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THERMODYNAMICS

Electrical Dep.

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pulls an air-fuel mixture into the cylinder by producing vacuum pressure into the cylinder through its downward motion.

2 Compression: -

This stroke begins at B.D.C or just at the end of the suction stroke. In this stroke the piston compresses the air-fuel mixture in preparation for ignition during the power stroke.

3 Combustion: →

Also known as power or ignition. This is the start of the second revolution of four stroke cycle. At this point the crankshaft has completed a full 360 degree revolution. This stroke produces mechanical work from engine to the turn crankshaft.

4 Exhaust: →

Also known as outlet. During the exhaust stroke the piston, once again, return from B.D.C to T.D.C, while the exhaust valve open, this action expels the spent air-fuel mixture through the exhaust valve.

- ⑤ high latent heat of vapourisation.
- ⑥ ~~low~~ high thermal conductivity.
- ⑦ high critical pressure.

(b)

Explain vapour absorption refrigeration system:

The vapour absorption refrigeration system comprises of all the processes in the vapour compression refrigeration system, like compression, condensation, expansion and evaporation. The refrigerant produces cooling effect in the evaporator and releases the heat to the atmosphere via the condenser.

The major difference between the two systems is the method of the suction and compression of the refrigerant in the refrigeration cycle. In the vapour compressor sucks

Q5(B).

The motorcycles and rickshaws due to being equipped with two-stroke engines are the most inefficient vehicle in complete burning of fuel and thus contribute most to emission of air pollutant in the environment.

The major pollutant from two stroke engines are carbon Monoxide (CO), Nitrogen oxide (NOx), HydroCarbon (HC) and respiratory diseases and other illness.

Due to this reason government of Pakistan / different provinces decided to ban st two stroke rickshaw to assembled rickshaws meet standard fixed by Pakistan Standard Quality Control Authority for smoke emission.

(15)

Difference between Petrol Engine and diesel engine.

The primary difference between petrol engine and diesel engine is that petrol engine work on otto cycle whereas diesel engine work on diesel cycle. The main parameter they are classified on the type of fuel.

Petrol Engine :->

- * Petrol engine are internal combustion engine which have spark-ignition. They run on relatively volatile fuels such as petrol.
- * In these engines, air and fuel are generally mixed post compression.
- * Petrol engines are work on the otto cycle.
- * In Petrol engines, air and petrol are mixed in carburettor before being introduced to cylinder.
- * One petrol and air are mixed, the fuel ignited via an electric spark.

Sucks the refrigerant from evaporator and compresses it to the high pressure. The compressor also enables the flow of refrigerant through the whole refrigeration cycle. In the vapour absorption cycle, the process of suction and compression are carried out by two different devices, the absorber and the generator.

Thus the absorber and the generator replaces the compressor in the vapour absorption cycle. The absorbent enables the flow of the refrigerant from the absorber to the generator by absorbing it.

Q1

1 THE IDEAL GAS LAW :-

The product of the pressure and the volume of one gram molecule of an ideal gas is equal to the product of the absolute temperature of the gas and the universal constant.

The ideal gas law also called general gas equation.

Mathematically: \rightarrow

$$P\bar{V} = RT$$

$$\bar{R} = MR$$

$$M = m/n$$

$$PV = MRT$$

$$P\bar{V} = \frac{m}{n} RT$$

\bar{V} - Volume per mole (molar volume) m^3/mol

m - Molecular weight $Kg/K.mol$.

$$P\bar{V}n = MRT$$

$$PV = mRT$$

2 - Isentropic expansion :-
(happen in turbine)

3 - Isothermal heat rejection :-
(happen in condenser)

4 - Isentropic Compression :-
(happen in a compressor)

Q2

(a)

Outline the key factors that you will consider while buying the refrigerator.

Key factors are :-

- ① low viscosity
- ② low freezing point
- ③ low boiling point
- ④ low heat capacity
- ⑤ low space volume
- ⑥ low saturation pressure

Q3

Distinguish between water tube and fire tube boiler.

Water tube :-

- * In water tube boiler water passes through tubes and the hot flue gases surround them.
- * The working pressure is high enough, up to 250 bar in super critical boilers.
- * The rate of steam generation and quality of steam are better and suitable for power generation.
- * Load fluctuation can be easily handled.
- * It requires less floor area for given output.
- * These are light in weight.
- * Direction of water circulation is well defined.

Q 4 (a) stroke.

A phase of the engine (e.g. compression stroke, exhaust stroke) during which the piston travels from top to bottom or vice versa. The type of power cycle used by a piston engine (two stroke, 4 stroke).

Describe the working of the working of four-stroke engine.

A four stroke engine is an internal combustion (IC) engine in which the piston completes four separate strokes while turning the crankshaft.

The four separate strokes are termed

1. Intake :-

This stroke of the piston begins at top dead center and ends at bottom dead center. In this stroke the intake valve must be in the open position while the piston

carburettor
to

Fire tube boiler: -

- * In fire tube boiler hot flue gases pass through tubes and water surrounds them.
- * These are operated at low pressure up to 20 bar.
- * Load fluctuation cannot be handled.
- * It requires more floor area for given output.
- * These are bulky and difficult to transport.
- * Overall efficiency is 75%.

ii Dalton's law of Partial Pressure:-

which state that the total pressure exerted by a mixture of gases is equal to the sum of partial pressures exerted by each individual gas in the mixture!

Mathematically:-

$$P_{\text{total}} = \sum_{i=1}^n P_i \quad \text{or}$$

$$P_{\text{total}} = P_1 + P_2 + P_3 + \dots + P_n$$

$$P_i = P_{\text{total}} \chi_i$$

B Explain the Carnot cycle:→

An ideal reversible closed thermodynamic cycle in which the working substance goes through the four successive operation of isothermal expansion to a desired point, adiabatic expansion to desired point, isothermal compression and adiabatic compression back to its initial state four processes.

Isothermal heat addition
(Happen in a boiler)

Diesel Engine :->

* The diesel engine is also an internal combustion engine which is also known as the compression-ignition engine.

* In these engines, the fuel is injected into a combustion chamber and is then ignited by the high temperature of the air in the chamber.

The high temperature of the air in the cylinder is due to the adiabatic compression. These engines only compress the air and not the fuel.

* The engine works on the diesel cycle, which consists of a constant pressure process, a constant volume process, and two isentropic processes.