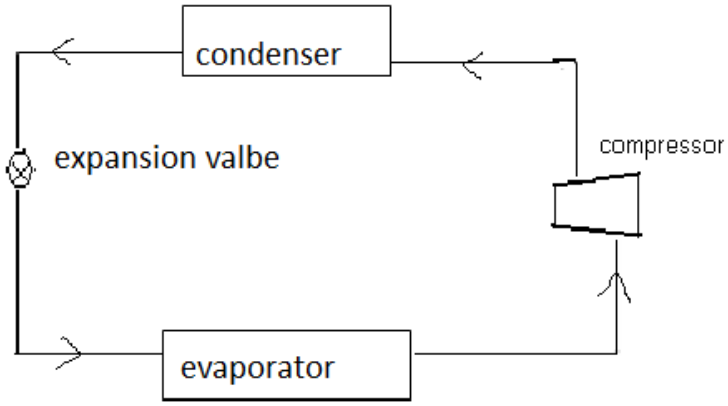
Question 1 (25 points)
Consider device in figure below working in thermodynamic cycle;



a. Write down name of cycle: vapor compression refrigeration cycle
b. What is the function of the cycle: transfer heat from low temperature to higher temperature place
c. Name the working fluid in the cycle? refrigerant

d. Fill the table below and write name of components on figure

Name of component	Function of component	Energy transfer and direction (heat: from /to); work by /on)
Compressor		work on
Condenser	Change(condense) vapor to liquid	Heat from
Expansion valve	Pressure drop from high to low	non
Evaporator	Change(evaporate) liquid to vapor	Heat to

Question 2 (25 points)

#	Question	Given example
1	Control mass	Water in bottle
2	Control volume	heart
3	Intensive property	Specific volume, pressure
4	Extensive property	Mass
5	State	T=20, P=100kPa
6	Process	Heat water from 20 to 30 ^{o}C
7	Quasi-equilibrium process	A very slow expansion of gas in cylinder
8	Non equilibrium process	Sudden expansion of cylinder
9	Thermodynamic cycle	Steam power cycle
10	Direct energy conversion system	PV solar to electricity, Fuel cell fuel to electricity
11	Thermodynamic law	First law
	A gauge pressure	Oxygen in cylinder 20 kPa gauge
12	One difference between control mass and control volume	No mass flow in c.m, while it flows in cv
13	One similarity between cm , CV	Both may involve heat transfer
14	Isothermal process	Constant temperature process, water boiling
15	Isobaric process	Constant pressure heating at 1 atm
16	Units of specific volume	m^3/kg
17	Pressure units	Pascal
18	Control surface	Boundary of CV e.g nozzle
19	Phase of a material	Liquid phase of water
20	Units of molal specific volume	$m^3/kgmole$

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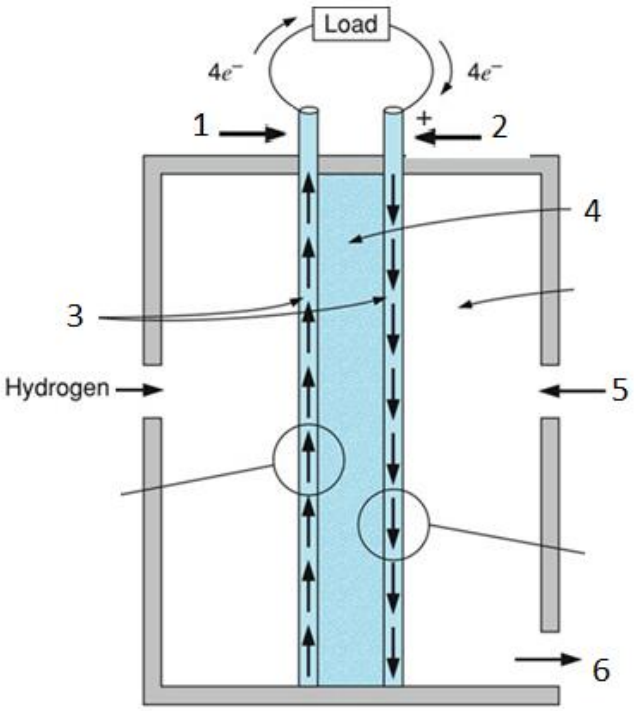
Quiz 1 Form C
Instructor: Dr. Afif Akel Hasan **Second semester 2020-2021**

Question 1 (20 points)

Consider energy conversion device in the figure below;

a. Give name of device? Fuel cell
b. What is the function of the device? Generate electricity from fuel
c. Name parts 1 to 4 1= anode, 2=cathode, 3= electrodes, 4= electrolyte
d. What is the function of parts **1** and **4** 1 to ionize the hydrogen atoms, 4 to transfer hydrogen ions to cathode.
e. What materials go in at **5**, and what comes out at **6** of device?
5= oxygen, 6= water



Question 2 (30 points)

True or false statements, correct the false ones T=4, F=12

T/F	#	Statement/correction
F	1.	Steam power plant is an example of direct energy conversion system. Steam power plant is an example of an **in**direct energy conversion system.
T	2.	Heat pump can produce cooling and heating.
F	3.	Control mass allows for mass transfer but does not allow for energy transfer. Control mass allows allow for energy transfer but does not allow for mass transfer
F	4.	Control volume involves mass but not energy transfer. Control volume involves mass and energy transfer.
F	5.	Boundary of control mass is fixed always. Boundary of control mass is fixed or movable.
F	6.	State of systems is defined by defining its boundary. State of systems is defined by defining its properties.
T	7.	State of system is a path independent function.
F	8.	Molal specific volume is always less than mass based specific volume. Molal specific volume is always greater than mass based specific volume.
F	9.	Path of non-equilibrium process is well defined and specified. Path of non-equilibrium process is not defined and not specified.
F	10.	Path of quasi-equilibrium process cannot be defined. Path of quasi-equilibrium process is well defined.
F	11.	Pressure given in textbook always is a gauge pressure unless it states otherwise. Pressure given in textbook always is a absolute pressure unless it states otherwise.
T	12.	First law of thermodynamics is related to energy conservation
F	13.	Zeroth law of thermodynamics is related to pressure measurements. Zeroth law of thermodynamics is related to temperature measurements.
F	14.	Laws of thermodynamics are derived ones. Laws of thermodynamics are experimental ones.
F	15.	Unit of specific volume is m3/N Unit of specific volume is m3/kg
T	16.	Pressure increases as you go deeper in sea water.