DepartmentofElectricalEngineering

Assignment

Date:20/04/2020

CourseDetails

CourseTitle: Thermodynamics

Module: 02

Instructor: SIR MUJTABA

Total 30

Marks:

StudentDetails

Name: MUHAMMAD IDREES KHAN StudentID: 16431

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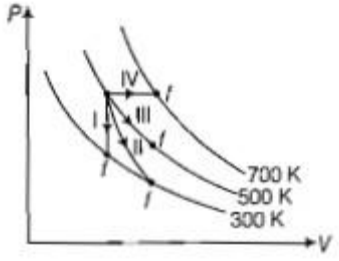
Q1.	(a)	Express the temperature of 139 Condegree Fahrenheit,Rankine and Kelvin scales.	Marks 06
			CLO1
	(b)	Derive the equation highlighting the work done by a gas or vapour in expanding for a constant temperature process.	Marks 05
			CLO1
Q2.		Analyze the given figure and match column1 with the correct option of column	Marks 08

		2.  Column1 | Column2 ProcessI | Adiabatic ProcessII | Isobaric ProcessIII | Isochoric ProcessIV | Isothermal	CLO1
Q3.	(a)	Hydrogen is compressed under a constant pressure of 5760 lb/ft^2 untilits volume is reduced from 28 to 12ft^3. Calculate the workdone in compressing the gas.	Marks 07 CLO1
	(b)	Differentiate between enthalpy and entropy using examples from daily life.	Marks 04 CLO1

NAME:MUHAMMAD IDREES KHAN

ID: 16431

SEMESTER: 2ND

DEPT. BEE

Q # 01 (9)

Ans.

Temperature in C° = 139°c

(a) $F = (1.8 \times C^\circ) + 32$

$F = (1.8 \times 139) + 32$

$F = (250.2) + 32$

$F = 282.2$

$\boxed{F = 282.2^\circ F}$

(b)

$R = F + 460$

$R = 282.2 + 460$

$\boxed{R = 742.2^\circ \text{ Rankine}}$

(c) $K = C^\circ + 273$

$K = 139 + 273$

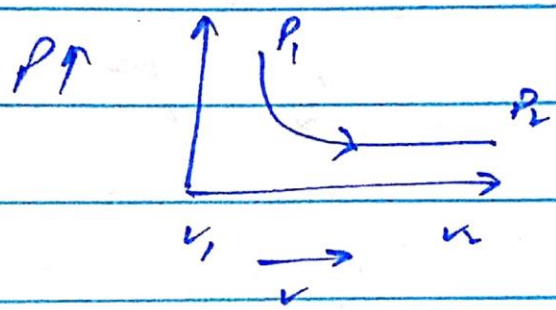
$\boxed{K = 412^\circ K}$

CP NO. 1 (Aus)

(b) Aus :-

Isothermal Process :-

In Isothermal process, the gas will expand doing external work equal to the amount of heat supplied.



$$PV = \text{Constant}$$

$$\boxed{Pv = c}$$

in Isothermal process, Temperature is constant.

Mathematically :-

$$W = \int_{V_1}^{V_2} P\,dv \rightarrow \quad (i)$$

As $P_1 v_1 = P_2 v_2 = Pv = c$

So

$$\boxed{P = c/v}$$

So Equation (1) becomes

$$W = \int_{v_1}^{v_2} \frac{c}{v}\, dv$$

$$W = \int_{v_1}^{v_2} \frac{1}{v}\, dv$$

$$= c \left| x \, |v| \right|_{v_1}^{v_2}$$

$$= c \left| \ln (v_2 - v_1) \right|$$

$$= c \left| \ln v_2 - \ln v_1 \right|$$

$$= c \ln \left| \frac{v_2}{v_1} \right|$$

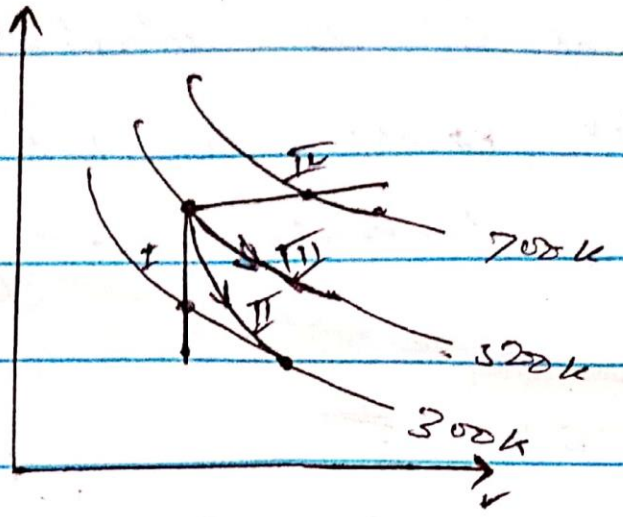
~~$W = P v$~~

$$W = Pv \ln \left(v_2 / v_1 \right)$$

Ans.

Q NO. 02

Ans:-



Solution:-

Process I=

Process I is Isochoric process. In This process, work done is ~~zero~~ zero because valume is constant.

Process II =

Process II is Isothermal process. In This process Temperature is constant, because The total work done is equal to amount of heat supplied.

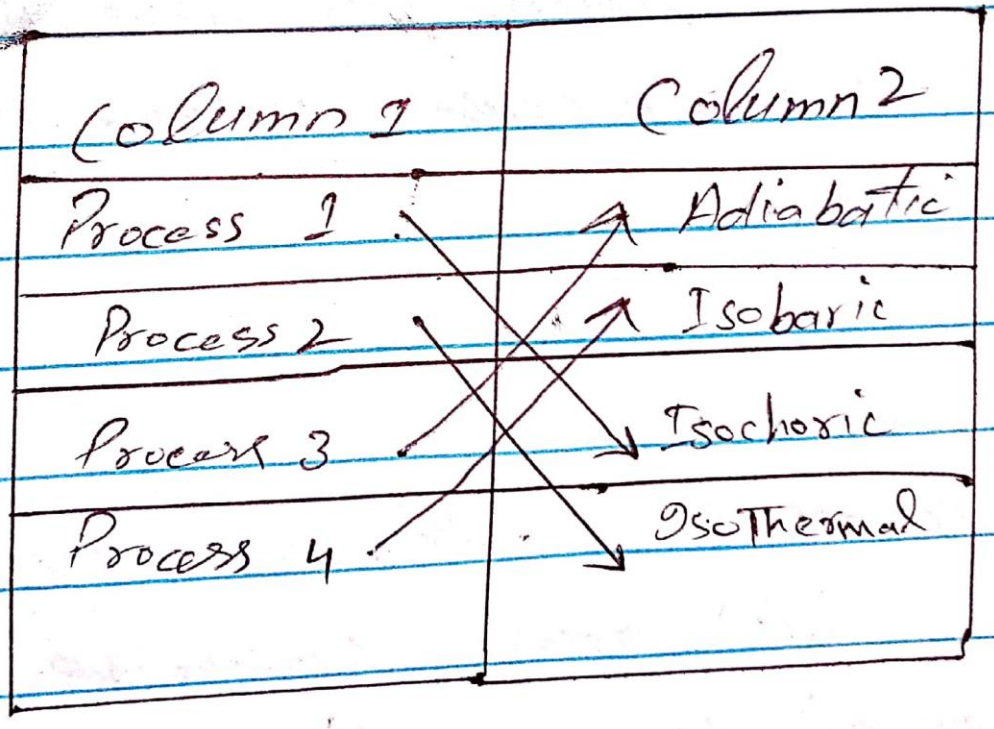
In This process ~~Press~~ pressure

Process III

Process III is adiabatic process. In this process. as pressure increases volume decrease inversily.

Process IV

Process IV is Isobaric process. In this process pressure is constant, and volume is increased.



Q NO. 3 (a)

Solution:

Data:

$$P = 5760 \text{ lb/ft}^3$$

$$V_2 = 28 \text{ ft}^3$$

$$V_1 = 12 \text{ ft}^3$$

As in constant pressure process.

$$\text{Work done} = P(V_2 - V_1)$$

$$\text{work done} = 5760 (28 - 12)$$

$$\boxed{\text{work done} = 92160 \text{ ft-lbf}}$$

Ans.

Q NO. 3 (b) Ans

(i) Enthalpy:-

Enthalpy is the equal to the total internal energy of the system plus the product of pressure and valume.

Mathematically:-

$$H = E + PV$$

The unit of enthalpy is (joul (J)).

Example:-

Refrigerator compressors and chemical hand warmers are both example of enthalpy from daily life.

Entropy:-

Entropy is the measure of system's thermal energy per unit temperature that is unavailable for doing useful work.

Mathematically:-

$$S = \frac{\Delta Q}{T}$$

The unit of entropy is Joul per kelvin (J/K).

Example :-

Campfire, Ice melting, salt or sugar dissolving, Popcorn making and boiling water are some examples of entropy from daily life.