Name Afaq Ahmed
id 16669
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Final paper

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(Q No 1 a)

Diode:-
A Semiconductor device with two terminals, typically allowing the flow of Current in and direction only

Difference b/w half wave rectificitation and full wave rectificition

Full wave rectification recfifies the negative Component of the input voltage to a positive voltage, then converts in into DC (pulse current) utilzing a diode bidge cofi-gurction.

In contast, half-wave rectification removes just the negative voltage compound using a Single dode before converting to DC.

(Q No 1 b)

Sol #

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

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

$-[(0.129 J/g\,°C)(97g)(T_f - 785°C) = (4.184 J/g\,°C)(323g)(T_f - 15°C)]$

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

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

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

$T_f = 22.1°C$

(Q# 2 (a))

1 Isobaric Process:-

According to fist low of thomodynamics Isobaric is that Process in which pressure (P) is constant.

$\Delta P = 0$

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

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

2 Isochoric Process:-

That process which volume is constant.

$\Delta V = 0 \Rightarrow \Delta W = 0$

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

$\Rightarrow \Delta Q = \Delta U \quad (\Delta W = 0)$

3 Isothronal Process:-

That process in which Temperature is constant.

$\Delta T = 0 \Rightarrow \Delta U = 0$

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

$\Delta Q = \Delta W \quad (\Delta U = 0)$

4 Adiabatic Process:-

The process in Heat is constant is Known as adiabatic process.

$\Delta Q = 0$

No heat exchange owers.

~~ΔQ~~ $= \Delta U + \Delta W$

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

↓ (work in) ↓ (work out)

(Q # 2 b)

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

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

$$\boxed{e = 40\%}$$

Actual $e = 0.5 e_i = 20\%$

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

$W = eQ_H = 0.20 (600J)$

Work = 120J

Ans

(Q No 3 a)

Differences between Internal Combustion Engines and External Combustion Engines:-

External combustion engines have a working fluid that is heated by the fuel. Internal combustion engine rely on the explosive power of the fuel with the engine to produce work.

In internal combustion engines, the explosion forcefully pushes pistone or expels hot high presure gas out of the engine at great speeds. Both moving pistons and ejected high speed gas have the ability to do work. In external combustion engines, combustion heats a fluid which, in turn, does all the work.

(Q No 3 b)

Pressore $P_A = 1$ atm

Tempauture $= T_A = 300K$

Solution:-

The process is adiabatic, So

$$\Delta Q = 0$$

$$P_A V_A^{r} = P_B V_B^{2}$$

and

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

For P_B:-

$$\text{As } P_A V_A^{v} = P_B V_B^{2}$$

$$P_B = \frac{P_A V_A}{V_B^{2}}$$

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

$$P_B = (1\ atm)\left(\frac{12 V_B}{V_B}\right)^{1.4}$$

$$P_B = (1\ atm)(12)^{1.4}$$

$$P_B = 32.4\ atm \text{ or } 32.84\ K.Pa$$

For T_B:-

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

$$T_B (P_A V_A) = (P_B V_B)(T_A)$$

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

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

$$T_B = 810\ K$$

(Q# 4 a)

Conduction	Convection
1 ⇒ The transfer of energy from higher-conduction to lower-conduction are as a result of interaction between the Particles.	⇒ The transfer of energy from are place to another place by the momemment of large no of particles in the same direction.
⇒ Takees place in Solid.	⇒ Take place in liquids & gares.
⇒ for example the heating of handle of the cattle and spoon etc.	⇒ Throug ventilation the hot air goes out-side of the room.

Scanned with CamScanner

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⇒ Force conuction-

⇒ Natural conuction-

(Q No 4 b)

$$Q_{water} = Q_{Pb}$$

$$M_{water} C_{water} \Delta T_{water} = -(m_{Pb} C_{Pb} \Delta T_{Pb})$$

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

$$522.5T_f - 12017.5 = -9.75T_f + 4241.25$$
$$+9.75T_f + 12017.5 + 9.75T_f + 12017.5$$

$$532.25T_f = 16258.75$$

$$T_f = 30.5^{\circ}C$$

(Q No 5)

Given -

Area of the roof = A = 6m × 8m = $48 m^2$

Thermal conductivity = K = 0.8 N/m°C

outer Temperature = T_2 = 0°C

Thickness of roof = 0.25m

1 Heat lost in 1hr = ?
2 Cost of that heat loss = ?

Solution :-

As we know that

$$Q = \frac{KA(T_1 - T_2)}{l}$$

$$Q = \frac{(0.8)(48)(25-0)}{0.25}$$

$Q = 3840\ W$

or $Q = 3.84\ KW$

1 ⇒ Heat lost that night in 10h is

$Q = Q \times \Delta t$

$Q = 3.84\ KW \times 10h$

$Q = 38.4\ KWh$

Cost / day

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

$= (38.4\ KWh)(\$0.2/KWh)$

$= \$7.68$

Cost / Mouth =

Cost month = (Cost / day) (30day / month)

$= (\$7.68)(30)$

$= \$230.4$