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FINAL PAPER

Question (1):

(a)

i) IDEAL GAS LAW:-

called the ideal gas law is also called the general gas equation is the equation of state of a hypothetical ideal gas. It is a good approximation of the behavior of many gases under many conditions, although it has several limitations.

The ideal gas law is often written in an empirical form:

MATHEMATICAL FORM:-

$$PV = nRT$$

where  $P$ ,  $V$  and  $T$  are the pressure, volume and temperature,  $n$  is the amount of substance and  $R$  is the ideal gas constant. It is the same ideal gas constant. It is the same for all gases. It can also be derived from the microscopic kinetic energy.

ii) Dalton's Law of Partial Pressure:-

Dalton's law of Partial pressures states that in a mixture of non-reacting gases, the total pressure exerted is equal to the sum of the partial pressures of the individual gases. Dalton's law is related to the ideal gas law.

Q3 Distinguish between water tube and fire tube boilers.

Answer

The boiler is divided into two main types. The main difference between fire tube and water tube is that in fire tube boiler the flue gases flow in the tube and water flows from the shell and in water tube boiler, water flows from the tubes and the flue gases from the shell or passes over the tube.

Q2(b)

## VAPOUR ABSORPTION REFRIGERATION:

### PRINCIPLE:

Here the heat energy is utilized to achieve the refrigeration. An electric heater or steam is used to add the heat to the refrigerant for the evaporation. Also an absorber, a pump and a generator are used to complete the cycle.

### CONSTRUCTION:-

Here a throttle valve is connected between an evaporator and a condenser. One pump is connected between an absorber and a separator. Water is filled in the absorber and it is connected to the evaporator. The evaporator is kept in the storage room.

The separator is connected to the condenser.

Both the condenser and evaporator consists of pipes in coil form to provide more contact surface area for the refrigerant. Arguments are made to circulate the cold water around the condenser and in the absorber. An electric heater is housed in the separator. Trays may be positioned to collect the exit water near by the absorber and condenser. A receiver is connected in between the condenser and the throttle valve.

## 4) STROKE

From top dead centre (T.D.C) to bottom dead centre (B.D.C) or from B.D.C to T.D.C

## FOUR-STROKE ENGINE

Four-stroke cycle engine works on four stroke principle i.e. there are four strokes in one cycle of such engine. Four stroke cycle engine is also called four cycle engine or Otto-cycle engine.

The four strokes of Otto-cycle engine are:

- 1) Intake stroke
- 2) Compression stroke
- 3) Power stroke.
- 4) Exhaust stroke.

### 1) INTAKE STROKE

On the intake stroke the piston is moving down <sup>due to which a partial vacuum is produced</sup> inside the cylinder. The intake valve is open. Therefore atmospheric pressure pushes the fresh air fuel mixture in the cylinder through the intake valve.

### 2) COMPRESSION STROKE

When the piston reaches the B.D.C on the intake stroke, the intake valve closes. Then the piston moves up on the compression stroke. During this the valves are closed therefore no air-fuel mixture

Q (s) Outline the difference between a petrol engine and a diesel engine.

Answer:-

Petrol and diesel engines operate using the same principle, but the difference lies in the spark plug. Diesel engines don't have any. The main differences between diesel and petrol engines is that petrol engine use spark plugs to ignite the air-fuel mixture, while diesel engine rely solely on heavily compressed air.

1) CONSISTENCY:-

Crude oil can be used to make different fuels, depending on its consistency and is categorised into lighter and heavier components. The lighter portion is used to make petrol which is why it has a lighter consistency. Diesel is made using the thicker portion, therefore has a denser and oily consistency.

2) TEMPERATURE DIFFERENCES:-

Petrol is removed from crude oil at a temperature of  $40^{\circ}\text{C}$  to  $208^{\circ}$  whereas Diesel is produced by conducting a distillation process on crude oil between  $200^{\circ}\text{C}$  ( $392^{\circ}\text{F}$ ) and  $380^{\circ}\text{C}$  ( $662^{\circ}\text{F}$ ) at atmospheric pressure.

Q2) You need a buy a refrigerator for your home. outline the key factors that you will consider while buying the refrigerator.

### ANSWER

When we buy the refrigerator so there is the following factor that you will consider while buying the refrigerator.

- 1) Look for the ENERGY STAR.
- 2) Consider a Refrigerator with a Top-Mounted Freezer.
- 3) Purchase an appropriately sized Refrigerator.
- 4) Consider the features that are most important to you....
- 5) Recycle your old Refrigerator.
- 6) Take advantages of utility rebates.

Q2 CARNOT CYCLE:

The Carnot cycle is a theoretical ideal thermodynamic cycle proposed by French physicist Sadi Carnot in 1824 and expanded upon by others in 1830s and 1840s. It provides an upper limit on the efficiency that any classical thermodynamic engine can achieve during the conversion of heat into work, or conversely the efficiency of a refrigeration system in creating a temperature difference by the application of work to the system. It is not an actual thermodynamic cycle but is a theoretical construct.



## The Carnot Cycle:

is a Carnot cycle operates,

1) The gas is isothermally compressed at  $T_c$ . Heat energy  $Q_c$  is removed.

2) The gas is adiabatically compressed with  $Q = 0$ , until the gas temperature reaches  $T_c$ .

3) After reaching maximum compression, the gas expands isothermally at temperature  $T_h$ . Heat  $Q_h = Q_{12}$  is transferred into the gas.

4) The gas expands adiabatically with  $Q = 0$ , until the temperature decreases back to  $T_c$ .

Work is done in all four processes of the Carnot cycle, but heat is transferred only during the two isothermal.

5) (a) Q2) You need a buy a refrigerator for your home. outline the key factors that you will consider while buying the refrigerator.

Answer

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- 3) Purchase an appropriately sized Refrigerator.
- 4) Consider the Features that are Most Important to You....
- 5) Recycle your old Refrigerator.
- 6) Take advantages of utility Rebates.

Q (5) Outline the difference between a petrol engine and a diesel engine.

Answer ::

Petrol and diesel engines operate using the same principle, but the difference lies in the spark plug. Diesel engines don't have any. The main differences between diesel and petrol engines is that petrol engine use spark plugs to ignite the air-fuel mixture, while diesel engine rely solely on heavily compressed air.

1) Consistency :-

Crude oil can be used to make different fuels depending on its consistency and is categorised into lighter and heavier components. The lighter portion is used to make petrol which is why it has a lighter consistency. Diesel is made using the thicker portion, therefore has a denser and oily consistency.

2) Temperature Differences :-

Crude oil at a temperature of  $40^{\circ}\text{C}$  to  $205^{\circ}\text{C}$  whereas Diesel is produced by conducting a distillation process on crude oil between  $200^{\circ}\text{C}$  ( $392^{\circ}\text{F}$ ) and  $350^{\circ}\text{C}$  ( $662^{\circ}\text{F}$ ) at atmospheric pressure.

## 4) STROKE

From top dead centre (T.D.C) to bottom dead centre (B.D.C) or from bottom dead centre (B.D.C) to top dead centre (T.D.C)

## FOUR-STROKE ENGINE

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### 2) COMPRESSION STROKE

When the piston reaches the B.D.C on the intake stroke, the intake valve closes. Then the piston moves up on the compression stroke. During this the valves are closed therefore no air-fuel mixture

mixture can enter or goes out of the cylinder  
Therefore the piston moves on

### POWER STROKE:

Power stroke is the name used by a family of diesel engines & trucks produced by Ford Motor Company and Navistar International for Ford products since 1994. Along with it use in the Ford-Series, applications include the Ford E-Series, Ford Excursions, and Ford L-Series commercial.

### Exhaust Stroke :-

The movement of an engine piston (as of a 4-stroke-cycle engine) that forces the used gas or vapor out through the exhaust ports.