

Presidency University, Bengaluru
School of Engineering

I Semester 2015-16 Comprehensive Examination

ME A 104 Thermodynamics
(Closed Book)

Max Marks: 80

Max Time: 180 Min

Weightage: 40 %

25 May 16

Set A

1. All the parts of question paper shall be answered in single answer booklet
2. All the questions of each part shall be answered together
3. Steam and refrigerant property tables are permitted.

Part A (10 x 3=30)

Q 1. Match the following and redraw the table after matching.

1. Power	a. K (Kelvin)
2. Energy	b. m ³ /s
3. Heat transfer per unit mass	c. kJ/kg.K
4. Absolute temperature	d. kJ/s
5. Temperature	e. kPa
6. Specific heat	f. kg/m ³
7. Specific volume	g. kJ (kilo Joules)
8. Density	h. m ³ /kg
9. Volume flow rate	i. °F (Degree Fahrenheit)
10. Gauge pressure	j. kJ/kg

Q 2. Complete the table for H₂O.

T, °C	P, kPa	h, kJ/kg	x	Phase description
5		1500		
400	300			
	22000			Saturated liquid
200	5000			
	20	2608.9		

Q 3 Show the variation of pressure on TV diagram for water and variation of temperature on PV diagram. Also show relationship of pressure and temperature for water by a PT diagram. All the diagrams shall be labeled well to indicate salient features

Part B (15 x 2=30)

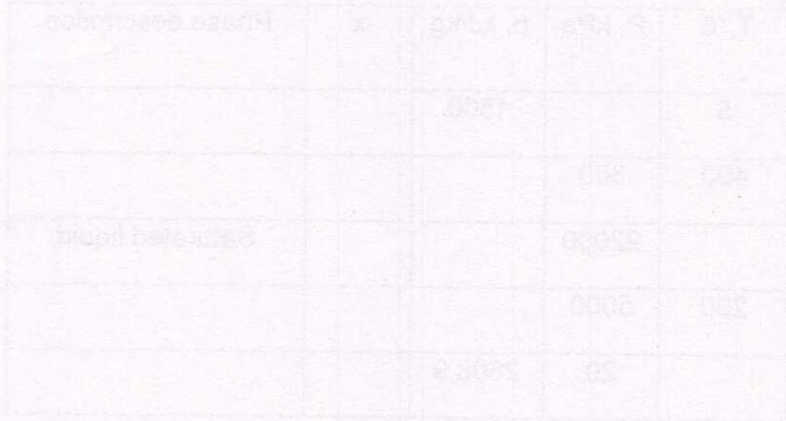
Q 4 A 1.5 m^3 of insulated tank contains steam at 200 deg C . Half of the volume is in the liquid phase and rest is in the vapor form. Determine (a) saturation pressure in the tank (b) mass of fluid (c) mass of steam (d) total mass of mixture (e) quality of the mixture (f) specific volume of the mixture (g) density of the mixture.

Q 5 100 kg/s of steam enters an adiabatic turbine at 2 MPa and $500 \text{ }^\circ\text{C}$ with 50 m/s velocity at an elevation of 3m and leaves at 75 kPa and $50 \text{ }^\circ\text{C}$, with a velocity of 70 m/s at an elevation of 0m .

- i) Explain the working of a turbine as a single inlet and single outlet steady state steady flow engineering device
- ii) Draw a diagram of this turbine indicating all the necessary details.
- iii) Determine the power output of this turbine.

Part C (20 x 1=20)

Q 6. An air-standard Diesel cycle has a compression ratio of 18 and a cutoff ratio of 1.8. At the beginning of the compression process, air is at 98 kPa and 305K . Assume the properties of air at room temperature are $c_p = 1.005 \text{ kJ/kg}\cdot\text{K}$, $c_v = 0.718 \text{ kJ/kg}\cdot\text{K}$ and $k = 1.4$. Determine (a) pressure and temperature at the end compression (b) maximum temperature and pressure in the cycle (c) heat supplied (d) temperature at the end of expansion (e) heat rejected from the cycle (f) work done (g) thermal efficiency of the cycle. If the swept volume of the cylinder is $0.850 \text{ cubic meter /kg}$, Determine mean effective pressure for the cycle.



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Set B

1. All the parts of question paper shall be answered in single answer booklet
2. All the questions of each part shall be answered together
3. Steam and refrigerant property tables are permitted.

Part A (10 x 3=30)

Q 1 Define the following in one line each and write the SI units

- I. Specific volume
- II. Specific gravity
- III. Absolute pressure
- IV. Energy
- V. Power

Q 2. Fill up the following table. Redraw the table. Write also suitable justification for your answer. Redraw the table in answer book

	Substance	Pressure	Temp	State	Justification
1	Water	800 kPa	200 deg C		
2	R 134	51.25 kPa	-38 deg C		
3	Water	5000 kPa	250 deg C		
4	R134a	51.25 kPa	-42 deg C		
5	Water	22064 kPa	373.95 deg C		

Q 3. Draw block diagrams of heat engine, refrigerator and heat pump by mentioning the usual notation. How do you calculate performance of each one them

Part B (15 x 2=30)

Q 4. Steam is flowing steadily through an adiabatic turbine. The inlet conditions of the steam are: $P_1 = 5\text{MPa}$, $T_1 = 400^\circ\text{C}$ and $V_1 = 100\text{m/s}$. The exit conditions of the steam are: $P_2 = 50\text{kPa}$ and $V_2 = 50\text{m/s}$. Steam is 85% dry at the exit. The mass flow rate of steam is 10kg/s .

- What are the inlet and exit conditions (Superheated/ Saturated Liquid or Mixture or vapour/ Sub cooled or Compressed liquid)?
- Find and list the enthalpy and specific volume of steam at the inlet and exit of the turbine.
- Write down the Steady Flow Energy Equation for the given turbine.
- Determine the power output of the given turbine.
- What are the inlet and exit areas of the given turbine?

Q 5 One kg of water initially at 9 deg C and 10 % dryness fraction, occupies a spring loaded piston cylinder device as given below. The device is now heated until the pressure rises to 800 kPa and 250 deg C.

Answer the following...

- What is the initial state and specific volume of the substance?:
- What is the final state and specific volume of the substance?
- Draw the process on a PV diagram
- Calculate the work produced.
- Comment on the nature of PV diagram

Part C (20 x 1=20)

Q 6. An ideal Otto cycle has a compression ratio of 10. At the beginning of the compression process, air is at 100 kPa and 298K, and 850 kJ/kg of heat is transferred to air during the constant-volume heat-addition process. Take $c_v = 0.718$ kJ/kg and $k=1.4$. Determine (a) pressure and temperature at the end compression (b) maximum temperature and pressure in the cycle (c) temperature at the end of expansion (d) heat rejected from the cycle (e) work done (f) thermal efficiency of the cycle. If the swept volume of the cylinder is 0.909 m³/kg, Determine mean effective pressure for the cycle.

Presidency University, Bengaluru
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II Semester 2015-2016

Test 1

Course: **ME A 104 Thermodynamics**
(Closed Book)

Max Marks: 30

Max Time: 50 Min

Weightage: 15 %

22Feb 2016

Set A

Solutions

Q 1 Answer the following in short

(4Q x 2M= 8M)

- A. Two scuba divers are swimming at a depth of 15m underwater. On seeing a ship coming towards them, one diver goes below the ship while the other changes his direction. Who experiences greater pressure?
- B. What the different modes of heat transfer? Explain with example .
- C. The temperature of ambient air in a certain location is measured to be -40°C . Express this temperature in Fahrenheit ($^{\circ}\text{F}$), Kelvin (K) and Rankine (R).
- D. A hydraulic turbine has 85 m of elevation difference available at a flow rate of $0.25\text{ m}^3/\text{s}$ and its overall turbine generator efficiency is 91 per cent. Determine the electric power output of this turbine.

Q 2 Answer the following

(3Qx 4M= 12M)

1. An open drum of 8 m height is used to store petroleum products (liquids). There are two products which are fractionally distilled and stored in the drum. One liquid floats on the other. The liquids have specific gravities of 0.9 and 0.8. The product with 0.9 specific gravity occupies 5 m of the drum while the other 2 m. What will be the absolute pressure experienced at the top surface of the liquid, interface between the two liquids and the bottom of the drum?
2. What are path functions and point functions? Give examples. Is heat/work a property of the system? if yes/no, why?
3. A car of mass 1775 kg travels with a velocity of 100 km/h. Find the kinetic energy. How high should it be lifted in the standard gravitational field to have a potential energy that equals the kinetic energy?

Q 3 Solve the following

(2Q x 5M=10)

- I. A gas is contained in a vertical, frictionless piston-cylinder device as shown in Fig 1. The piston has a mass of 3.2kg and cross sectional area of 35cm^2 . A compressed spring above the piston exerts a force of 150 N on the piston. If the atmospheric pressure is 95 kPa, determine the pressure inside the cylinder.

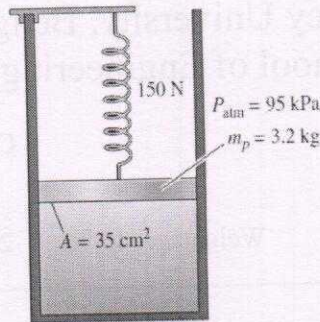


Fig 1. Spring Loaded Piston Cylinder

- II. A class room that normally contains 60 people is to be air conditioned with window air conditioning units of 2 kW cooling capacity. A person at rest may be assumed to dissipate heat at a rate of about 360 kJ per hour. There are 10 light bulbs in the room, each with a rating of 100 W. The rate of heat transfer to the class room through the walls is estimated to be 10000 kJ per hour. If the room is to be maintained at a constant temperature of 21 °C, determine the number of window air conditioning units required.

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II Semester 2015-2016

Test 1

Course: **ME A 104 Thermodynamics**
(Closed Book)

Max Marks: 30

Max Time: 50 Min

Weightage: 15 %

22 Feb 2016

Set B

Solutions

Q 1 Answer the following in short

(4Q x 2M= 8M)

- A. Explain: Quasi-static process.
- B. A 3 kg plastic tank that has a volume of 0.2 m^3 is filled with liquid water. Assuming the density of water is 1000 kg/m^3 , determine the weight of the combined system.
- C. Define the internal energy of a system and total energy of a system.
- D. Determine the energy required to accelerate a 1300 kg car from 10 to 60 kmph on an uphill road with a vertical rise of 40 m.

Q 2 Answer the following

(3Qx 4M= 12M)

1. Discuss absolute, gauge and vacuum pressure with the help of graphical representation.
2. A basic barometer can be used as an altitude measuring device in airplanes. The ground control reports barometric reading of 753 mmHg while the pilot's reading is 290 mmHg. Estimate the altitude of the plane from ground level if the average air density is 1.20 kg/m^3 .
3. Consider a tall man with 1.75 m height standing vertically in water and completely submerged in a pool. Determine the pressure difference of pressure acting on his head and toe in kPa

Q 3 Solve the following

(2Q x5M=10)

- I. A vertical piston-cylinder device contains a gas at a pressure of 100 kPa. The piston has a mass of 5 kg and diameter is 12 cm. Pressure of the gas is to be increased by placing some weights on the piston. Determine the local atmospheric pressure and mass of the weights that will double the pressure of gas inside the cylinder.
- II. Water is pumped from a lower reservoir to a higher reservoir by a pump that provides 20 kW of shaft power. The free surface of the upper reservoir is 45 m higher than the lower reservoir. If the flow rate of water is measured to be $0.03 \text{ m}^3/\text{s}$, determine the mechanical power that is converted to thermal energy during this process due to frictional effects. Also determine the power output of a turbine, if it replaces the pump with all the other conditions being the same.

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II Semester 2015-2016

Test 1

Course: ME A 104 Thermodynamics
(Closed Book)

Max Marks: 30

Max Time: 50 Min

Weightage: 15 %

22Feb 2016

Set C

Solutions

Q 1 Answer the following in short

(4Q x 2M= 8M)

- Differentiate between density and specific volume.
- Differentiate between steady and uniform process.
- Are specific properties intensive properties? If they are/are not, why?
- Enumerate any four different forms of work.

Q 2 Answer the following

(3Qx 4M= 12M)

- You dive 5 m down in the ocean. What is the pressure acted upon your body? and find out the absolute pressure there?. Take density of water (ρ) = 997 kg/m³, g = 9.81 m/s² and ambient pressure = 101.325 kPa.
- Explain the governing equations for modes of heat transfer with common parameters involved therein
- A 2.5 m tall steel cylinder has a cross sectional area of 1.5 m² as shown in Fig 1. At the bottom with a height of 0.5 m is liquid water on top of which is a 1m high layer of gasoline. The gasoline surface is exposed to atmospheric air at 101kPa. What is the highest pressure in the water? Take: $\rho_{\text{gasoline}} = 750 \text{ kg/m}^3$ $\rho_{\text{water}} = 997 \text{ kg/m}^3$

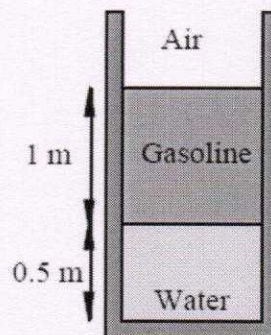


Fig 1 Tall Steel Cylinder

Q 3 Solve the following

(2Q x5M=10)

- I. The storage tank for a flammable gas mixture has a movable lid which gives room for expansion of the gas. It is also fitted with a stirrer so as to maintain uniform density of the gas mixture inside the tank. If the internal energy of the gas mixture stored is 600MJ initially, find the final internal energy of the gas mixture when the work done by the stirrer is 200MJ, expansion work by moving the lid 150MJ, heat transfer to the surrounding air is 100MJ and heat transfer from solar radiation is 300MJ.

- II. Consider a wind turbine with blade span diameters of over 80 m installed at a site subjected to steady winds at 7 m/s for electric power generation. Taking the overall efficiency of the wind turbine to be 32 % and the air density to be 1.25 kg/m^3 . Determine the electric power generated by the wind turbine

Presidency University, Bengaluru
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II Semester 2015-2016

Test 2

Course: **ME A 104 Thermodynamics**
(Open Book)

Max Marks: 30

Max Time: 50 Min

Weightage: 15 %

18 April 2016

Set A

Q 1. Answer the following briefly

(2Q x 4 M= 8 Marks)

- A. Can a heavy blade structure of a steam turbine rotate at very high speeds? Justify your answer by any three logical reasons in support of your answer. Also write steady flow energy equation in support of your answer clearly stating the assumptions.
- B. Consider an air compressor operating in steady state conditions. Energy is being lost to the atmosphere from the compressor in the form of heat transfer. Formulate the equations of Conservation of mass and conservation of energy Are the volume flow rates at the inlet and outlet equal? If yes/no, justify.

Q 2. Solve the following

(2Q x 6 M= 12 Marks)

- I. A 1.8 cubic meter rigid tank contains steam at 220 deg C . One-third of the volume is in the liquid phase and the rest is in the vapor form. Determine (a) the pressure of the steam, (b) the quality of the saturated mixture, and (c) the density of the mixture.
- II. Argon in the amount of 1.5 kg fills a 0.04 cubic meter piston-cylinder device at 550 kPa. The piston is now moved by changing the weights until the volume is twice the original size. During this process, Argon's temperature is maintained constant. Determine the final pressure of the device and the work done. What is the heat transfer in the process? Justify your answer.

Q 3 A piston-cylinder device contains steam initially at 1 MPa, 450 deg C, and 2.5 cubic meter. Steam is allowed to cool at constant pressure until it first starts condensing. Show the process on a T-v diagram with respect to saturation lines and determine (a) the mass of the steam, (b) the final temperature, and (c) the amount of heat transfer.

If the above piston cylinder is further cooled till the vapor contents disappears determine the final temperature and amount of heat transfer. Show the processes on T-v diagram with respect to saturation lines. Also represent the above processes on a P-v diagram

(10 Marks)

Presidency University, Bengaluru
School of Engineering

II Semester 2015-2016

Test 2

Course: ME A 104 Thermodynamics
(Open Book)

Max Marks: 30

Max Time: 50 Min

Weightage: 15 %

18 April 2016

Set B

Q 1. Answer the following briefly

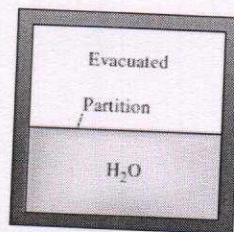
(2Q x 4 M= 8 Marks)

- A. Write any four critical observations regarding the properties of water by referring to saturated steam tables.
- B. Steam at very high pressures and temperatures are allowed to flow through a) an adiabatic turbine and b) a capillary tube. Compare the thermodynamic effects of these two flows.

Q 2. Solve the following

(2Q x 6 M= 12 Marks)

- I. An insulated tank is divided into two parts by a partition. One part of the tank contains 2.5 kg of compressed liquid water at 60 deg C and 600 kPa while the other part is evacuated. The partition is now removed, and the water expands to fill the entire tank. Determine the final temperature of the water and the volume of the tank for a final pressure of 10 kPa. What will be the work done during the process?



- II. Nitrogen gas is expanded in a polytropic process with $n=1.25$ from 2 MPa and 1200K to 200kPa in a piston-cylinder device. How much work is produced and heat is transferred during the expansion process, in KJ/kg?

Q 3 A piston-cylinder device initially contains 0.35 kg of steam at 3.5 MPa, superheated by 7.4 degree Celsius. Now the steam loses heat to the surroundings and the piston moves down, hitting a set of stops at which point the cylinder contains saturated liquid water. The cooling continues until the cylinder contains water at 200 degree Celsius. Determine: Final pressure and quality (If mixture), boundary work, the amount of heat transfer when piston hits the stops, the total heat transfer **(10 Marks)**

Presidency University, Bengaluru
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II Semester 2015-2016

Test 2 (mu)

Course: ME A 104 Thermodynamics
(Open Book)

Max Marks: 30

Max Time: 50 Min

Weightage: 15 %

26
18 April 2016

Set C

Q 1. Answer the following briefly

(2Q x 4 M= 8 Marks)

- A. Enumerate any four steady flow energy devices used in industrial applications
- B. The conservation of mass and conservation of energy equation are analogous in the case of a steady flow engineering device. Derive the mass balance and energy balance for this engineering equipment.

Q 2. Solve the following

(2Q x 6 M= 12 Marks)

- I. A 0.14 m^3 rigid tank contains a saturated liquid –vapour mixture of R-134a at 400kPa. If the saturated liquid occupies 20 percent of the volume, and saturated vapour occupies 80 percent of volume, determine the (a) mass of liquid (b) mass of vapour (c) total mass of the refrigerant in the tank and (d) quality of mixture
- II. Distinguish compressed liquid from sub cooled liquid. Determine the condition and specific heat of water maintained at 5 MPa and 60 deg C.

Q 3 A gas is compressed from an initial volume of 0.42 cubic meter to a final volume of 0.12 cubic meter During the quasi-equilibrium process, the pressure changes with volume according to the relation $P = aV + b$, where $a = - 1200 \text{ kPa/cubic meter}$ and $b = 600 \text{ kPa}$. Calculate the work done during this process (a) by plotting the process on a P-VL diagram and finding the area under the process curve

(10 Marks)

Presidency University, Bengaluru
School of Engineering

II Semester 2015-2016

Test 2
(MMU)

Course: **ME A 104 Thermodynamics**
(Open Book)

Max Marks: 30

Max Time: 50 Min

Weightage: 15 %

18 May 2016

Set D

Q 1. Answer the following briefly

(2Q x 4 M= 8 Marks)

- A. Explain the functioning of heat exchanger with steady flow equation and underlying assumptions
- B. Differentiate between nozzle and diffuser with their assumptions and write down steady flow equation.

Q 2. Solve the following

(2Q x 6 M= 12 Marks)

- I. A 0.14 m^3 rigid tank contains a saturated liquid -vapour mixture of R-134a at 400kPa. If the saturated liquid occupies 30 percent of the volume, and saturated vapour occupies 70 percent of volume, determine the (a) mass of liquid (b) mass of vapour (c) total mass of the refrigerant in the tank and (d) quality of mixture
- II. Why the dryness fraction of superheated and sub-cooled substance is undefined. Determine the condition and specific heat of water maintained at 10 MPa and 300 deg C.

Q 3 An insulated rigid tank is divided into equal partitions. Initially one part contains 4 kg of an ideal gas at 800 kPa and 50 deg C. The other part is evacuated. When the partition is removed, the gas expands into a tank. Determine final temperature, pressure in the tank.

(10 Marks)

PRESIDENCY UNIVERSITY, SCHOOL OF ENGINEERING
BANGALORE

Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics

Duration: Min

Weightage : 5% Set 1

QUIZ-2

ID No. _____ Section _____

- 1 The state at which the liquid and vapor phases coexist in equilibrium is (tick correct answer)
(a) Saturated vapor (b) Saturated liquid-vapor mixture
(c) Superheated vapor (d) compressed liquid
- 2 The amount of energy absorbed or released during a phase-change process is _____ heat
- 3 _____ is passing from the solid phase directly into the vapor phase.
- 4 The ratio of the mass of vapor to the total mass of the mixture is called _____
- 5 During a steady-flow process, the total amount of mass contained within a control volume does not change with time ($m_{CV} = \text{constant}$) _____ (True /False)

PRESIDENCY UNIVERSITY, SCHOOL OF ENGINEERING
BANGALORE

Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics

Duration: Min

Weightage : 5% Set 2

QUIZ-2

ID No. _____ Section _____

1. A nozzle is a device that _____ the velocity of a fluid at the expense of pressure.
2. It is impossible for any device that operates on a cycle to receive heat from a single reservoir and produce a net amount of work. This statement is _____
3. The conservation of mass principle requires that the total amount of mass entering a control volume not equal the total amount of mass leaving it. _____ (True /False)
4. _____ law is the pressure applied to a confined fluid increases the pressure throughout by the same amount.
5. During a steady-flow process, the total amount of mass contained within a control volume does not change with time ($m_{CV} = \text{constant}$) _____ (True or False)

PRESIDENCY UNIVERSITY, SCHOOL OF ENGINEERING
BANGALORE

Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics

Duration: Min

Weightage : 5% Set 3

QUIZ-2

ID No. _____ Section _____

1. A substance is said to be superheated if the given temperature is greater than the saturation temperature for the given pressure. _____ (True or False)
 2. A diffuser is a device that _____ the pressure of a fluid by slowing it down.
 3. The Carnot heat engine is the most efficient of all heat engines operating between the same high- and low-temperature reservoirs. _____ (Agree or Disagree)
 4. The _____ pressure is the difference between the absolute pressure and the local atmospheric pressure.
 5. The transfer of heat from a low-temperature medium to a high-temperature one requires special devices called _____
-

PRESIDENCY UNIVERSITY, SCHOOL OF ENGINEERING
BANGALORE

Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics Set 4

Duration: Min

Weightage : 5%

QUIZ-2

ID No. _____ Section _____

1. The working fluid used in the refrigeration cycle is called a _____
2. The efficiency of a refrigerator is expressed in terms of the _____.
3. It is impossible to construct a device that operates in a cycle and produces no effect other than the transfer of heat from a lower-temperature body to a higher-temperature body. This statement is _____
4. If two bodies are in thermal equilibrium with a third body, they are also in thermal equilibrium with each other. This law is belongs to _____
5. : A process that can be reversed without leaving any trace on the surroundings is called _____ process

PRESIDENCY UNIVERSITY, SCHOOL OF ENGINEERING
BANGALORE

Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics

Duration: Min

Weightage : 5%

QUIZ-2

Set 5

ID No. _____

Section _____

1. An _____ process is one in which the system is perfectly insulated and the heat transfer is zero.
 2. _____ is energy expended by a force acting through a distance.
 3. Saturation temperature is the pressure at which the liquid and vapor phases are in equilibrium at a given temperature _____ (True or False)
 4. " _____ is the thermodynamic term used to describe a cyclic device that allows the transfer of heat energy from a low temperature to a higher temperature,
 5. One Ton of refrigeration is equal to 211 kJ/min. _____ (True or False)
-

PRESIDENCY UNIVERSITY, SCHOOL OF ENGINEERING
BANGALORE

Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics

Duration: Min

Weightage : 5%

QUIZ-2

Set 6

ID No. _____

Section _____

1. Carnot cycle is reversible cycle that is composed _____ isothermal process and _____ adiabatic process
2. If the pressure is held constant, the boundary work equation becomes _____
3. The substances involved in the chemical and physical changes under investigation are called the system _____ (True or False)
4. Entropy is a measure of the disorder or randomness of a system _____ (True or False)
5. The efficiency of an irreversible heat engine is always _____ than the efficiency of a reversible one operating between the same two reservoirs.

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Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics

Duration: Min

Weightage : 5%

Set 7

QUIZ-2

ID No. _____	Section _____
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1. Isobaric process is a process during which the pressure P remains constant. _____ (Agree or Disagree)
 2. The objective of a refrigerator is to remove heat (Q_L) from the refrigerated space (yes or No)
 3. It is expressed as "No heat engine can exchange heat with a single reservoir, and produce an equivalent amount of work" (Tick correct answer as given below)
(a) Kelvin-Planck Statement (b) Clausius Statement
 4. Throttling valves are any kind of flow-restricting devices that cause a significant pressure drop in the fluid _____ (True or False)
 5. _____ is device where two moving fluid streams exchange heat without mixing
-

PRESIDENCY UNIVERSITY, SCHOOL OF ENGINEERING
BANGALORE

Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics

Duration: Min

Weightage : 5%

Set 8

QUIZ-2

ID No. _____	Section _____
--------------	---------------

1. Conservation of mass is a conserved property, and it cannot be created or destroyed during a process. _____ (True or False)
2. The real or imaginary surface that separates the system from its surroundings is _____
3. _____ is the ratio of the density of a substance to the density of some standard substance at a specified temperature
4. Density is mass per unit volume and specific volume is volume per unit mass (Yes or No)
5. _____ is a normal force exerted by a fluid per unit area

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Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics

Duration: Min

Weightage : 5%

QUIZ-2

Set 9

ID No. _____ Section _____

1. The first law is also known as _____
2. The environment around the system is called _____
3. Change in Internal energy is _____ (negative or positive) when energy is released by a system undergoing a chemical or physical change.
4. At constant volume process, the work to be produced is _____
5. In which no mass is permitted to cross the system boundary is called _____ system

PRESIDENCY UNIVERSITY, SCHOOL OF ENGINEERING
BANGALOR

Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics

Duration: Min

Weightage : 5%

QUIZ-2

Set 10

ID No. _____ Section _____

- 1 In which there is no interaction between system and the surroundings is called _____
- 2 Which statement is wrong in the following
 - (a) Work done by the system is positive
 - (b) work done to the system is -ve
 - (c) Heat given to the system is positive
 - (d) Heat rejected by the system is positive
- 3 The tremendous amount of energy associated with the strong bonds within the nucleus of the atom itself is called _____ energy
- 4 _____ energy is the transfer of energy due to the emission of electromagnetic waves (or photons)
- 5 A substance, one with uniform that has a fixed chemical composition throughout is belongs to _____

PRESIDENCY UNIVERSITY, SCHOOL OF ENGINEERING
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Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics

Duration: Min

Weightage : 5%

QUIZ-2

Set 11

ID No. _____ Section _____

1. _____ is a work producing device. (Turbine/Compressor)
2. Carnot cycle has two reversible _____ and two reversible _____ processes.
3. Water _____ on freezing. (Expands/Contracts)
4. Isothermal process can be represented by a _____ (horizontal/vertical/inclined/curved) line in TS diagram.
5. Carnot cycle has the maximum thermal efficiency. True or False

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Course No: ME A104

DATE: . 05. 2016

Max. Marks: 5

Subject: Thermodynamics

Duration: Min

Weightage : 5%

QUIZ-2

Set 12

ID No. _____ Section _____

1. A fan increases _____ between inlet and outlet (pressure/volume/temperature)
2. A shower is an example of _____ (nozzle/turbine/compressor/mixing chamber/heat exchanger)
3. Heat transferring on its own accord from low temperature to high temperature without any external work will result in a device known as _____
4. Steam behaves as an ideal gas at very low pressures. True or False.
5. At critical point all the three phases co-exist. True or False.

ID No	_____	Section _____	Signature of Invigilator
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Presidency University, Bengaluru
School of Engineering

II Semester 2015-2016

Quiz 1

Course: **ME A 104 Thermodynamics**
(Closed Book)

Max Marks: 10

Max Time: 30 Min

Weightage: 5 %

Date 26 March 2016

Set A

Instructions to Candidates

- Write legibly with pen only and do not over write. Write ID No, Section No in the designated place
- Answer the questions in the question paper itself, no extra answer book shall be provided. Rough work can be done at the back of the sheet

Q. No.	Question (One Mark Each)	Answer
1.	The boundary work for a constant volume process is: a) $P(V_2 - V_1)$ b) Zero c) $P_1 V_1 \ln \frac{V_2}{V_1}$ d) None of the above	
2.	Enthalpy of vaporization h_{fg} _____ with increase in temperature.	
3.	Isothermal process refers to (a) constant pressure (b) constant temperature (c) constant volume (d) constant entropy	
4.	A spring-loaded piston-cylinder device is heated until the pressure rises to 0.800 MPa and the temperature is 250°C. Find the specific volume of the device.	
5.	A substance that has fixed _____ throughout is called as a pure substance.	
6.	A substances undergoes a change of phase in a spring loaded piston cylinder arrangement. The work done would be calculated by a formula	
7.	The locus of points joining saturated liquid states of a pure substance is known as (a) Saturated vapor line (b) Saturated liquid line (c) Critical point (d) Superheated line	
8.	State TRUE or FALSE Work done is a path function.	
9.	The heat transfer in a constant volume regime should be calculated by----- (a) Change of Enthalpy (b) Change of Internal energy (c) Change of temperature (d) Neither of the above	
10.	The saturated steam tables always end with (a) Triple point (b) Critical point (c) Supercritical temperatures (d) Neither of the above	

ID No _____	Section _____	Signature of Invigilator _____
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Presidency University, Bengaluru
School of Engineering

II Semester 2015-2016

Quiz 1

Course: **ME A 104 Thermodynamics**
(Closed Book)

Max Marks: 10

Max Time: 30 Min

Weightage: 5 %

Date 26 March 2016

Set B

Instructions to Candidates

1. Write legibly with pen only and do not over write. Write ID No, Section No in the designated place
2. Answer the questions in the question paper itself, no extra answer book shall be provided. Rough work can be done at the back of the sheet

Q. No.	Question (One Mark Each)	Answer
1.	Specific heat of air at constant pressure is always _____ Specific heat of air at constant volume	
2.	Water exists at 150°C at 476.16 kPa pressure. The enthalpy of the water vapour is 1500kJ/kg. What is the condition of the water? a) Saturated liquid b) Saturated vapour c) Sub cooled liquid d) Saturated mixture	
3.	The relation between pressure and volume in a polytropic process can be expresses as:A a) $PV = C$ b) $\frac{P}{V} = C$ c) $PV^n = C$ d) none of the above	
4.	The pressure and temperature for refrigerant 134a is 400kPa and 0°C . Determine the enthalpy.	
5.	The characteristic equation of gases $pV = mRT$ holds good for (a) water vapour (b) real gases (c) ideal gases (d) mixture of gases.	
6.	1-kg of water that is initially at 90°C with a quality of 10 percent occupies in piston-cylinder device. What is the saturation pressure in this state?	
7.	For the closed system write the relation for first law of thermodynamics	
8.	A tank contains water with its temperature less than the saturation temperature at a given pressure. The state of water will be-----	
9.	A tank contains water with its temperature equal to the saturation temperature at a given pressure. The state of water will be-----	
10.	The saturated steam tables always begin with (a) Triple point (b) Critical point (c) Supercritical point (d) Neither of the above	

ID No	_____	Section _____	Signature of Invigilator
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Presidency University, Bengaluru
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II Semester 2015-2016

Quiz 1

Course: **ME A 104 Thermodynamics**
(Closed Book)

Max Marks: 10

Max Time: 30 Min

Weightage: 5 %

Date ^{21 April} ~~26 March~~ 2016

Set C

Instructions to Candidates

1. Write legibly with pen only and do not over write. Write ID No, Section No in the designated place
2. Answer the questions in the question paper itself, no extra answer book shall be provided. Rough work can be done at the back of the sheet

Q. No.	Question (One Mark Each)	Answer
1.	The locus of points joining saturated vapor states of a pure substance is known as (a) Saturated vapor line (b) Saturated liquid line(c) Critical point (d) Superheated line	
2.	State TRUE or FALSE Heat Transfer is a path function.	
3.	The heat transfer in a constant pressure regime involving work done should be calculated by----- (a) Change of Enthalpy (b) Change of Internal energy (c) Change of temperature (d) Neither of the above	
4.	If the temperature of a substance at a given pressure is greater than the saturation temperature at that pressure, then the substance is	
5.	The pressure and volume follow _____ relationship in expansion of a gas against spring	
6.	When a stationary mass of gas was compressed without friction at constant pressure its initial state of 0.4 m ³ and 105 kPa was found to change to final state of 0.20 m ³ and 105 kPa. Calculate work done during the process. (a) 21000 kJ (b) - 21000 kJ (c) 12000 kJ (d) - 12000 kJ	
7.	Fill in the blank by choosing the right table for the below condition: (a) if $T = T_{sat}$ @ given P we have _____ \	
8.	Determine the specific volume of 1.5 kg of water contained in a volume of 1.2 m ³ .	
9.	From steam tables corresponding to 18 bar pressure: $h_f = 884.6$ kJ/kg, $h_{fg} = 1910.3$ kJ/kg. If the dryness fraction (x) is 0.85, find the enthalpy of the saturated vapour.	
10.	Draw the Pv diagram for constant pressure process (without considering vapour dome)	