Name Usama-Aziz
Id 16310
Section "B"
Paper BEME
Department Civil Engineering
Instructor Name Engr. Sir Sayed Ashraf Ali

Q.No1
P.No(a)

Ans: Diode:-

A diode is an electronic component that;
has two terminals,
limits current to one ~~dimension~~ direction.

→ Diodes have an anode and a cathode.

→ Positive current normally flows from the anode to the cathode.

→ Diodes are a basic building block of the charge-collecting element in many detectors.

Halls wave	
→ Halls wave rectifire is a low-ellsiciency rectifier.	Full wave rectifier is a high ellsiciency rectifier.
→ Halls wave rectifier does not require center tapping of the secondary winding of transformer	Full wave rectifier ~~requires~~ centre tapping of the secondary winding of the transformer.
→ Halls wave rectifier less electronic components as full wave rectifier.	Full wave rectifier ~~require~~ more electronic components.
→ Halls wave less costly then full wave.	Full wave rectifier is easily.
→ one diode conducts in each halls cycle of input.	Two diode conduct in each halls cycle input.

P.Uo(b)

Solution:

$$-\text{lose}_{heat} = \text{Gain}_{heat}$$

$$-[(C_{Au})(\text{mass})(\Delta T)] = (C_{H_2O})(\text{mass})(\Delta T)$$

$$-[(0.129\ J/g^\circ C)(97g)(T_f - 785^\circ C)] = (4.186J/g^\circ C)(323g)(T_f - 15^\circ C)]$$

$$-[(12.5)(T_f - 785C^\circ)] = (1.35\times10^3)(T_f - 15C^\circ)$$

$$-12.5T_f + 9.82\times10^3 = 1.35\times10^3 T_f - 2.02\times10^4$$

$$3\times10^4 = 1.36\times10^3 T_f$$

$$\boxed{T_f = 22.1C^\circ}\ \text{Ans}$$

Q.No 5

Solution:

Nothing that heat transfer through the rods is by conduction and the area of the rods is:

$$A = 6m\times8m = 48m$$

The steady rate of heat transfer through the rods is determined to be

$Q = kA(T-T)/L = (0.8)(48)(25-0)/0.25$

$= 3840 W$

$= 3.84 kW$

The amount of heat lost through the rods during a 10 hour period and its cost are determined from:

$Q = Q \cdot \Delta t = (3.84 kW)(10h)$

$Q = 38.4 kWh$

cost/day = (Amount of energy) – (unit cost of energy)

$= (38.4 kWh)(\$0.2 kWh)$

$= \$7.68$

cost/day = \$7.68

cost/month = (cost/day) x (30day/month)

$= \$7.68 \times 30$

cost/month = \$230.4

Scanned with CamScanner

Q No 4
P No (a)

Ans:

Conduction	Convection
→ Energy transfered by direct contact.	occurs in gases and liquids.
→ Energy flows directly from warmer to cooler objects.	Movement of large number of particles in same direction.
→ Continues untill object temperature are equal	Cycle occurs while temperature differences exist.

P.No(b)

Solution:

$Q_{water} = -Q_{pb}$

$m_{water} c_{water} \Delta T = -(m_{pb} c_{pb} \Delta T_{pb})$

$125(4.18)(T_f - 23) = -75(0.13)(T_f - 435)$

$522.5T_f - 12017.5 = -9.75T_f + 42412.5$

$+9.75T_f + 12017.5 = +9.75T_f + 12017.5$

$532.25T_f = 16258.75$

$T_f = 30.5°C$ Ans

Q No 2:

P.No(b)

Solution:

$$e = 1 - \frac{T_c}{T_H}$$

$$e = 1 - \frac{300K}{500K}$$

$e = 40\%$

Actual $e = 0.5e_c = 20\%$

$$e = \frac{W}{Q_H}$$

$W = eQ_H$

$= 0.20 (600J)$

Work = 120J

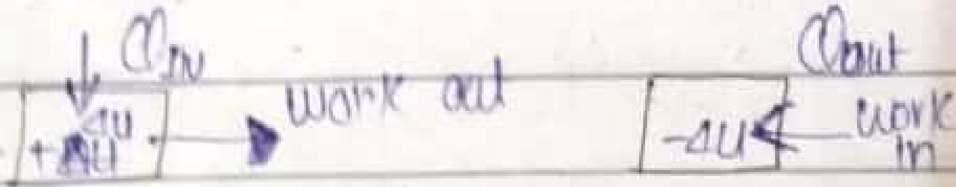
P.No(a)

Ans

ISOBARIC PROCESS

constant Pressure $\Delta P = 0$

$\Delta Q = \Delta U + \Delta W$ But $\Delta W = P\Delta V$



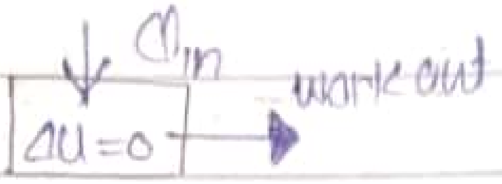
Heat In = Wout + Increase in internal energy.

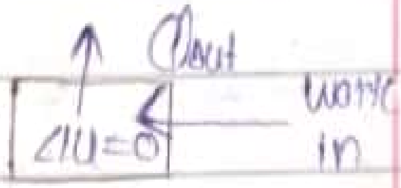
Heat Out = Wout + Decrease in internal Energy.

ISOTHERMAL PROCESS

Const Temperature, $\Delta T = 0$, $\Delta U = 0$

$\Delta Q = \Delta U + \Delta W$ And $\Delta Q = \Delta W$





Net heat input = Work out put

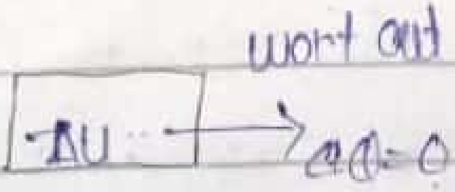
Work Input = Net heat out

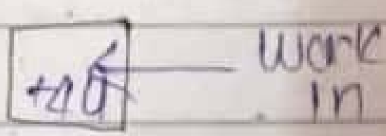
ADIABATIC PROCESS

No Heat Exchange, $\Delta Q = 0$

$\Delta Q = \Delta U + \Delta W$; $\Delta W = -\Delta U$ or $\Delta U = -\Delta W$

$\Delta W = -\Delta U$ $\Delta U = -\Delta W$



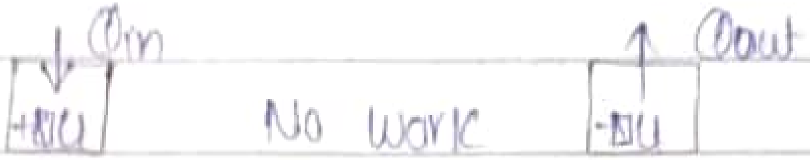


work done at EXPENSE of internal energy INPUT work INCREASES internal energy.

ISOCHORIC PROCESS

constant volume, $\Delta V = 0$ $\Delta W = 0$

$\Delta Q = \Delta U + \Delta W^{0}$ so that $\Delta Q = \Delta U$



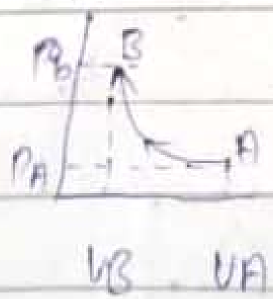
Heat in = Increase in internal energy

Heat out = Decrease in internal energy.

Q No 3

P.No (b)

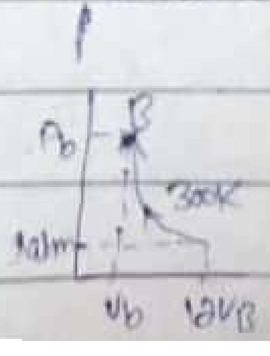
Solution:



$P_A V_A = P_B V_B$

$\frac{P_A V_A}{T_A} = \frac{P_B V_B}{T_B}$

Adiabatic (cont): Find P_b



$P_A V_A = P_b V_B$

solve for P_b:

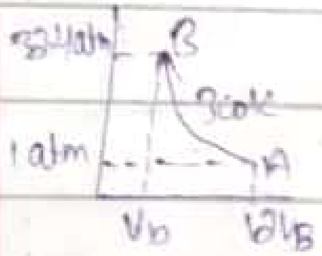
$P_b = P_A \left(\frac{V_A}{V_B}\right)^{\gamma}$

$$P_b = P_a \left(\frac{12V_b}{V_B}\right)^{1.4}$$

$$P_b = (1atm)(12)^{1.4}$$

$$\boxed{P_b = 32.4 atm \text{ or } 3284 KPa}$$

Adiabatic (Const.): Find T_b



$$\frac{P_A V_A}{T_A} = \frac{P_B V_B}{T_b}$$

Solve for T_b

$$\frac{(1 atm)(12V_B)}{(300K)} = \frac{(32.4 atm)(1V_B)}{T_b}$$

$$\boxed{T_B = 810 K}$$

Q.No3
P.No(a)
Ans: Internal combustion engine:-

The comarcially succesfull combustion engine was created by G-lenior in 1860. And then more madified in 1876 by N.otto.

External combustion engine:-

The external combuction engine is working as heat engine where a working as fluid or gas.

diffs b/w External and Internal engine:

The difference b/w external and internal combustion engine is quite Straight forward and made obvious by the difference

in their names. in external combustion engine the fuel is not burned inside the engine.
while in internal combustion engine the combustion chamber lies right in the middle the engine.
E.C.E working fluid that heated while I.C.E within the engine to produce work.