

Welcome Sir!

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Semester 2nd

Subject Thermodynamic

Dept: BEElectrical

Exam: Final Assignment

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(1)

Q State the following along with their mathematical expression.

① The ideal Gas law.

② Dalton's law of partial pressures.

Ans 1: The ideal Gas law

Mathematically expression for ideal gas law.

$$PV = nRT$$

• This equation hold for ideal gases.

• "R" is the ideal gas constant

• Temperature must be in kelvin.

• This law allows us to solve for any of the variables affecting a gas.

$$PV = nRT$$

P = pressure

V = volume

T = temperature

(2)

$n =$ number of moles
 $R =$ gas constant

($R = 0.0821$ if $P = \text{atm}$, $V = \text{L}$ and $T = \text{K}$)

($R = 8.314$ if $P = \text{Pa}$, $V = \text{m}^3$, and $T = \text{K}$)

(ii)

Ans: Dalton law of partial pressure.

States that the total pressure of a mixture of gases is the sum of the partial pressure of its components.

- This partial pressure of a gas in a mixture is the pressure that the gas would exert if alone.

\therefore Mathematically expression:

$$P_T = P_1 + P_2 + P_3 + \dots + P_n$$

$P_1 =$ partial pressure by gas 1.

(3)

Q(1) (b) Explain the Carnot Cycle:

Ans: Carnot Cycle:

The Carnot Cycle, is a thermodynamic process, that describes how a fluid is used to convert the thermal energy into work,

* Nicolas Leonard Sadi Carnot.

* it is related to the theory of heat engines.

• When a system goes through different energetic state and returns to its original state, a thermodynamic cycle has occurred,

• While cycle occurs, work can be done

• There must be an absolute low temperature.

(4)

Q No (2) (a) You need to buy
a refrigerator for
your home.

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

Ans: Buy a new refrigerator
is a big decision.

Not only is the refrigerator a
center piece among your
collection of kitchen appliance,
it's a gathering place for preparing
family meals.

① Look for the energy star:

Energy Star is the simple

choice for saving energy. Saving
money and helping to protect
the climate. After heating,
cooling, and hot water.

The refrigerator is probably
the next largest energy user
in your home.

(5)

Consider a Refrigerator with a Top-mounted Freezer.

Refrigerators are sold in many configurations including Top freezer, bottom freezer, and side-by-side. Your new refrigerator doesn't have to be the same configuration you had before, so long as you account for proper sizing.

(iii) Recycle your old Refrigerator. Recycling old refrigerator is another important way to help prevent global warming. Not only does it prevent energy-wasting units from ending up in someone.

(6)

Take Advantage of utility

Rebates:

Be sure to visit the Energy Star rebate finder to check

for special offers from your

local utility on purchasing

a new refrigerator and for

recycling an old one.

Q2) (b) Explain vapour absorption

Refrigerator System:

Ans: The vapour absorption refrigerator system comprises

of all the process in the

vapour compression refrigerator

system like. Compression,

Condensation, expansion and evaporation, in the

Vapour absorption system the refrigerator used is ammonia water of lithium bromide.

∴ Simple Absorption System and how it works.

(1) Consider: just like in the traditional condenser of the vapour compression cycle. The refrigerator enters the condenser at high pressure and temperature and gets condensed.

(ii) ∴ Expansion valve or restriction

When the refrigerator passes through the expansion valve, its pressure and temperature reduces suddenly.

This refrigerator (ammonia)

in this cases) then enter

the evaporator or evaporators.

(iii) Evaporator: the refrigerator at very low pressure enters the evaporator and produces the cooling effects. In the vapour compression cycle this refrigerant is sucked by the compressor. but in the vapour absorption cycle. This refrigerant flows to the absorber that acts as the suction of the the refrigerator cycle.

(4) Absorber: the absorber is a sort of vessel consisting of water that acts as the absorbent, and the previous absorber refrigerant.

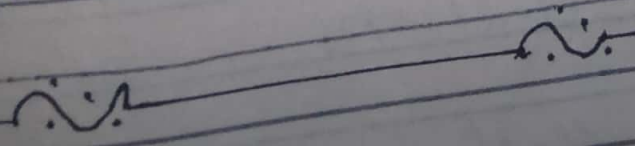
pump: when the absorbent absorbs the refrigerant

Strong solution of refrigerant absorbent (ammonia - water) is formed. This solution is pumped by the pump.

(b) Generator: the ammonia solution in the generator is heated

by the external source of heat. This can be steam, hot water or any

other suitable source. Due to heating the temperature of the solution increases.



Q3: Distinguish b/w water tube
of fire tube boilers.

Ans: water tube boiler ::

- (i) In water-tube boilers water passes through tubes and hot flue gases surround them.
- (ii) The working pressure is high enough up to 250 bar in super critical boilers.
- (iii) The rate of steam generation and quality of steam are better and suitable for power generation.
- (iv) Load fluctuations can be easily handled.
- (v) It requires less floor area.

output.

Fire tube boiler:-

- (i) In fire-tube boilers hot flue gases pass through tubes and water surround them
- (ii) These are operated at low pressure up to 20 bar
- (iii) The rate of steam generation and quality of steam are very low. Therefore, they are not suitable for power generation.
- (iv) Load fluctuation cannot be handled.
- (v) It requires more floor area for a given output.
- (vi) They are bulky and difficult to transport.

Q4

State the meaning of the word

"Stroke": & describe the working of a 4 stroke engine.

Ans: STROKE: Stroke is the movement of the piston from top dead center

(T, D, S) to bottom dead center (B, D, I) or from (B, D, C) to (T, D, C).

CYCLE: It is a series of events that repeat themselves.

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

(i) Intake Stroke:

(ii) Compression Stroke:

(iii) Power Stroke:

(iv) Exhaust Stroke:

(1) Intake Stroke: In the intake stroke is moving

down due to which the partial vacuum is produced inside the cylinder intake valve is open. There fore atmospheric

more pressure pushes the fresh

one full mixture in the cylinder

through the intake valve.

Compression Stroke: when the piston rises the B.D.C. on the intake

stroke valve close the piston moves up on the compression

stroke. During this stroke

both valve are closed

There gas on air fuel mixture

can enter & goes out of

the cylinder. There gas when

the piston moves up the

inside the cylinder is compressed.

it is compressed the one-eighth

or one-ninth volume. amount

to which the air fuel mixture

is called "compression ratio"

if the mixture is compressed

ratio to one-eighth

of the volume, the compression ratio is "8" to "1" (8:1)

(ii) power stroke: During the compression stroke the piston moves up which it gets near T.D.C. The spark plug produces a spark which ignites the compressed air-fuel mixture. Due to which the temperature and the pressure of gas rises. The pressure become about 600 Psi which push the piston down. As during the stroke, we obtain power there fore it is called power stroke

The piston transmit this power through the connecting rod to the crank due to which the crank shaft.

This rotary motion is carried through the shaft and gears to the car wheel due to which wheel turns and car moves.

(iv) Exhaust Stroke: During the power stroke is the piston reaches (B, D, C). The exhaust valve opens. Then the piston moves to the exhaust stroke when the piston moves up!

pushes out the burnt gases from the cylinder through the exhaust valve. When the piston reaches I, D, C, the exhaust valve closes intake valve open for the second cycle.

Q No 5: (A) Outline the difference b/w petrol engine and a diesel engine.

Ans: petrol engine :: A petrol engine is an internal combustion engine with spark ignition, designed to run on petrol (gasoline) and similar volatile fuels.

Intake Stroke:

(i) Intake valve open.

ii piston move down $\frac{1}{2}$ turn

of Crankshaft.

iii A vacuum is created in the cylinder.

iv Atmospheric pressure pushes the air/fuel mixture into the cylinder.

Compression Stroke:

i valves close.

ii piston move up $\frac{1}{2}$ Turn of Crank Shaft.

iii Air/fuel mixture is compressed

iv Fuel start to vaporize and heat begins to build.

Power Stroke:

i valves remain closed.

ii Spark plug fires igniting fuel mixture.

iii piston move down $\frac{1}{2}$ turns of Crank Shaft.

iv Heat is converted to
mechanical energy.

Exhaust Stroke.

Exhaust valves opens.

piston move up (crankshaft
make $1/2$ turn

Exhaust gases are pushed
out polluting the atmosphere.

Diesel Engine

→ The diesel engine (also known
as Compression-Ignition engine)
is an internal combustion
engine.)

In which Ignition of the
fuel that has been injected

into the combustion chamber by injector.

Intake Stroke:

- i piston move from T.D.C to B.D.C creating vacuum in the cylinder.
- ii Intake valve open allowing only air to enter the cylinder and the exhaust valve remains closed.
- iii valve remains closed.

Compression Stroke:

- iv Both valves stay closed piston move from B.D.C to T.D.C compressing air to 22:1

Compressing the air this exhaust ~~me~~ increases the temperature inside the cylinder to above 1000 degree F.

PowerStroke:

- (i) Both values stay closed
- ii When the piston is the end of Compression Stroke (TDC)
- iii The injector sprays a mist of diesel fuel into the cylinder.
- iv When hot air mixes with diesel fuel an expansion takes place in the cylinder.
- v Expanding gases push the piston from TDC to BDC.

Exhaust Stroke:

(i) Piston moves from BDC to TDC.

(ii) Exhaust valve opens and the exhaust gases escape

(iii) Intake valve remains closed.



Q5 (b) Several provincial governments in Pakistan have banned the use of 2 stroke engine in auto rickshaws. Identify the causes behind this decision.

Ans:- The problem of banning two-stroke auto-rickshaws in Pakistan is discussed in the different context here, such as impact on the socio-economical status of rickshaw drivers, factory workers engaged in rickshaw manufacture, rickshaw user, etc.

and the qualification of the benefits and cost, as well

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as it Socio-economic implications.
The primary data were collected
through questionnaires developed
for the Punjab Pakistans.

The motor cycle and rickshaws
due to being equipped with
2 stroke engines are the

most inefficient vehicles
in complete burning of fuel
and thus contribute most
to emission of air pollution

in the environment. The major
pollutants from two stroke engine
are Carbon Monoxide (CO)

Nitrogen (NO_x) Hydrocarbon
(HC) and particulate matter
(PM).

ii Identify Causes behind the
decision.

(1) Firstly a commercially available
lighter-weight - rickshaw
in a low pollution

(24)

four-stroke engine replacing
the traditional two-stroke engine

- Based on a positive result from a wide-scale city trial. full commercialization of a simple hybrid system using a small gasoline engine and high-performance batteries.

• Hydrogen fuel cell powered

prototype rickshaws, that could be commercially viable if a adequate support infrastructure can be put in place.

- Significant improvements in the energy efficiency, and substantial reductions in greenhouse gas emissions and other pollutants

• Clean air in Pakistan cities.

• Thriving commercial relations

blw Pakistan and US companies

and cities.

∴ Responses towards justification of the ban.

In our computations there was almost a complete consensus of imposing the ban as all the parties accepted that the two-stroke engine rick-shaws, being source of injurious air pollutants to human and animal health, were contrary to the national goal. Total justification of the ban was the two-stroke-~~rick~~shaw technology is obsolete and have been banned all over the world.

(26)

Moreover These rick-shaw have lived their life. Being very old They are hegh noisy . and emit poisonouns pollutants .

Such as (Co) Carbon dioxide oxidies of nitrogens, Sulfur dioxide particulates, particulate such as pmi pm . 2-5 etc.

• (End)

Sorry Sir i have no Leptop , beacuse i have write into register.

Thankz your Sir.

Allah Hafiz!