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Q # 01 **Diode:-**

Diode is an electronic component that.

(1) has two terminals

(2) limit current to one direction.

* Diodes have an anode and a cathode.
* possitive current normally from the anode to the cathode
* Diode are usefull for protecting circuitry from harmfull voltage or current.

	Half wave rect	Full wave rect
(1)	Half wave rectifier current only during positive half cycle of the applied input. Therefore it show unidirectional characteristic	Full wave rectifier both the halves of the input signal is utilized at the same time of operation. Therefore it show bidirectional characteristic.

(2)	out put frequency (fundamental ripple) Frequency of half-wave rectifier is equal to be frequency of input i.e 50 Hz	Full wave rectifier out put frequency (fundamental ripple frequency) is twice that of the applied input i.e. 100 Hz
(3)	Half wave rectifier has less ripple factor when compared to full wave rectifier For half wave rectifier it is about 1.21.	Full wave rectifier has more ripple factor when compared to half wave rectifier For full wave rectifier it is about 0.482
(4)	Half wave rectifier circuit required only one diode	Full wave rectifier circuit two or even 4 diodes are used in the circuit.
(5)	Half wave rectifier has an efficiency of 40.6%	Efficiency of full wave rectifier is 81.2%.

(b) **Sol:-**

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

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

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

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

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

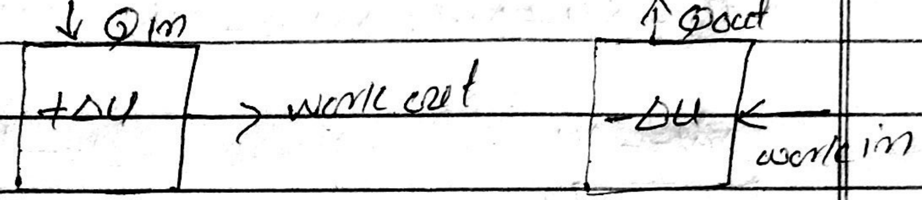
$$3\times10^4 = 1.36\times10^3\,T_f$$

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

Q2 (A) ISOBARIC PROCESS:

Constt pressure, $\Delta P = 0$

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



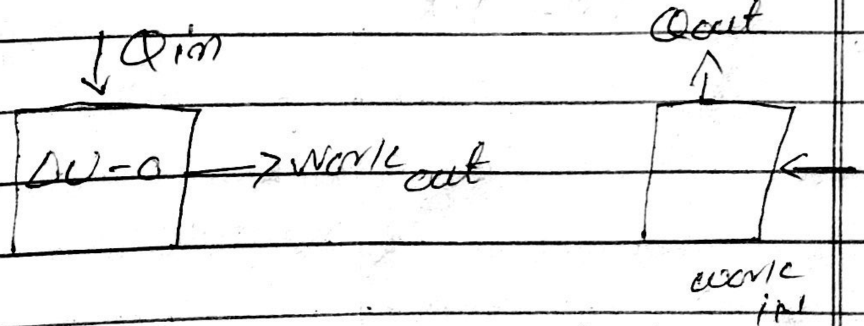
Heat in = Wout + increase in Internal energy

Heat out = Wout + Decrease in Internal Energy.

ISO thermal process:

Constt. Temperature, $\Delta T = 0$, $\Delta U = 0$

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



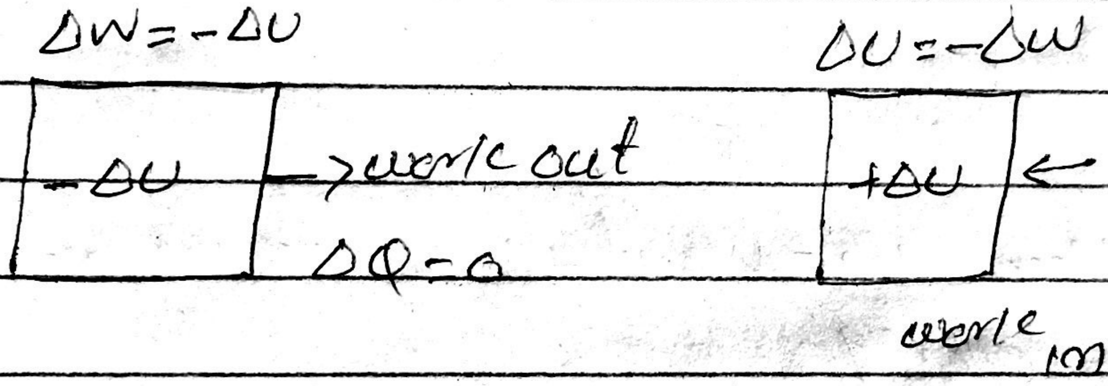
Net Heat input - Work output

Work input - Net Heat out.

ADIABATIC process:

No Heat Exchange, $\Delta Q = 0$

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



Isometric process:

In this system there is no change in the volume i.e volume is constant.

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

$$\Delta Q = \Delta U$$

(13) **Sol:** **pb:**

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

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

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

Actual $e = 0.5 e_i = 20\%$

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

$$W = eQ_H = 0.20\,(600\,J)$$

$$\boxed{\text{Work} = 120\,J}$$

Result:

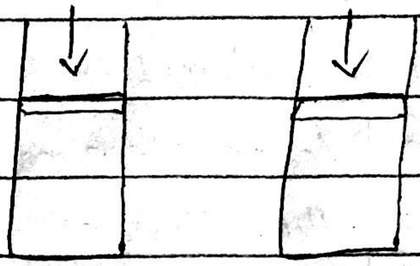
$$\boxed{e = 40\%}$$

$$\boxed{\text{Work} = 120\,J}$$

Q # 03

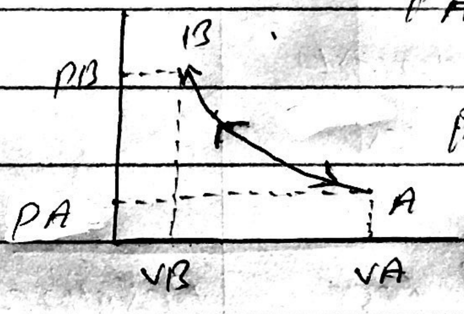
	I.C. Engine	E.C. Engine
(1)	Combustion of fuel takes place inside the cylinder	Combustion of fuel take place outside the cylinder.
(2)	Working fluid may be petrol, Diesel & various types of gases	Working fluid is steam
(3)	Required less space	Required large space.
(4)	capital cost is relatively low	capital cost is relatively high
(5)	starting the engine is easy & quick	starting of this engine required time
(6)	Thermal efficiency is high	Thermal efficiency is low.
(7)	fuel cost is relative high	fuel cost is relatively low.

(13) **Sol:**



$\Delta Q = 0$

Find

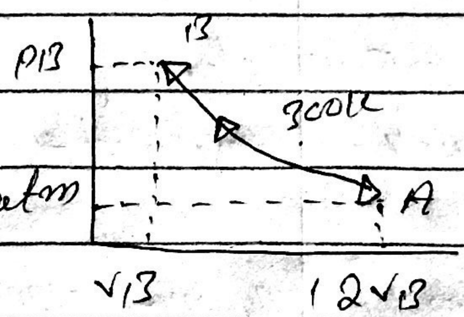


$P_A V_A^{\gamma} = P_B V_B^{\gamma}$

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

Solve for PB

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



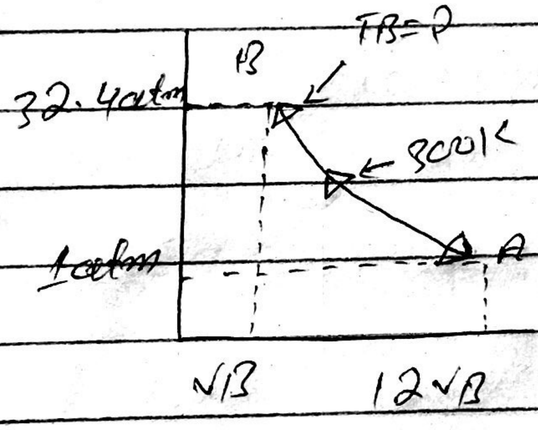
$P_A V_A^{\gamma} = P_B V_B^{\gamma}$

Solve for

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

$P_B = 32.4\,atm$
or 3284 kPa.

Adiabatic Find T_B



$\Delta Q = 0$

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

Solve for T_B

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

$$(T_B = 810K)$$

Q # 04 (A)

	Conduction	Convection
(1)	Conduction is a process in which transfer of heat take place btw object by direct Contact.	Convection refer to the form of heat transfer in which energy transition with occour within the fluid.
(2)	How heat travels btw objects in direct contact	How heat passes through fluids
(3)	Due to temperature difference	Due to density difference.
(4)	use heated solid substance	uses Intermediate substances.
(5)	slow speed	Slow speed.
(6)	law of reflection and refraction.	Does not follow

(13) Sol:

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

$$m_{water}\, C_{water}\, \Delta T_{water} = -(m_{pb}\, C_{pb}\, \Delta T_{pb})$$

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

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

$$+\,9.75T_f + 12017.5 \quad +9.75T_f + 12017.5$$

$$532.25T_f = 16258.75$$

$$\boxed{T_f = 30.5\,°C}$$

Q5 Sol:-

Nolting That Heat transfer Through the roof is determined by the condueling and the area of the roof is

$A = 6m \times 8m = 48m^2$

The steady rate of heat transfer Through the roof is determine to be.

$Q = KA(T_1 - T_2)/L$

$= (0.8)(48)(25-0)/(0.25) = 73840$

$W = 3.84\,KW$

(b) The amount of heat lost Through the roof during a 10-hour period and it is Cost are determined from

$Q = Q.\Delta t = (3.84KW)(10h) = 38.4KWh$

Cost/day:- = (Amount of Energy)(unit cost of En)

$= (38.4KWh)(\$0.2/KWh) = \$7.68$

Cost/month:- = (Cost/day) × (30 day/month)

$= \$7.68 \times 30 = \$230.4$

$\$ = 230.4$